Rational Software Development Platform

VisualAge Generator to EGL Migration Guide

Version 6 Release 011

SC31-6830-03

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Note

Before using this document, read the general information under "Notices" on page 433.

Third Edition (September 2006)

This edition applies to the following licensed programs:

- Rational Web Developer
- Rational Application Developer
- WebSphere Development Studio Client Advanced Edition for iSeries
- WebSphere Developer for zSeries

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Preface

This document is intended for those who want to migrate from VisualAge Generator 4.5 to the Enterprise Generation Language (EGL).

Who should read this book

This book is intended for programmers or system administrators who want to migrate code from VisualAge Generator 4.5 to the Enterprise Generation Language (EGL).

Related information

Related documents are provided in one or more of the following formats:

- Online book files (.pdf) on the product CD-ROM. Adobe Acrobat Reader is used to view the manuals online and to print desired pages.
- HTML files (.htm) on the product CD-ROM.

The most recent version of this book is available as an online book file (.pdf) on the following web site:

http://www.ibm.com/developerworks/rational/products/egl/egldoc.html

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Part 1. Migration overview

Chapter 1. Migration Overview

The Rational® Developer or WebSphere® Developer products with the Enterprise Generation Language (EGL) component are the successor products for VisualAge Generator. Migration of your VisualAge Generator (VAGen) source code is required to convert to EGL.

This migration guide provides information about planning your migration, using the migration tools to convert your source code, and additional steps needed to complete your migration after running the migration tools.

Terminology used in this book

EGL ships as a component of several products. This book uses the following terminology:

developer product
Any of the products that include EGL as a component. This includes the following products:

- Rational Web Developer
- Rational Application Developer
- WebSphere Development Studio Client Advanced Edition for iSeries™
- WebSphere Developer for zSeries

EGL development environment
The Workbench and other windows that you see after starting any of the products that include EGL as a component.

EGL COBOL generator
Any of the products or features that provide EGL COBOL generation support for iSeries, zSeries, or VSE. This includes the following products:

- WebSphere Development Studio Client Advanced Edition for iSeries
- EGL COBOL generation feature in WebSphere Developer for zSeries
- IBM Rational COBOL Generation Extension for zSeries
- VisualAge Generator EGL Plug-in for VSE

EGL build server
Any of the products or features that provide the EGL build server support for iSeries or zSeries. This includes the following products:

- WebSphere Development Studio Client Advanced Edition for iSeries
- WebSphere Studio Enterprise Developer Options for z/OS
- IBM Rational COBOL Runtime for zSeries
- For VSE, there is no build server. Instead, generated VSE COBOL programs use the same preparation process as VisualAge Generator.

EGL runtime server
Any of the products that provide EGL runtime support for iSeries or zSeries. This includes the following products:

- WebSphere Development Studio Client Advanced Edition for iSeries
- Enterprise Developer Server for z/OS
- IBM Rational COBOL Runtime for zSeries

- For VSE, there is no EGL runtime server product. Instead, VSE uses the VisualAge Generator Server for MVS, VSE, and VM with additional PTFs to bring this product to the support level that includes EGL capability.

What is new in EGL that requires migration?

EGL includes major changes from and enhancements to VisualAge® Generator, including the following:

- Changes to the VAGen language, including many enhancements such as new data types, multidimensional structure field arrays, dynamic arrays, the *case* statement, and improved web support.
- Changes to the user interface you use to develop your programs, including content assist, code templates to create a part, and a text editor for most part types.
- Changes to the generation and preparation process, including only Java™ generation rather than C++ and Java generation for distributed platforms and the use of an EGL build server instead of preparation JCL templates for COBOL generation.
- Changes to runtime, including the use of the EGL runtime server.
- Changes to library management, including your ability to choose your own source code repository to interface with EGL.

The differences between the VAGen language and EGL are extensive. In the past when you upgraded from one version of Cross System Product or VisualAge Generator to a new version, there were only minor changes to the language. The previous migration tools were able to migrate each part independently of any other parts. However, due to the differences between the two languages, the VisualAge Generator to EGL migration tool must migrate each part in the context of other referenced or associated parts to determine the following:

- The part type of the referenced part
- Information that must move to the referencing part due to the new EGL syntax
- The location of the referenced part within the workspace

Cross-part migration is the term used to describe this situation in which the migration of one part depends on other parts. Cross-part migration is required to produce the best possible conversion from the VAGen language to EGL. This in turn means that you need to carefully consider which groups of parts you migrate together.

Given the differences between VisualAge Generator and EGL and the need for cross-part migration, this migration is a major undertaking and needs to be carefully planned.

Planning your migration

You need to consider the following tasks when planning your migration project:

- Plan a pilot project for migration:
  - Select the developers and systems support personnel that will be involved in the pilot project.
  - Select a small subset of your source code to use in the pilot project. Use this small subset to verify your environmental setup and your library management procedures and tools.

  - Upgrade to VisualAge Generator 4.5 with FixPak 5. Contact IBM® Support to obtain the fix pack or check the VAGen web site at http://www-306.ibm.com/software/awdtools/visgen/support and then follow the link in the Download section. Also review Appendix F, "Situations where incorrect External Source Format causes problems in creation of EGL," on page 411 for additional VisualAge Generator APARs that might be necessary for your specific situation.
  - Install DB2® if it is not already available. DB2 is required for the migration database.
  - Review the capabilities of the developer product that you plan to use. Be sure that it includes the features that you require. For example:
    - If you plan to generate COBOL for the z/OS environment, you must use a developer product that includes COBOL generation for zSeries®.
    - If you plan to use iSeries, you must use a developer product that includes COBOL generation for iSeries.
  - Review the prerequisites for the developer product that you plan to use. In addition, review the prerequisites for your runtime environment. For example:
    - If you plan to generate COBOL for the z/OS environment, be sure to review the prerequisites for the EGL build server and EGL runtime server that you plan to use.
    - If you plan to generate COBOL for the VSE environment, be sure to review the information about prerequisites in the *VisualAge Generator EGL Plug-in for VSE Reference Manual*.
    - If you plan to generate Java for the UNIX® System Services (USS) environment, be sure to review the prerequisites for the Enterprise Developer Options for z/OS components.
    - If you plan to generate for iSeries, be sure to review the prerequisites for the runtime component of your developer product.
    - If you plan to generate Java for a workstation environment, be sure to review the prerequisites for the developer product that you plan to use.
- Make key decisions about the scope of the pilot project. For example:
  - Determine if you can freeze your VAGen development and maintenance during the actual migration. This technique enables you to migrate just the production level of source code. If you will not be able to freeze VAGen development and maintenance, be sure to include the following tasks in your pilot project:
    - Develop and test procedures for migrating your work-in-process source from VisualAge Generator to EGL.
    - Develop and test procedures for dual maintenance of common (shared) parts.
  - Choice of a back end source code repository.
- Build a task list, resource assignments, and schedule for the pilot project.
- Obtain education for the team that will run the pilot project:
  - Developer product environment
  - EGL language
  - VisualAge Generator to EGL migration tools
  - Your new source code repository
- Run the pilot project plan to do the following:

- Install the developer product for the pilot team, and be sure to install on a machine that has the same regional settings as you used for developing your VAGen programs. For example:
  - If you developed your VAGen programs on a German machine, you should install your developer product on a German machine. This ensures that the comma used as a decimal point and German umlaut characters are migrated correctly.
  - If you developed your VAGen programs on a Chinese machine, you must install your developer product on a Chinese machine using the same code page. This ensures that your DBCS characters are migrated correctly.
- Determine how to organize your source code in EGL. Map this organization to the equivalent VAGen organization. See "Determining how to organize your EGL source code" on page 49 for considerations and recommendations.
- Run the VAGen Migration Tool for the pilot set of code. See the following sections for information on the migration tool:
  - Chapter 2, "Migration Tool Philosophy," on page 17
  - Part 2, "Migrating from VisualAge Generator 4.5 on Java to EGL," on page 113
  - Part 3, "Migrating from VisualAge Generator 4.5 on Smalltalk to EGL," on page 133
  - Part 4, "Stages 2 and 3 — common migration steps," on page 153
  - Part 5, "Completing the migration," on page 181
- Test your source code in the EGL development environment:
  - Plan and install the connectivity required to use the EGL debug facility. If you use any of the following when you test your VAGen programs using the Interactive Test Facility (ITF), you need to plan how you will achieve comparable EGL debug capabilities:
    - Non-EGL programs that you need to call from ITF.
    - Access to DB2 databases.
    - Access to DL/I databases, which is not supported by EGL debug.
    - Access to VSAM files.
  - Create your EGL build parts for debug. This includes the build descriptor options, linkage options, and resource associations parts that you need for debug.
  - Test your source code using the EGL debug facility. Be sure to test each type of connectivity to your host environments.
- Create library management processes:
  - Select and install a source code repository, including access from the developer workstations.
  - Define change management procedures that work with your corporate culture and your selected source code repository.
  - Develop any tools you need for your change management procedures, including the following:
    - Checkin and checkout procedures.
    - Version control procedures.
    - Tools to retrieve source code from the source code repository and to load a workspace or directory structure if you want to use batch generation.
- iSeries COBOL target environment:
  - Follow directions in the *EGL Server Guide for iSeries*.

– z/OS COBOL target environments:
  - Install and enable TCP/IP. TCP/IP is the only method for transferring outputs of COBOL generation to the z/OS host.
  - Install prerequisites for the EGL build server and EGL runtime server products, including any changes to your COBOL compiler and runtime.
  - Install the EGL build server and EGL runtime server products.
  - Install the latest PTFs for the EGL build server and EGL runtime server products.
  - Create a new set of libraries to contain the outputs of COBOL generation and the results from the EGL build server.
  - If you use CICS or IMS, create a new region for testing the EGL-generated COBOL. This technique avoids accidentally intermixing your VAGen-generated code with the EGL-generated code and enables you to continue maintaining the VAGen code while you are running the pilot project.
  - Customize the EGL runtime server, including running the customization verification programs for all of your runtime environments.
  - Customize the EGL build server and pseudo-JCL build scripts. See "Converting VAGen preparation templates and procedures to EGL build scripts" on page 193 for details.
– VSE COBOL target environments:
  - Follow the directions in the *VisualAge Generator EGL Plug-in for VSE Reference Manual*.
– Java target environments:
  - Review the runtime platform differences if you are changing platforms (for example, from Windows® CICS® to Windows native). Make any code changes that result. Based on your original and new runtime platform, see the appropriate sections in Chapter 10, "Language and runtime differences," on page 209 for a list of the differences. See this same chapter if you are changing from generating C++ to generating Java.
  - Obtain JDBC support from your vendor if you are currently using ODBC support.
– Generate and prepare your programs:
  - Review and modify your build parts (build descriptor, linkage option, resource association, linkedit and bind control parts). Based on the build parts used for your runtime environment, see the appropriate sections in Chapter 9, "Completing your migration," on page 183 for details of changes that cannot be handled by the VAGen Migration Tool.
  - If you modified the VAGen reserved words, create an EGL reserved words file.
  - Optionally, build an EGL batch generation server machine. This requires the use of a source code repository and the creation of tools to load a directory with all the parts you need for generation.
– Testing:
  - Test at least a representative sample of your generated programs to ensure you understand any runtime differences. See "Runtime differences" on page 209 for a list of differences.
  - Test your library management procedures and tools using typical changes that you might make to the EGL source code. Be sure to test your procedures for changing common code, forms, dataTables, and programs

for each target environment. Also test your procedures for adding common code, forms, dataTables, and programs for each target environment.
    - Run a pilot change cycle using typical changes for several developers to ensure that your planned library management processes are acceptable.
    - Plan and test backup and recovery procedures for your source code repository.
  – Refine your library management procedures and tools based on the results of the pilot project.
  – Document the findings of the pilot project, including:
    - Code changes that need to be made, particularly if you are changing target environments.
    - Changes developers need to make to any personal build descriptor parts.
    - References to sections of the Migration Guide that are particularly useful for your developers based on the problems you encountered during the pilot project.
    - Changes in runtime behavior that your end users will notice.
    - Final library management and change control process.
- Build a plan to complete your migration based on the findings from the pilot project.
- Provide education for the remaining developers:
  – Developer product environment
  – EGL language
  – Your source code organization in EGL, including how the code is structured into EGL projects, packages, and files
  – Your new source code repository
  – Your new library management process
  – Your new generation process
  – Mentoring, as needed, during the first few weeks of development

Determining whether you can migrate to EGL

EGL is the strategic component in the Rational Developer or WebSphere Developer products to which VisualAge Generator customers should migrate. EGL support is not meant to be a complete replacement for **ALL** functions and platforms supported by VisualAge Generator Developer 4.5 (VAGen). Depending on your target environment and the types of programs you have developed with VisualAge Generator, you might need to wait for a future release of EGL.

The following list shows VisualAge Generator target environments that are supported by EGL.

- MVS™ CICS
- MVS Batch
- IMS/VS
- IMS BMP
- Unix System Services
- Windows Native
- AIX® Native
- Linux™ on Intel® platforms
- HP-UX

- Solaris
- iSeries

In addition, VisualAge Generator EGL Plug-in for VSE V1.0 (program number 5724-L93) provides support for the following target environments:

- VSE CICS
- VSE Batch

Note: While VisualAge Generator generates Java and C++ for certain platforms, EGL only generates Java.

For additional considerations in these supported environments, see the following:

- Special considerations for migrating to EGL — File and data base access, Table 1 on page 9
- Special considerations for migrating to EGL — User interface, Table 2 on page 9
- "VisualAge Generator features not available in EGL" on page 10

The following tables list special considerations for supported environments.

Table 1. Special considerations for migrating to EGL — File and data base access

VAGen file and database access	Special consideration
SQL	Supported in EGL.
Serial, indexed, and relative records	Supported in EGL.
Message queue records	Supported in EGL.
DL/I	Supported in EGL for COBOL generation for the z/OS environments. Not supported for debug, Java generation, or COBOL generation for the VSE environments.
GSAM	Supported in EGL.
IMS™ Message Queues	Supported in EGL.
Btrieve	Not supported in EGL.
Local VSAM	Supported for the following: • Java generation for AIX. • COBOL generation. Not supported for debug or for Java generation for other environments.
Remote VSAM	Supported for the following: • Debug if the remote file is on CICS for z/OS or iSeries. • Java generation for Windows if the remote file is on CICS for z/OS or iSeries. • COBOL generation for CICS for z/OS or VSE CICS.

Table 2. Special considerations for migrating to EGL — User interface

VAGen user interface	Special considerations
Text user interface, including print	Supported in EGL for both COBOL generation and Java generation.

Table 2. Special considerations for migrating to EGL — User interface (continued)

VAGen user interface	Special considerations
Web transactions and User Interface (UI) records	Supported in EGL for both COBOL generation and Java generation depending on the environment. Not supported for IMS/VS. For VSE CICS, see the documentation for the VSE plug-in.
JSP and Java servlets which use VAGen Java wrappers	• You can migrate your JSP and Java servlets to your new developer product using the information provided by that product. • You can migrate your VAGen server programs to EGL using this VAGen Migration Guide. You can generate the Java wrappers using EGL.
Java GUI applications or applets that do *not* use VAGen parts on the free form surface, but which use VAGen Java wrappers.	• You can migrate your Java applications or applets to your new developer product using the information provided by that product for migrating Java code from VisualAge for Java. • You can migrate your VAGen server programs to EGL using this VAGen Migration Guide. You can generate the Java wrappers using EGL.
Java GUI applications or applets that use VAGen parts on the free form surface.	Not supported in the current release.
Smalltalk GUI views or visual parts.	Not supported in the current release. The views with VAGen parts must be migrated to Java-based solutions. EGL will not have any Smalltalk-based solutions.

VisualAge Generator features not available in EGL

In addition to the special considerations listed in Tables 1 and 2, if you need any of the features in the following list, you should assess the impact of migrating now versus migrating in the future:

- Specialized editors and lists such as a listing of the program produced during generation.
- Specialized functionality:
  - Searching for references in a selected set of parts and limiting the search list to a program's associates.
  - Filtering parts by part type or by subtype. EGL provides a search capability so you might be able to search on a specific part type or subtype.
- Specialized debug support including:
  - DL/I database I/O
  - Calls to programs in the IMS/VS environment
- Web transaction support for the following environments:
  - IMS/VS
  - VSE CICS, but see the documentation for the VSE plugin for any enhancements to its support.
- VisualAge Generator Templates.

- If you plan to use Java generation, also determine if you use CICS specific functions that cannot be converted to native runtime environments. See "Differences between distributed CICS and native workstation environments" on page 214 for details of the differences.

Terminology differences

VisualAge Generator Developer on Java, VisualAge Generator Developer on Smalltalk, and EGL all use different terminology. To help you relate the VAGen terminology to the EGL terminology, the following six tables show the three sets of terminology.

Table 3. Code organization terminology differences

VisualAge Generator on Java	VisualAge Generator on Smalltalk	Enterprise Generation Language (EGL)
Workspace	Image	Workspace
Project	Configuration map	EGL Project
Package	Application	EGL source folder and EGL Package containing one or more EGL files
(no comparable concept)	(no comparable concept)	File (generally a Java package or a Smalltalk application will split into multiple files). An EGL file contains one or more EGL parts of one or more part types.
Class or Type	Class	EGL part type
Method or Member	Method	(no comparable concept)
VAGen part	VAGen part	EGL part within a file

Table 4. VAGen parts and concepts terminology differences

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
Shared data item	Shared data item	Type definition to a DataItem part
Non-shared data item	Non-shared data item	primitive item definition
Data item part	Data item part	DataItem part
Record part	Record part	Record part **Note:** The migration tool converts all VAGen record definitions to EGL fixed records to preserve VAGen behavior.
PSB part	PSB part	PSBRecord part
User interface (UI) record	User interface (UI) record	VGUI record
Structure items (structure of fields in a record)	Structure items (structure of fields in a record)	Structure fields
Array (multiply occurring item in record or map)	Array (multiply occurring item in record or map)	Structure field array
Table part	Table part	DataTable part
Map group part	Map group part	FormGroup

Table 4. VAGen parts and concepts terminology differences (continued)

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
Map part: • display map • printer map	Map part: • display map • printer map	Form: • textForm • printForm
I/O option and I/O object	I/O option and I/O object	EGL I/O statement
Java application or applet (GUI)	Smalltalk view or visual part (GUI)	• Smalltalk view and visual parts are not supported. • Java applications and applets are supported *if* you did not use VAGen parts on the free form surface. If you did use VAGen parts on the free form surface, then the Java application or applet is not supported in the current release.
Generation options part	Generation options part	Build descriptor part
Generation option	Generation option	Build descriptor option
Linkage table part	Linkage table part	Linkage options part

Table 5. VAGen with IDE Windows terminology differences

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
Log • Shows error messages • Product closes only if you close BOTH the Log and the Workbench • Workspace is ALWAYS saved when you close the product	System Transcript • Shows error messages • Product closes if you close EITHER the System Transcript or the VisualAge Organizer • Image is OPTIONALLY saved when you close the product	Console • Shows messages. Problems view • Shows messages, especially those related to syntax validation. • Workspace is ALWAYS saved when you close the product.
Workbench • Shows the projects and packages in the workspace.	VisualAge Organizer • Shows the applications in the image.	EGL and Web perspectives: • Navigator and Project Explorer views show the projects, source folders, packages, and files in the workspace.
Scrapbook	Workspace	Scrapbook page editor
Repository Explorer	Application Editions Browser	If you decide to use a repository, the repository might have a comparable concept.

Table 5. VAGen with IDE Windows terminology differences (continued)

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
VAGen Parts Browser • 3 panes show package, part type, and VAGen parts • Filtering and sorting is included in the browser	VAGen Parts Browser • 3 panes show application, part type, and VAGen parts • Filtering and sorting is included in the browser	EGL and Web Perspectives: • Navigator and Project Explorer views show the projects, source folders, packages and files in the workspace. • Outline view shows the parts within a file. • EGL Parts List view provides filtering and sorting.
VAGen options	VAGen preferences	EGL preferences
VAJava options	VASmalltalk preferences	Other product preferences
References tool to find parts that use a specific part name or text string	References tool to find parts that use a specific part name or text string	EGL Search or File Search
Associates tool to find all parts referenced by a specific part	Associates tool to find all parts referenced by a specific part	EGL Parts Reference

Table 6. VAGen Workspace management terminology differences

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
Repository	Library	None. CVS and Clear Case LT are provided depending on the product that you use. You can choose your own repository management system.
Add / Delete	Load / Unload	If you decide to use a repository, the repository might have a comparable concept.
Replace with	Load another edition	Replace with local history **Note:** The repository you decide to use might have additional facilities.
Compare with	Browse changes	Compare with local history **Note:** The repository you decide to use might have additional facilities.

Table 7. VAGen Repository management terminology differences

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
Administrator	Library Supervisor	If you decide to use a repository, the repository might have a comparable concept.

Table 7. VAGen Repository management terminology differences (continued)

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
Repository management: • Purge / Restore • Compact	Library management: • Purge / Salvage • Clone	If you decide to use a repository, the repository might have a comparable concept.

Table 8. VAGen source code management terminology differences

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
Ownership: • Project owner • Package owner • Class owner	Ownership: • Configuration map manager • Application manager • Class owner	If you decide to use a repository, the repository might have a comparable concept.
Version and release	Version and release	If you decide to use a repository, the repository might have a comparable concept.
Project: 1. A project is required. 2. VAGen Project List Part specifies relationships between projects. 3. The package owner can always release the package to the project.	Configuration map: 1. Usage is optional. 2. Required map specifies relationships between configuration maps. 3. Optionally, you can delegate the release of applications or restrict their release to the configuration map manager.	Project: 1. A project is required. 2. EGL Build Path property for the project. However, this does not automate loading projects together into the workspace. 3. No comparable concept, unless provided by the repository.
Package: 1. No comparable concept 2. No comparable concept 3. No comparable concept 4. Group members 5. Versioning the project automatically versions the included packages.	Application: 1. Prerequisite application 2. Subapplications 3. Privileges 4. Group members 5. You must version the application before you version the configuration map	Folder or Package: • If you decide to use a repository, the repository might have a comparable concept.
Class or Type: • Versioning the package or project automatically versions the included classes	Class: • You must version and release the class before you version the application	EGL part type: • No comparable concept in EGL.

Table 8. VAGen source code management terminology differences (continued)

VisualAge Generator on Java	VisualAge Generator on Smalltalk	EGL
VAGen parts: • There is a date and time stamp for each part • Packages containing duplicate part names CAN be added to the workspace. • There is a duplicate parts tool to locate the duplicate parts	VAGen parts: • There is a date and time stamp for each part • Applications containing duplicate part names CANNOT be loaded into the image.	EGL parts: • Parts are in EGL files; only the EGL file has a date and time stamp. • You can have duplicate parts in the workspace. EGL uses a combination of a project's EGL build path, the file's import statements, and the containerContextDependent property to determine the name space that is searched to resolve references to part names. Part names must be unique within the name space. The EGL build path for a project limits which additional projects are considered when looking for a part name. The import statement for a file limits which additional packages and/or parts within the EGL build path are considered when looking for a part name. The containerContextDependent property for a record or a function specifies that EGL should use the EGL build path and import statements for the file containing the program rather than from the file containing the record or function.

References

In addition to this Migration Guide, you should check the following for additional or more-current information:

- The web site and news group for VisualAge Generator. The web site is as follows:

  `http://www.ibm.com/software/awdtools/visgen/`
- The web site and news group for EGL. The web site is as follows:

  `http://www.ibm.com/developerworks/rational/products/egl/`
- The web site and forum for the product that you are using.

The following also contain details beyond the scope of this Migration Guide:

- The online help system for EGL.

- The *EGL Reference Guide*, which describes the EGL language and the debug and generation process. The specific book varies based on the developer product you are using and whether you are using COBOL generation as follows:
  - *Rational Application Developer EGL Reference Guide Version 6.0.1* (SC31-6839-03)
  - *IBM WebSphere Developer for zSeries EGL Reference Guide Version 6.0.1* (SC31-6837-03).
  - *WebSphere Development Studio Client Advanced Edition EGL Reference Guide for iSeries Version 6.0* (SC31-6838-01).
  - *VisualAge Generator EGL Plug-in for VSE Reference* (SC18-9531).
- The *EGL Server Guide*, which describes how to set up build server and build scripts, as well as other reference material for creating your runtime environment. The specific book varies based on the COBOL generation product you are using as follows:
  - *IBM Rational COBOL Runtime Guide for zSeries Version 6.0.1* (SC31-6951). The equivalent Enterprise Developer Server books are *WebSphere Developer for zSeries Host Configuration Guide* (SC31-6930) and *IBM Enterprise Developer Server Guide for z/OS* (SC31-6306-03).
  - *WebSphere Development Studio Client for iSeries Advanced Edition EGL Server Guide for iSeries Version 6.0* (SC31-6841-01).
  - *VisualAge Generator EGL Plug-in for VSE Reference* (SC18-9531).

The following white papers are also available to assist with migration:

- For migration from VAGen on Java:
  - *How to Modify the EGL File Location Algorithm used by Stage 1 of the VisualAge Generator on Java to Enterprise Generation Language Migration Tool.*
  - *How to Consolidate Projects and Packages during Stage 1 of the VisualAge Generator on Java to Enterprise Generation Language Migration Tool.*
- For migration from VAGen on Smalltalk:
  - *How to Modify the EGL File Location Algorithm used by Stage 1 of the VisualAge Generator on Smalltalk to Enterprise Generation Language Migration Tool.*
  - *How to Consolidate Projects and Packages during Stage 1 of the VisualAge Generator on Smalltalk to Enterprise Generation Language Migration Tool.*
- For migration from either VAGen on Java or VAGen on Smalltalk:
  - *How to Create Records for Implicit Items when Migrating from VisualAge Generator to Enterprise Generation Language.*
  - *Using the Rename User Exit in the VisualAge Generator to Enterprise Generation Language Migration Tool.*
  - *How to Modify the Package Name in the JSP when Migrating Web Transactions from VisualAge Generator to Enterprise Generation Language.*
- For migration from Cross System Product or VisualGen:
  - *Migrating from Cross System Product Version 4.1 to Enterprise Generation Language Version 6.0.1.1.* While this white paper is specific to Cross System Product Version 4.1, it includes an appendix that explains the differences between migrating from earlier versions of Cross System Product and from VisualGen Version 2.2.

  All of the white papers are available in the ″Migrations″ section of the page at:
  `http://www.ibm.com/developerworks/rational/products/egl/egldoc.html`

Chapter 2. Migration Tool Philosophy

The VisualAge Generator to EGL migration tool is actually a series of tools. This chapter provides a high-level overview of the tools and describes the techniques used by the tools.

The design of the VisualAge Generator to EGL migration tools has several major objectives:

- Preserve the program behavior from VisualAge Generator to EGL.
- Preserve the Java project and package structure from VisualAge Generator to EGL when appropriate.
- Preserve the Smalltalk configuration map and application structure from VisualAge Generator to EGL when appropriate.
- Enable you to perform incremental migration of subsystems, one subsystem at a time.
- Enable you to migrate multiple versions of your subsystems.

The design of the VisualAge Generator to EGL migration tools also has several secondary objectives:

- Use batch mode processing as much as possible with opportunities for you to optionally review the planned migration at critical points before proceeding to the next step.
- Store information about the planned migration in a database so that it can be preserved across multiple project versions and multiple subsystems. This also enables you to save intermediate results as backup. This is important if you have large numbers of parts in your repository.
- Provide a set of sample programs for the tool that extracts the VAGen source from your repository and loads the migration database. You can optionally tailor the sample programs to more accurately reflect your environment.

The design of the VisualAge Generator to EGL migration tools is based on the following assumptions:

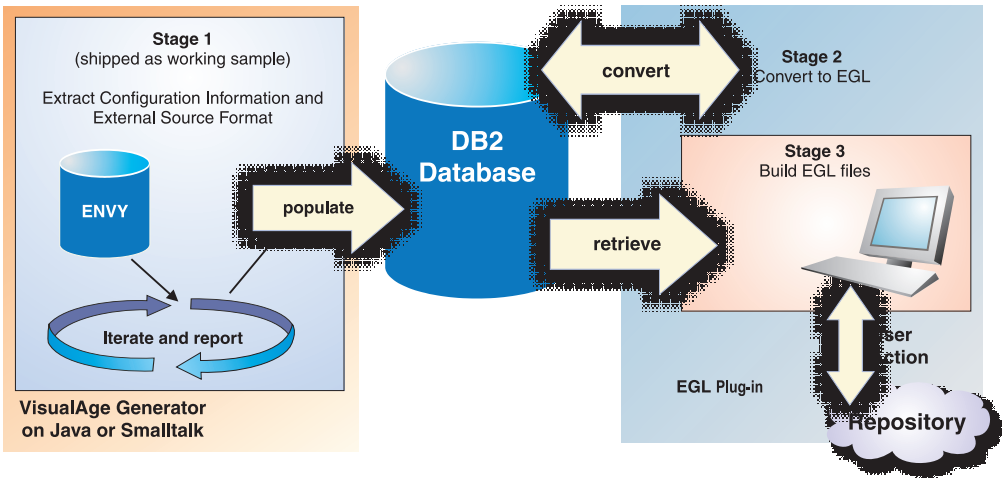
- Migration is from VisualAge Generator 4.5 **using External Source Format that is produced by** VisualAge Generator 4.5.
- The parts to be migrated **are valid VisualAge Generator parts**. Programs, tables, and map groups can be validated and/or generated in VisualAge Generator 4.5.

There are two methods for using the VisualAge Generator to EGL migration tools:

- Stage 1 to 3 migration, which is described in “Overview of the VisualAge Generator to EGL Migration Tools” on page 18. This is the primary technique for migrating your source code.
- Single File Migration, which is described in “Overview of Single File Migration” on page 24. This technique is useful for migrating a few programs to verify that your environment is working properly.

Overview of the VisualAge Generator to EGL Migration Tools

To achieve the objectives listed, the VisualAge Generator to EGL migration tool is actually a series of tools that are organized into three stages as shown in the following figure.



- The tool for Stage 1 runs in the VAGen environment. The Stage 1 tool extracts information about the organization of your source code and the source code itself from your Java repository or Smalltalk library. The Stage 1 tool also determines the placement of each part in the EGL project, package, and file organization. The Stage 1 tool loads this information into a migration database. The VAGen source code is stored in External Source Format.
- The tool for Stage 2 runs in the EGL environment. The Stage 2 tool uses the information that is stored in the migration database to create EGL syntax for the VAGen parts that were stored in the migration database during Stage 1. The Stage 2 tool stores the resulting EGL source code in the migration database.
- The tool for Stage 3 also runs in the EGL environment. For each EGL project you want to create, the Stage 3 tool extracts the EGL source for the parts that belong to that project and creates an EGL project in the file system for you. Optionally, if you are only working with one version of a set of projects, the Stage 3 tool can import the projects into your workspace.

After you have the projects in your workspace, you can then version the projects with whatever source code repository you have decided to use. You use the tools provided by the source code repository to manage your source code.

Migration tool terminology

To achieve a good cross-part migration, when you migrate a part, you must provide not only the part itself but all parts that it references. For example, when you migrate a program, you should provide not only the program, but also all the parts that the program references. For a program, the set of parts that you need when you migrate the program is the same set of parts that you need when you generate the program in VisualAge Generator. This set of parts is the program's associates list.

In VisualAge Generator, the common techniques for providing all the parts for generation are as follows:

- Project List Parts (PLPs) in VisualAge Generator on Java
- Configuration maps in VisualAge Generator on Smalltalk.

The migration tool makes use of these two techniques. The tool uses the following terminology:

- If you are migrating from VisualAge Generator on Java:
  - A *high-level PLP project* is a Java project that contains a Project List Part (PLP) and is not referenced by any other PLP.
  - A *migration set* consists of all the VAGen projects referenced in a Java high-level PLP project, including all VAGen projects in the entire PLP chain starting at the high-level PLP project.
- If you are migrating from VisualAge Generator on Smalltalk:
  - A *high-level configuration map* is a Smalltalk configuration map that is not listed as a required map by any other configuration map.
  - A *migration set* consists of all the Smalltalk configuration maps listed as required maps in a Smalltalk high-level configuration map. The migration set includes all the configuration maps from the entire chain of Smalltalk required maps starting at the high-level configuration map.
- A *migration plan* is a file that specifies the information for one or more migration sets. If you specify a migration plan file name in your Stage 1 preferences then all the migration sets that match your repository filters are placed in the same migration plan file. If you do not specify a migration plan file name, then each migration set is placed in a separate migration plan file.

Note: If you are migrating from VisualAge Generator on Java and do not currently use PLP projects, you can create PLP projects to use just for migration. Alternatively, you can do one of the following:

- If you have information in a database or other system that specifies what is needed for generation in terms of Java project versions, then you can write a tool to create the migration plan file (or files) automatically from your database.
- Create the migration plan file (or files) by hand.

If you are migrating from VisualAge Generator on Java, see the section "Migration plans and high-level PLP projects" on page 128 for more details.

Stage 1 Details

The Stage 1 tool is shipped as a sample program with the Rational Developer or WebSphere Developer product. You install the sample program to run on either VisualAge Generator Developer on Java or VisualAge Generator Developer on Smalltalk, depending on the VisualAge Generator Developer 4.5 product that you currently use. The two sample programs differ somewhat due to the differences in the Java and Smalltalk environments. However, the basic steps for using the Stage 1 sample programs are the same in both environments. The basic steps for Stage 1 are:

- Step 1. Define rules and preferences to direct the Stage 1 migration.
- Step 2. Run the tool and produce one or more of the following outputs:
  1. One or more migration plan files
  2. A report showing how each migration plan file will be migrated
  3. A log file containing messages about any problems detected
  4. A migration database

Step 1

Define rules and preferences that provide the Stage 1 tool with information about what you want to migrate, including the following:

1. How to filter Java project names so that only the projects you want to migrate will be considered. For Smalltalk, you specify how to filter the Smalltalk configuration map names. This improves performance for Stage 1 because the tool only processes those Java projects or Smalltalk configuration maps that match your filters.
   - From those Java projects that match your filters, the Stage 1 tool selects any Java projects that contain a high-level Project List Part. A Java project contains a high-level Project List Part (PLP) if the Java project is not referenced by any other PLPs.
   - From the Smalltalk configuration maps that match your filters, the Stage 1 tool selects any high-level configuration maps. A high-level configuration map is one that is not listed as a required map by any other configuration map.
2. Whether you want to create one migration plan that reflects everything that could migrate based on your filter, or whether you want to create multiple migration plans, with one migration plan for each Java high-level PLP project version or Smalltalk high-level configuration map version.
3. How to create the EGL project, package, and file names from the Java project and package names or from the Smalltalk configuration map and application names. The information you can specify includes the following:
   - Rules that indicate which Java projects and packages or Smalltalk configuration maps and applications contain common code.
   - Renaming rules to be used when creating the EGL project and package names.
   - Names to be used for the EGL files that contain common parts or unused parts.
4. The name of the migration database and the user ID and password that are needed for access to the database.
5. Which outputs you want the Stage 1 tool to produce in Step 2. You can choose to create all the outputs in a single step or you can create the outputs in sequence so that you have a chance to review your rules and preferences before creating the next, more time-consuming output.

Step 2

Based on the rules and preferences you have defined, the Stage 1 tool produces the following possible outputs:

1. **Migration plan file (or files).** A migration plan file contains migration sets. Each migration set is one high-level PLP project version from the Java repository or one high-level configuration map version from the Smalltalk library. The dependent Java project versions or the required Smalltalk configuration map versions are specified in the migration set.
   - If the migration preference file does not specify a value for the migration plan filename option, then multiple migration plan files are created. Each high-level PLP project version for Java results in one migration plan file that contains one migration set. Similarly, each high-level configuration map version for Smalltalk results in one migration plan file that contains one migration set version.
   - If the migration preference file specifies a value for the migration plan filename option, then each high-level PLP project version for Java results in a migration set entry within the single migration plan file. Similarly, each high-level configuration map version for Smalltalk results in a migration set entry within the single migration plan file.

- For example, consider an Order Entry system that is made up of 5 Java projects and a sixth Java project that contains a PLP that specifies the versions of the other 5 projects. If you request multiple migration plans and 3 versions, then 3 migration sets will be created -- one for each version of the Java Order Entry project that contains the PLP part. Similarly for Smalltalk, if you want to migrate 3 versions of a configuration map that reflects that code that makes up the Order Entry system, there will be 3 migration sets -- one for each version of this high-level configuration map

You can direct the Stage 1 tool to stop at this point so you have the opportunity to review the migration plan file (or files) to ensure that the Java project versions or Smalltalk configuration map versions that you want to migrate are correctly reflected in the migration plan file (or files).

2. **A report showing how each migration set will be migrated.** The Stage 1 tool can produce this report **without loading the database**. This helps you ensure that your filters and preferences select the correct set of Java projects or Smalltalk configuration maps and that you are satisfied with the naming conventions of EGL projects, packages, and files that resulted from your renaming rules. Reviewing the report gives you an opportunity to refine your rules and preferences if you are not happy with the proposed EGL structure before the Stage 1 tool actually loads the database. You can iterate through the previous steps as many times as necessary until you are satisfied with what will be migrated and the proposed EGL structure. The report shows the following:
   - For Java, each migration set lists the project versions that are included. For each project version, you can see the package versions, and for each package version, you can see a list of the VAGen parts.
   - For Smalltalk, each migration set lists the configuration map versions that are included. For each configuration map version, you can see the application versions, and for each application version, you can see a list of the VAGen parts.

   For each VAGen part, you can see the corresponding EGL project, package, and file name where the part will be placed. For each VAGen part, you can also see both the associates list created by VisualAge Generator and the EGL file where the associate is placed. See the section "Placing parts in EGL files" on page 38 for information on how the VAGen parts are assigned to files during Stage 1 – 3 migration.
3. **A log file provides messages** if any of the VAGen program, table, map group, or control part names conflict with the EGL reserved word list. These parts are not renamed during migration. You can either rename the parts in VisualAge Generator or wait until you have migrated to EGL.

   The log file also includes messages for any UI record names that conflict with the EGL reserved word list or that starts with the # or @ symbol. UI records are renamed during Stage 2 migration.
4. **A migration database** loaded with the information and VAGen source code based on the migration plan files. You can select one migration plan to use in loading the database or all the migration plan files in a directory. The Stage 1 migration tool loads the data base with the following:
   - Information about each migration set within the selected migration plan file (or files).
   - The set of associated Java projects or Smalltalk configuration maps for the migration set.
   - The VAGen part definitions in External Source Format for each VAGen part in the set of Java projects or Smalltalk configuration maps.

- The corresponding EGL project, package, and file names for each Java project, package and VAGen part or each Smalltalk configuration map, application and VAGen part.
- A report is also created during this step so that you have a complete record of what was loaded into the migration database. This report is in the same format as the previous report.

The Stage 1 tool is shipped as a sample program for both the Java and Smalltalk versions of VisualAge Generator. You can use the Stage 1 tool ″as is″ or you can modify the sample program to better fit your environment. For example,

- You might currently store configuration information outside the Java repository or Smalltalk library. This configuration information might specify which versions of your source code are required for generation. In this situation, you could use the sample programs as a guide to writing your own tool to load the migration database from a combination of your configuration information and your Java repository or Smalltalk library.
- You might want to change the parts placement algorithm. See “Determining how to organize your EGL source code” on page 49 for considerations that might cause you to modify the parts placement algorithm for the Stage 1 migration tool.

If you modify the Stage 1 sample programs, you might want to modify the migration database to include additional information to assist in the analysis of your code. You can add additional columns to the existing SQL tables or you can add additional tables to the migration database. However, these new columns and tables will not be used in Stages 2 and 3 of migration. Additionally, if you modify the Stage 1 sample programs, you must be sure to populate the SQL tables with the information shown in the sample programs. If you do not, Stages 2 and 3 will not be able to migrate your code.

See Chapter 4, “Stage 1 — Extracting from Java,” on page 115 for details about installing and running the Stage 1 tool on VisualAge Generator Developer on Java. See Chapter 5, “Stage 1 — Extracting from Smalltalk,” on page 135 for details about installing and running the Stage 1 tool on VisualAge Generator Developer on Smalltalk.

Stage 2 Details

The Stage 2 tool is shipped in the Eclipse plugin com.ibm.etools.egl.vagenmigration and runs in the EGL environment. Because the information you want to migrate is now in the migration database, you use the same Stage 2 tool regardless of whether you are migrating from VisualAge Generator on Java or VisualAge Generator on Smalltalk. The basic steps for running the Stage 2 tool are as follows:

1. You define rules and preferences to tell the Stage 2 tool what you want to migrate, including the following:
   - Specific details about how you want your EGL source code to be created. For example, the Stage 2 migration tool must split VAGen working storage records into two EGL basic records:
     a. A record that is named the same as the original working storage record and which contains all the non-level 77 items.
     b. A second record that is named the same as the original working storage record with a suffix and which contains all the level 77 items.

There is a Stage 2 migration preference that enables you to specify the suffix you want the Stage 2 tool to use whenever it creates a new record to contain level 77 items.

- Which migration set or sets you want to migrate. For example, if you created 3 migration sets to migrate 3 different versions of the Order Entry system, you might only want to migrate one version initially. This gives you the flexibility to limit migration, without having to migrate everything in the migration database at the same time.
- The name of the migration database and the user ID and password that are needed for access to the database. Both the Stage 2 and Stage 3 migration tools attempt the database logon with the user ID and password used to logon to the Windows machine if the database user ID and password are not specified explicitly.
- Whether you want to automatically start the Stage 3 tool after Stage 2 completes. If you run Stage 3 automatically, you can choose to load one version of the EGL projects into your workspace. You can also choose to load the EGL projects into a temporary directory so that you can interface with your source code repository at a later time.

2. Based on the rules and preferences you have defined, the Stage 2 tool does the following:
   a. Retrieves parts for one migration set from the database.
   b. Converts the External Source Format source code to EGL source code.
   c. Stores the EGL source code in the migration database. Messages associated with part migration are also stored in the migration database. This improves performance for Stage 2 because if the same part edition is used in another migration set, the EGL source code is already available and not converted again.
   d. Creates a log file of any potential problems that are encountered, including generatable parts that conflict with the EGL reserved word list or ambiguous situations that the migration tool is unable to resolve.
   e. Iterates to process the next selected migration set.

The Stage 2 migration tool can be run in batch mode. See Chapter 6, “Stage 2—Conversion to EGL syntax,” on page 155 for details about installing and running the Stage 2 tool in the EGL development environment. You cannot modify the Stage 2 migration tool.

Stage 3 Details

The Stage 3 tool is shipped in the same Eclipse plug-in (com.ibm.etools.egl.vagenmigration) as the Stage 2 tool and also runs in the EGL environment. Because the information you want to migrate is now in the migration database, you use the same Stage 3 tool regardless of whether you are migrating from VisualAge Generator on Java or VisualAge Generator on Smalltalk. The basic steps for running the Stage 3 tool are as follows:

1. You define rules and preferences to tell the Stage 3 tool what you want to migrate, including the following:
   - Which migration set or sets you want to migrate. For example, if you created 3 migration sets to migrate 3 different versions of the Order Entry system, you might have migrated all 3 versions through the Stage 2 tool, but only want to migrate one version through the Stage 3 tool. The most common reason for doing just one version in Stage 3 is that you want to version this code in your source code repository, then migrate the next version with the Stage 3 tool and version it in your source code repository.

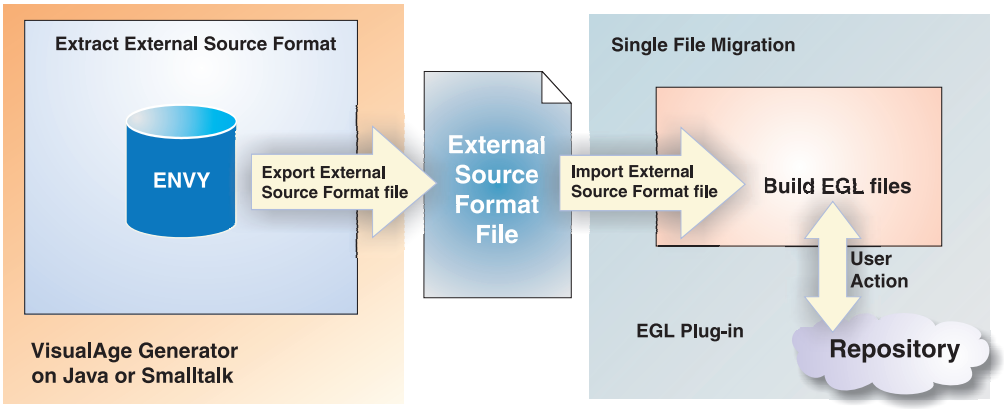
- The name of the migration database and the user ID and password that are needed for access to the database.

2. Based on the rules and preferences you have defined, the Stage 3 tool does the following:
   a. Creates a ″to do″ list for the migration set. This ″to do″ list contains a consolidated list of the messages produced by Stage 2 that might require you to perform additional tasks to complete the migration.
   b. Creates the EGL project and package structure in your workspace based on the information stored in the migration database during Stage 1.
   c. Creates the .egl source files based on the EGL source code that was stored for the VAGen parts during Stage 2. The .egl source files include most import statements that are needed to resolve EGL part references. See “EGL build path and import statements” on page 35 for details about the import statements.
   d. Creates the .eglbld files based on the EGL XML source that was stored for VAGen control parts during Stage 2. The control parts are generation options (EGL build descriptor parts), linkage options, resource associations, bind control and linkedit parts.
   e. Refreshes the workspace so that EGL validation runs.
3. At this point you should do the following:
   a. Optionally, version or commit the EGL projects into your source code repository to establish a baseline that reflects the code exactly as it was migrated.
   b. Review the workspace for any messages in the Problems view to see if there are any validation errors. You can do this in conjunction with the log produced in Stage 2 or the ″to do″ list produced in Stage 3.
   c. Generate (without preparing) all programs and dataTables to ensure proper migration for your target environment. When you generate the programs, be sure to use the genFormGroup and genHelpFormGroup build descriptor options so that all your formGroups are generated. *This step is optional, but it is strongly recommended.*
   d. Version or commit the EGL projects into your source code repository to establish a new baseline that reflects any code changes you made to resolve problems.
   e. Generate and test the migrated code. This step is also optional, *but it is strongly recommended.*

The Stage 3 migration tool can be run in batch mode. See Chapter 7, “Stage 3 — Import,” on page 171 for details about running the Stage 3 tool on EGL. The Stage 3 tool is installed automatically at the same time you install the Stage 2 tool. You cannot modify the Stage 3 migration tool.

Overview of Single File Migration

When you are first getting accustomed to EGL and setting up your environment, you might want to migrate just a few programs to verify your environment, ensure generation and preparation are working properly, and ensure your runtime environment is properly configured for EGL. In this case, you might not want to go through the full Stage 1 to 3 migration. The Stage 2 migration tool provides a mechanism for you to migrate programs using what is called single file migration as shown in the following figure:



Single file migration is a more manual process than Stage 1 to 3 migration. In single file mode, you use VisualAge Generator to export External Source Format source code to a file. Then you use the EGL development environment to create an EGL project and EGL package. You can then use the Import wizard to import the External Source Format file into EGL source. The single file migration tool runs and does the following:

- Creates the target EGL source file, if it does not exist. If the file does exist, you have the option to overwrite or append to the file. Depending on your preferences and the parts contained in the External Source Format file, the migration tool might create additional EGL files.
- Converts the External Source Format source code to EGL source code.
- Creates a log file of any potential problems that are encountered, including generatable parts that conflict with the EGL reserved word list or ambiguous situations that the migration tool is unable to resolve.

The External Source Format to EGL conversion that occurs during single file migration is essentially the same syntax conversion that occurs during Stage 2 of the Stage 1 to 3 migration. However, single file migration has several limitations that do not make it suitable for large scale migrations. The limitations include:

- Only parts in the single External Source Format file are considered during migration. To achieve the best possible migration, include a program with all its associates in the External Source Format file.
- The placement of VAGen parts into files is different from that of Stage 1 – 3 migration. In single file mode, assuming you specified *targetFile.egl* as the target EGL file name, the following occurs:
  - All control parts are placed in a file called targetFile.eglbld.
  - Each UI record is placed in a file by itself called uiRecordName.egl, where uiRecordName is the name of the UI record.
  - If you do not select the preference to separate generatable parts into EGL files, all the remaining parts are placed in a file called targetFile.egl.
  - If you select the preference to separate generatable parts into EGL files, the following occurs:
    - Each program part is placed in a file called programName.egl, where programName is the name of the program.
    - Each table part is placed in a file called tableName.egl, where tableName is the name of the table.
    - Each map group and all maps in the map group are placed in a file called mapGroupName.egl, where mapGroupName is the name of the map group.

- All the remaining parts are placed in a file called targetFile.egl. targetFile can be the same as programName.egl if you want to place all the remaining parts in the same file as the program. There is no attempt to determine which parts are shared by multiple generatable parts.

  – All the files are placed in same EGL project, source folder, and package.

- Because all the output files are placed in the same EGL package, the migration tool does not include any import statements. In addition, because all the parts are placed in the same EGL package, your original Java project and package structure are not preserved. Similarly, your original Smalltalk configuration map and application structure are not preserved.
- If the same part occurs multiple times in the External Source Format file, only the last definition is migrated.
- There are four alternative techniques for dealing with common parts when migrating in single file mode. Be sure you understand the disadvantages of each technique before choosing one of them. The four techniques are as follows:
  – If you migrate one large External Source Format file containing several programs and their associates, you can only specify one targetFile name. Assuming you selected the Migration Preference to *Separate parts into EGL files*, the migration tool places the data items, functions, PSBs, and non-UI records into the single target file. Even if the programs share common parts so that the same associate appears multiple times in the file, the migration tool only migrates one definition of the part. Therefore, you will not have any duplicate parts using this technique. However, if the programs have numerous associated parts, the targetFile can be quite large.
  – If you migrate two External Source Format files to the same EGL package and the two files contain the same part **and you specify different targetFile names**, you will have duplicate parts that cannot be resolved by EGL. This happens if you migrate a file with Program1 and its associates and a second file with Program2 and its associates and the two programs share some common parts. The migration tool places the common parts in both targetFiles. You can avoid this problem by migrating each program with its associates to a separate EGL package. This still results in duplicate parts in the workspace, but because they are in different packages, EGL is able to resolve the part references.
  – If you migrate two External Source Format files to the same EGL package and the two files contain the same part **and you specify the same targetFile name**, you are prompted for whether you want to overwrite the existing targetFile in the workspace.
    - If you specify that you do not want to overwrite the existing targetFile, then any data items, functions, PSBs, and non-VGUI records in the second import are added to the targetFile. All the common parts in the second import result in duplicate parts within the targetFile.
    - If you specify that you want to overwrite the existing targetFile, then any data items, functions, PSBs, and non-VGUI records in the second import completely replace the targetFile. This results in the loss of any parts included in the first import, but not included in the second import.
    - If you selected the Migration Preference to *Separate parts into EGL files*, the migration tool overwrites the files created for programs, formGroups, and dataTables. If you did not select the preference, then these parts are placed in the targetFile and added or overwritten based on your response to the overwrite prompt.
    - The migration tool always overwrites the files for VGUI records and .eglbld files.

Similarly to the first technique, you can avoid this problem by migrating each program with its associates to a separate EGL package. This still results in duplicate parts in the workspace, but because they are in different packages, EGL is able to resolve the part references.

  - If you split the common parts out into a separate External Source Format file, you might not have all the information necessary to do a good VisualAge Generator to EGL migration on a single-file basis. For example, if you have an SQL record in one External Source Format file, and a function that uses modified SQL for the record is in a different file, the migration tool cannot completely build the I/O statement for the function. In addition, if the common parts are in a different package, you must add EGL import statements to each file that needs to reference the common package (or packages).

- Additional processing that is done by Stages 2 and 3 is also not performed in single file mode. Some examples are as follows:
  - Forms are not nested within formGroups.
  - Only one line is included between the parts in the output files.

See "Migration challenges" on page 27 and "Techniques used by the VisualAge Generator to EGL Migration Tool" on page 32 for a better understanding of the differences between single file migration and Stage 1 to 3 migration.

Migration challenges

There are several differences between the VisualAge Generator and EGL approaches to writing and managing source code. The following differences are of particular importance to migration:

- EGL syntax in some cases is more precise than VisualAge Generator
- Differences in when and how part references are resolved
- Differences in handling common code

These differences are explained in more detail in the following sections.

Precise EGL syntax

Even though the syntax of the two languages differs greatly, the VAGen language can, for the most part, be migrated to the EGL language while preserving the same behavior as the original VAGen program. However, there are number of situations in which the EGL syntax is more precise or more restrictive than in VisualAge Generator. These situations are rare in typical programs. However, when they do occur, the migration tool requires cross-part migration to determine the exact EGL syntax that preserves the behavior you required in VisualAge Generator. Cross-part migration means that the migration tool needs to have one or more other referenced parts available to be able to do a correct migration of the current part. The following are some examples:

- In VisualAge Generator you use the DISPLAY I/O option for both display (text) and printer maps. EGL provides the display statement for text forms and the print statement for print forms. To facilitate migration from VisualAge Generator, there is an EGL preference to indicate that you want VisualAge Generator Compatibility. The VisualAge Generator Compatibility preference permits the use of the display statement for print forms. During migration, if the program, its map group, and the map are all available, then the migration tool can determine whether to migrate to a display or print statement. However, if the DISPLAY function is being migrated without a program, then the migration

tool cannot definitively determine whether to use an EGL display or print statement. In this situation, the migration tool uses the display statement because it is tolerated for print forms in VisualAge Generator Compatibility mode.

- In VisualAge Generator you use the SET map PAGE statement for both display (text) and printer maps. This causes the screen to be cleared if the next CONVERSE or DISPLAY is for a display map and a page eject if the next DISPLAY is for a printer map. EGL provides the clearScreen system library function for text forms and the pageEject system library function for print forms. The VisualAge Generator Compatibility preference does not affect the use of clearScreen or pageEject. During migration, if the program, its map group, and the map are all available, then the migration tool can determine whether to migrate to the clearScreen or pageEject system library function. However, if the SET map PAGE statement is used in a function that is being migrated without a program, then the migration tool cannot definitively determine whether to use the clearScreen or pageEject system library function. In this situation, the migration tool uses EZE_SETPAGE, which is intentionally invalid EGL syntax. This results in an error in the Problems view so that you are aware you need to correct the function.
- In VisualAge Generator, you can specify either an edit table or an edit function as the edit routine for a map variable field. You cannot specify both. In EGL, you can specify both the validatorDataTable and the validatorFunction properties. If the edit table or the edit function is available during migration, the migration tool can determine whether to set the validatorDataTable or the validatorFunction property. However, if the part specified by the edit routine is not available, the migration tool cannot definitively determine whether to set the EGL validatorDataTable or validatorFunction property. In this situation, the migration tool attempts to determine whether the edit routine is a table or function by using information such as the length of the edit routine name and the existence of an edit message. If the migration tool still cannot make a determination, it uses the validatorFunction property. There will only be an error in the Problems view if the validatorFunction is not a function or cannot be found.

The migration tool uses all the available parts in the migration set to resolve ambiguous situations. To minimize these ambiguous situations, always include associated parts when you migrate. For example, when you migrate a program, be sure to include all the parts that you need to generate the program in VAGen. This ensures the best possible migration of your parts. For an overview of how the migration tool resolves ambiguous situations, see the following sections:

- “Migrating with a program” on page 41
- “Migrating with associated parts” on page 42
- “Migrating without associated parts” on page 43

See Chapter 3, “Handling ambiguous situations,” on page 61 for a complete list of the situations where the migration tool must do cross-part migration to achieve a correct migration and the steps the migration tool takes to try to make an intelligent choice if the additional parts are not available.

When and how part names are resolved

At definition time, VisualAge Generator does not require that all parts exist. In the program structure diagram, VisualAge Generator indicates missing maps, records, tables and functions with a question mark. However, in other places such as the use of a shared data item, there is no indication if the part does not currently exist.

When you save a part in VisualAge Generator, there is some basic syntax validation, but there is no cross-part validation until you test, validate, or generate. In EGL, whenever you save a file, there is more extensive validation -- including validation that all part names can be resolved. This gives you the earliest possible warning when there is a problem.

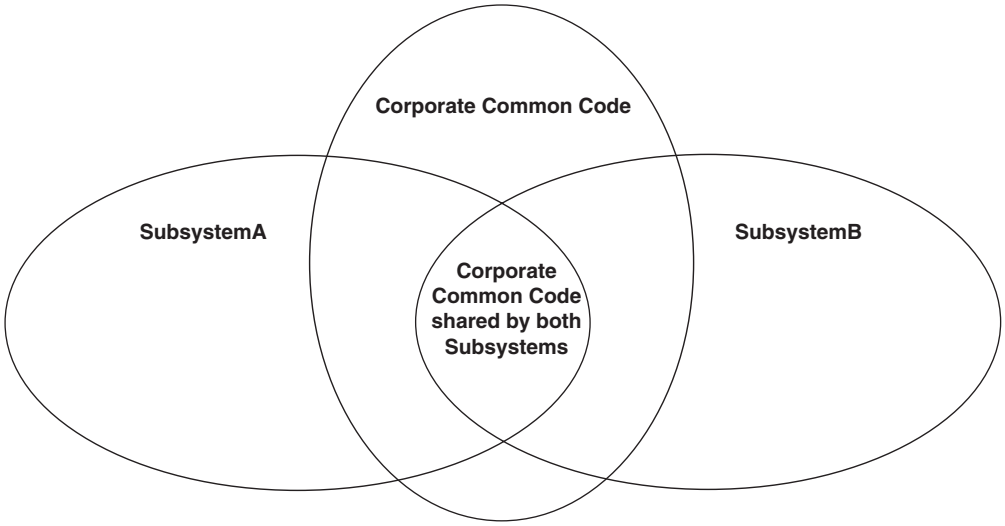
VisualAge Generator searches all parts in the workspace to find a particular part name. If there are duplicate part names in VisualAge for Java, then test and generation stop until the duplicate part problem is fixed. VisualAge for Smalltalk does not permit you to load duplicate parts into the image. In EGL, you are permitted to have duplicate part names in your workspace. EGL uses a combination of the EGL build path for a project, import statements in a file, and the containerContextDependent property for records and functions to determine which definition of a part to use.

When you migrate using Stage 1 to 3 migration, the migration tool sets the EGL build path for projects and includes import statements in files based on the available parts in the migration set. To obtain the correct EGL build path and import statements, always include all the associated parts when you migrate. For example, when you migrate a program, be sure to include all the parts that you need to generate the program in VisualAge Generator. This ensures the best possible migration of your parts. See the following sections for more details:

- "EGL build path and import statements" on page 35
- "containerContextDependent Property" on page 36

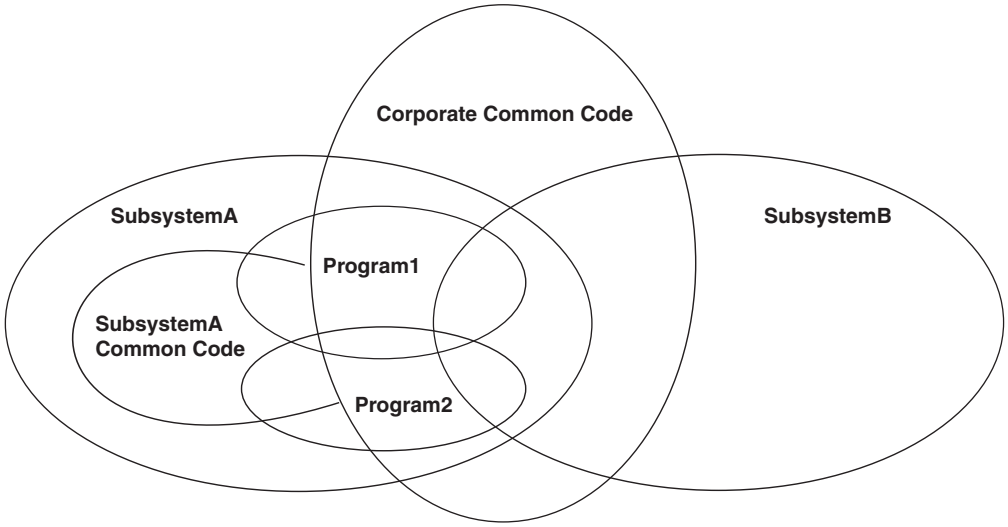
Common code scenarios

Common code is code that is shared between subsystems or programs. The following figure shows common code that is shared by two subsystems.



In this case, there are one or more Java projects or Smalltalk configuration maps that contain Corporate Common Code. The code in these projects or configuration maps can be shared by multiple subsystems. In this example, SubsystemA and SubsystemB use subsets of the common code. Some of the Corporate Common Code is used by both subsystems. For example, Corporate Common Code might include SQL record definitions that are used by many subsystems.

The next figure shows the same basic sharing of Corporate Common Code by the two subsystems, with SubsystemA shown in more detail.



SubsystemA has SubsystemA Common Code that is used by multiple programs within SubsystemA, but only by programs within SubsystemA. In this case, Program1 and Program2 each make use of some of the SubsystemA Common Code as well as some of the Corporate Common Code. Between the two programs, there is some overlap of both the SubsystemA Common Code and the Corporate Common Code, including overlap with Corporate Common Code that SubsystemB uses. For example, SubsystemA Common Code might include SQL record definitions that are used only by programs within SubsystemA. SubsystemA Common Code might also include a map group definition that is used by several programs within SubsystemA.

Common code and VisualAge Generator

To facilitate the use of common code, VisualAge Generator determines at test and generation time how a particular piece of source code should be interpreted. The advantage of this is that each subsystem or program can make slight variations in the code, just by varying the specific map group that a program uses or by varying data item or record definitions that are in the workspace during generation. The following are three examples:

- Much of the same logic can be shared by an online program that interacts with a terminal and a batch program that prints a similar report as follows:
  - ProgramA is main transaction program using MapGrpA which contains display maps named HEADER, DETAIL, and TRAILER. ProgramA displays the partial HEADER map, displays DETAIL lines in a floating area, and then converses the TRAILER map which contains an input field where the user can request the next report. ProgramA uses the SET™ HEADER PAGE statement to clear the screen.
  - ProgramB is a main batch program using MapGrpB which contains printer maps named HEADER, DETAIL, and TRAILER. Program B produces a hardcopy version of the same report that ProgramA displays on a terminal. ProgramB displays the partial HEADER map, displays the DETAIL print lines in a floating area, and then displays the TRAILER map at the bottom of the page. ProgramB uses the SET HEADER PAGE statement to force a page eject.
  - The number of lines in the floating area differs between the main transaction and the main batch programs. However, the logic for data retrieval, data manipulation, and displaying the HEADER and DETAIL maps is the same for both programs. Because of this, ProgramA and ProgramB were designed to use common functions to retrieve data from the database, manipulate the data, and display the HEADER and DETAIL maps.

  - This common code technique works in VisualAge Generator because the same DISPLAY I/O option can be used for both display and printer maps. In addition, the same SET HEADER PAGE statement can be used for both display and printer maps. VisualAge Generator interprets the DISPLAY I/O option and the SET map PAGE statement based on the specific program it is testing or generating.
  - EGL requires different statements for display and print forms -- display and clearScreen for a text form; print and pageEject for a print form. In VisualAge Generator Compatibility mode, the display statement is tolerated for a print form. However, even in VisualAge Generator Compatibility mode, clearScreen only applies to text forms and pageEject only applies to print forms.

- A less typical example is the use of a common error handler function called SET-MESSAGE-TEXT which retrieves message text from a VAGen table called MSGTBLE and stores it in a function parameter called MESSAGE-TEXT, where MESSAGE-TEXT is a shared data item.
  - Assume that SubsystemA and SubsystemB run in different CICS regions. In this case, the two subsystems can each provide their own definition of the MSGTBLE and their own definition of the MESSAGE-TEXT shared data item which is used as a function parameter. This might occur if the subsystems provide different size error message fields on their respective map definitions.
  - VisualAge Generator uses the definition that is currently loaded in the workspace when it generates a program. As long as each subsystem always loads its own definition of the MESSAGE-TEXT data item into the workspace before test or generation, VisualAge Generator will use the definition that is correct for that subsystem. The disadvantages of this technique are that you must control what is in the workspace when you generate and you cannot have both subsystems in the workspace at the same time.
  - EGL permits you to have both subsystems in the workspace at the same time. In this situation, EGL uses a combination of the EGL build path, import statements, and the containerContextDependent property for the SET-MESSAGE-TEXT function to resolve the reference to the MESSAGE-TEXT dataItem part definition.
- A slightly different example is the use of a common error record called ERROR-RECORD which contains a shared data item called MESSAGE-TEXT2.
  - Assume that SubsystemA and SubsystemB have different definitions of MESSAGE-TEXT2. This might occur if the subsystems need to build message text for different screen sizes.
  - VisualAge Generator uses the definition that is currently loaded in the workspace when it generates a program. As long as each subsystem always loads its own definition of MESSAGE-TEXT2, VisualAge Generator will use the definition that is correct for that subsystem. The disadvantages of this technique are similar to the SET-MESSAGE-TEXT function example. You must control what is in the workspace when you generate and you cannot have both subsystems in the workspace at the same time.
  - EGL permits you to have both subsystems in the workspace at the same time. In this situation, EGL uses a combination of the EGL build path, import statements, and the containerContextDependent property for the ERROR-RECORD to resolve the reference to the MESSAGE-TEXT2 dataItem part definition.

Common code and the migration tool

Common code is generally code that is used in many programs. You need to include the common code in every migration set because it influences the migration tool in the following ways:

- If common code is available, the migration tool is able to resolve most ambiguous situations. This minimizes or eliminates the code changes you must do manually.
- If common code is available, the migration tool can properly set the EGL build path for projects and include the correct import statements for your EGL files. This minimizes the number of EGL build path changes and additional import statements you must do manually.
- The first time the migration tool migrates a part version, the tool stores the EGL created for the part into the migration database. The original External Source Format is also retained in the migration database. If another migration set uses the same part version, the migration tool uses the original External Source Format for reference when creating EGL for the new parts in the additional migration set, but does not convert the part to EGL again. The migration tool also uses the EGL for the part version when building the EGL projects, packages, and files for the additional migration set. This technique provides the necessary reference information for the migration tool to resolve ambiguous situations during cross-part migration, while improving performance by only migrating each part version one time.

To ensure the best possible migration, when you are migrating a subsystem, you should always include Corporate Common Code and the Subsystem Common Code in your migration set.

Techniques used by the VisualAge Generator to EGL Migration Tool

Overview of techniques

There are a number of techniques that the migration tool uses to determine the corresponding EGL syntax and to preserve the VisualAge Generator behavior. These techniques are as follows:

- Editor and build descriptor preferences
- Program properties
- EGL build path and import statements
- containerContextDependent property
- EGL reserved word list
- Placing parts in EGL files
- Migrating with a program
- Migrating with associated parts
- Migrating without associated parts
- Controlling the order for processing migration sets
- Overwriting and merging files

These techniques are explained in the following sections. There are also some general rules that govern the migration tool.

Editor and build descriptor preferences

Before you start Stage 2 of migration, you should turn on the *VisualAge Generator Compatibility* preference for your workspace. The EGL *VisualAge Generator Compatibility* preference provides support for the following VAGen behaviors:

- Use of the hyphen (-) and national language characters @ and # in part names. However, these characters are not permitted as the first character of a name even in VisualAge Generator Compatibility mode.

- The primitive data types **numc** and **pacf**
- Defaulting the subscript to 1 for single dimension structure-field arrays
- The **deleteAfterUse** property on a **use** declaration for a dataTable, which is the replacement for keep after use
- The SQL field property **sqlDataCode**
- The **call** statement options of *externallyDefined* and *noRefresh*, which are the replacements for the NONCSP and NOMAPS options
- The **transfer** and **show** statement *externallyDefined* option, which is the replacement for the NONCSP option on DXFR and XFER statements
- A **display** printForm statement is implemented the same as a **print** printForm statement
- The initial value of a form field is used only when displaying a field on the screen that has not had a value assigned to it. The preference does not set the initial value of the field in storage.
- Even precision for decimal fields (VAGen PACK fields) is incremented by 1 except for host variable references in SQL WHERE clauses and the EGL *prepare* statement.

The EGL *VisualAge Generator Compatibility* preference provides the following replacements for EZE data words:

- The **VGVar.handleSysLibraryErrors** system variable, which is the replacement for EZEREPLY
- The **dliVar.handleHardDLIErrors** system variable which is the replacement for EZEDLERR
- The **ConverseVar.segmentedMode** system variable, which is the replacement for EZESEGM
- The **VGVar.sqlIsolationLevel** system variable, which is the replacement for EZESQISL.
- The **VGLib.getVAGSysType** system function, which provides the old VAGen values for EZESYS

The EGL *VisualAge Generator Compatibility* preference provides the following replacements for EZE function words:

- The **VGLib.connectionService** system function, which is the replacement for EZECONCT

The VAGen migration tool automatically adds the vagCompatibility=″YES″ option to every VAGen generation option part that it migrates to an EGL build descriptor part. The vagCompatibility build descriptor option directs generation to provide the same support as the *VisualAge Generator Compatibility* preference.

Note: If you think that you might want to eliminate the use of VisualAge Generator Compatibility mode in the future, see “Eliminating the use of VisualAge Generator Compatibility mode” on page 201 for details **before you migrate**. For example, if you need to eliminate hyphen, @, or # from your part names, you might want to use a Rename User Exit during migration.

There are preferences that enable you to minimize the migration tool’s use of VisualAge Generator Compatibility mode. For example, you can specify that the migration tool should not add the vagCompatibility=″YES″ build

descriptor option to every VAGen generation option part. For details, see "VAGen Migration Preferences" on page 157.

Regardless of how you set the preferences, the migration tool always turns on VisualAge Generator Compatibility mode when refreshing the workspace.

Program properties

There are five program properties that the migration tool includes for every program:

- *includeReferencedFunctions = yes.* The migration tool always includes this program property so that functions do not have to be nested within the program. This enables you to keep just one copy of common functions in a separate project or package and import them, rather than including the common functions in each program. When you use Stage 1 – 3 migration, the migration tool also includes any necessary import statements for functions that are in a different package from the program.
- *allowUnqualifiedItemReferences = yes.* The migration tool always includes this program property so that references to fields (VAGen data items) do not need to be qualified. The EGL rules for unqualified fields incorporate the VAGen rules so that unqualified fields resolve to the same record, dataTable (VAGen table) or form (VAGen map) as in VisualAge Generator. The migration tool does not add qualifications.
- *localSQLScope = yes.* The migration tool always includes this program property even though yes is the default value. The naming conventions that the migration tool uses to create the result set ID and the prepare statement ID do not guarantee uniqueness across programs. Therefore, localSQLScope = yes is required to preserve VAGen behavior.
- *throwNrfEofExceptions = yes.* The migration tool always includes this program property so that NRF (noRecordFound) and EOF (endOfFile) are treated as error conditions. In EGL, NRF and EOF are not normally treated as error conditions. Therefore, throwNrfEofExceptions = yes is required to preserve VAGen behavior.
- *handleHardIOErrors = no.* The migration tool always includes this program property so that the default value for VGVar.handleHardIOErrors is set to 0. VGVar.handleHardIOErrors is the replacement for EZEFEC. The normal EGL default value for VGVar.handleHardIOErrors is 1. However, the VAGen default value for EZEFEC is 0. Therefore, handleHardIOErrors = no is required to preserve VAGen behavior.

The migration tool includes the @DLI complex property for every DL/I or IMS program and sets the following properties:

- *psb = "psbVariableName"*. The migration tool includes this program property to specify the name of the variable that provides the name of the PSB record part. The migration tool always uses psb as the variable name.
- *callInterface = DLICallInterfaceKind.CBLTDLI*. The migration tool includes this program property to ensure that CBLTDLI is used as the call interface. CBLTDLI provides the same call interface that is used by VisualAge Generator. EGL uses AIBTDLI as the default call interface. If you want to use AIBTDLI, you must add PCB Name information to your IMS PSBs and your EGL PSB record parts.
- *handleHardDLIErrors = no*. The migration tool includes this program property so that the default value for dliVar.handleHardDLIErrors is set to 0. dliVar.handleHardDLIErrors is the replacement for EZEDLERR. The normal EGL

default value for dliVar.handleHardDLIErrors is 1. However, the VAGen default value for EZEDERR is 0. Therefore handleHardDLIErrors = no is required to preserve VAGen behavior.

- *pcbParms* = [*list of PCB parameters*]. If the VAGen program includes EZEDLPCB[*n*], where *n* is a numeric literal, as a called parameter, the migration tool includes the pcbParms property to provide the mapping of the input PCB parameters to the PCBs in the program's PSB record part.

EGL build path and import statements

EGL enables you to have multiple definitions for a part name in the workspace at the same time. The EGL build path for a project limits which other projects will be considered when looking for a part name. The import statement in a file determines which packages, other than the current package, and which parts within the EGL build path will be considered when looking for a part name.

In most situations, the EGL build path and import statements are sufficient to resolve any part references. For example, the EGL build path and import statements for a program are sufficient to resolve a record name if you use the record as a type definition in a record declaration in a program. The EGL build path and import statements are also sufficient to resolve dataItem part references if you only have one definition of the dataItem part that can be used with a record definition, function local storage or function parameter list.

For example, you might be working on SubsystemA and SubsystemB which have two different definitions of RECORDX. All programs in SubsystemA need to use the SubsystemA definition of RECORDX. This can be achieved as follows:

- The EGL build path property for projects in SubsystemA needs to include the project that provides SubsystemA's definition of RECORDX.
- Files for programs in SubsystemA that use RECORDX as a type declaration for a record need to include an import statement for the package within SubsystemA that contains the definition of RECORDX.

The EGL build path property for the SubsystemA projects limits the projects that will be searched to just the projects within SubsystemA and the common projects. The import statements in the files within SubsystemA limit which packages within the EGL build path will be considered. Even if RECORDX uses dataItem part ITEM1 as a type definition and the two subsystems have different definitions of ITEM1, the EGL build path and import statements are sufficient to resolve the references to ITEM1. The project that contains RECORDX in each subsystem must specify an EGL build path property that includes the subsystem project that contains that corresponding subsystem definition of ITEM1. The file containing RECORDX in each subsystem must have an import statement that specifies the subsystem package that contains the corresponding subsystem definition of ITEM1.

When you use Stage 1 – 3 migration, the migration tools do the following **based on the parts in the migration set**:

- Set the EGL build path for each project based on the parts the project needs to reference in other projects.
- Include most import package statements for each file based on the parts the file needs to reference in other packages within the EGL build path for the project that contains the file. These import statements are based on the part associates that were determined by VisualAge Generator during Stage 1 of migration.
- The migration tool adds import statements for data item parts. During Stage 2 migration, the migration tool determines if a data item part has an edit routine.

If the table or function specified as the edit routine is included in the migration set, then the migration tool updates the migration database to include the part specified as the edit routine as an associate of the data item.

- The migration tool adds import statements for UI records. During Stage 2 migration, the migration tool determines if any field in the UI record specifies program link information. If so and the referenced program and first UI record are included in the migration set, then the migration tool updates the migration database to include the program and first UI record as an associates of the UI record.
- The migration tool adds import statements for functions. During Stage 2 migration, the migration tool determines if any statement in the function explicitly references a table. If so and the referenced table is included in the migration set, then the migration tool updates the migration database to include the table as an associate of the function.
- The migration tool does not add import statements for the following situations because these are not associates in VisualAge Generator:
  - For a function that transfers to a program using a CALL, DXFR, or XFER statement. If you are generating for Java, you must add the import statement for the package containing the program within the file containing the function or fully qualify the program name with the package name. Alternatively, you can use an entry in a linkage options part to specify the name of the package where the program is located.
  - For build parts in *.eglbld* files. VAGen control parts, such as the generation options parts, do not list their associated parts, so the information is not readily available to the migration tool. In addition, due to the way EGL processes build descriptor parts, you will likely need to do some reordering of the *nextBuildDescriptor* values (VAGen /OPTIONS). This reordering will in turn require modification of any imports the migration tool might have done.

Note: The Stage 1 migration tool analyzes the parts in the migration set to determine the associates for each part. To ensure that only parts for the migration set are included in the analysis, the Stage 1 migration tool deletes any Java projects from the workspace before loading the migration set specified by a high-level PLP project. Similarly, the Stage 1 migration tool deletes any Smalltalk configuration maps before loading the migration set specified by a high-level configuration map. Because the analysis of associates is limited to the migration set, the migration tool does not set the EGL build path property to specify EGL projects that are not included in the migration set. In addition, the migration tool does not include import statements for EGL packages that are not included in the migration set.

When you use single file migration, the migration tool functions as follows:

- Does not set the EGL build path because the output is always going into a single existing project.
- Does not include the import package statements because all the files that are created go into the same package. Thus, no import statement is required.

containerContextDependent Property

Note: This section describes a capability that is only partially implemented in EGL version 6.0.1. If you specify containerContextDependent for a function, the resolution of function invocations within that function occurs at generation time (not at development time) and includes reference to the name space of

the program or PageHandler that uses the invoking function. At this time, containerContextDependent has no effect on name resolution for record or dataItem parts.

The description that follows reflects what is intended for the final implementation.

As described in "EGL build path and import statements" on page 35, the EGL build path and import statements are generally sufficient to provide the part name resolution that you need. However, EGL expects to resolve all part name references whenever you save a file. EGL adds an error message to the Problems view if it cannot resolve the part name. Depending on your architecture, you might also need to use the containerContextDependent property for records or functions.

Consider the situation where RECORDX is used as the type definition for a function parameter in FUNCTIONY. Assuming that RECORDX and FUNCTIONY are in different projects and packages, EGL expects the following:

- The EGL build path for the project that contains FUNCTIONY must include the project that contains the definition of RECORDX.
- The file containing FUNCTIONY must include an import statement for the package that contains RECORDX.

If all subsystems have the same definition of RECORDX, then the EGL build path and import statements are sufficient, and EGL can resolve the part reference for RECORDX whenever you save the file containing FUNCTIONY.

However, consider the situation in which SubsystemA and SubsystemB both use FUNCTIONY, but have different definitions of RECORDX. In this situation, the EGL build path and import statements cannot point to both subsystems at the same time. EGL supports the containerContextDependent property for functions. In this situation, you can specify *containerContextDependent=yes* for FUNCTIONY. This specifies that the part name references for the function parameters and local storage are not to be resolved until FUNCTIONY is used within a program. When you test or generate a program that uses FUNCTIONY, the EGL build path of the project containing the program and the import statements of the file containing the program determine where to find the definition of RECORDX. Using *containerContextDependent=yes* enables you to achieve the same flexibility provided by VisualAge Generator for the function. The EGL build path for each project in the subsystem and the import statement for any files containing programs in the subsystem point to that subsystem's definition of RECORDX.

The containerContextDependent property is also supported for record parts. For example, SubsystemA and SubsystemB might both use the same definition of RECORDZ. However, RECORDZ uses a type definition that references the dataItem part called ITEM1. The subsystems have different definitions of ITEM1. In this case, you can specify *containerContextDependent=yes* for RECORDZ so that EGL validation will not attempt to resolve ITEM1 until RECORDZ is used in a program. The EGL build path of the project containing the program and the import statements of the file containing the program determine where to find the definition for ITEM1.

The migration tool does not attempt to set the containerContextDependent property for you. This is because the migration tool does not require that you migrate all your subsystems at the same time and does not do a complete analysis of all definitions of all parts to determine when there are duplicate part definitions. You can add the containerContextDependent property as necessary if you

determine that there are duplicate part names that need to be resolved at test and generation time (as in VisualAge Generator) rather than at definition time (as in EGL).

EGL reserved word list

EGL has a reserved word list. Parts cannot be named the same as any EGL reserved word. In addition, EGL does not permit the use of the # or @ symbol as the first character of an EGL part name. If a VAGen part is named the same as an EGL reserved word, or if a VAGen part starts with the # or @ symbol, the migration tool does the following based on the part type:

- The migration tool does not rename programs, map groups, or tables because these parts frequently have references from non-VAGen programs or the runtime environment (for example, a CICS PROGRAM definition).
- The migration tool renames data items, records, maps, and functions by prefixing the part name with a Renaming prefix. The Renaming prefix is one of the VAGen Migration Preferences that you can specify for Stage 2 or single file mode migration.

  Note: For the purposes of renaming, the migration tools treat a UI record the same as other records. In addition, if a UI record must be renamed, the Stage 3 migration tool changes the name of the .egl file that contains the UI record so that the file name matches the new name for the record.
- The migration tool does not rename control parts, except for the following:
  - The migration tool removes the .BND suffix from the end of a bind control part name.
  - The migration tool removes the .LKG suffix from the end of a link edit part name.
  - The migration tool changes any other dots to underscores in control part names. The tool also changes dots to underscores in control part names that are referenced in the /OPTIONS, /RESOURCE, and /LINKEDIT generation options.

The Stage 1 migration tools provide a list of the program, map group, table, and control part names that conflict with the EGL reserved word list. If you do not rename these parts before you migrate, the Stage 2 migration tool (or single file mode) will also issue an error message. There will be an error in the Problems view. You can correct the problem in EGL by renaming the program, formGroup, or dataTable and optionally using the EGL *alias* property.

Note: The Stage 2 migration tool issues a warning message for any UI record that is renamed by the tool. Because the Stage 3 migration tool also renames the .egl file, there is no error in the Problems view for UI records.

Placing parts in EGL files

When you migrate using Stage 1 – 3 migration, each Java package or Smalltalk application migrates to the corresponding EGL package based on your Stage 1 renaming rules. The VAGen parts within the original Java package or Smalltalk application are placed in one or more EGL files within the corresponding EGL package based on the following:

- The type of part:
  - Generatable part -- program, table, map group, or UI record
  - Control part -- generation options, resource associations, linkage table, linkedit, or bind control

  - Other migratable parts -- data item, map, function, PSB, and records other than UI records.
- A Stage 1 preference that enables you to identify Java project or package names that contain common parts. Similarly, there is a Stage 1 preference for Smalltalk that enables you to identify configuration map or application names that contain common parts.
- Whether the part is used by some other part. The Stage 1 migration tool determines whether a part is used based on the following:
  - A part is ″used″ if it appears on the VAGen associates list of any generatable part **in the migration set**.
  - A part is ″used″ if it is in a common Java project or package or in a common Smalltalk configuration map or application as specified in your Stage 1 preferences.

The Stage 1 migration tool determines the placement of all parts. The Stage 1 migration tool places VAGen parts within a single Java package or Smalltalk application into EGL files within the corresponding EGL package as follows:

- All control parts are placed in a single file called eglPackageName.eglbld, where eglPackageName is the name of the corresponding EGL package.
- Each program part is placed in a file called programName.egl, where programName is the name of the program.
- Each table part is placed in a file called tableName.egl, where tableName is the name of the table.
- Each map group and all maps in the map group are placed in a file called mapGroupName.egl, where mapGroupName is the name of the map group. If there is no map group part, the Stage 1 migration tool creates a dummy map group part. Because the map group and all maps in the map group must be placed in the same file, these parts must be considered as a group. This can result in some parts being moved to a different EGL package or project if the parts were not originally in the same Java package or Smalltalk application. The migration tool determines where to place the mapGroupName.egl file as follows:
  - If the map group and all its maps are **in the same Java package**, the mapGroupName.egl file is placed in the corresponding EGL package. Similarly, if the map group and all its maps are in the same Smalltalk application, the mapGroupName.egl file is placed in the EGL package that corresponds to the Smalltalk application. In this situation, the migration tool handles the mapGroupName.egl file in the same manner as the program and table files. This is the most common situation.
  - If the map group and its maps are spread across **several Java packages within a project**, then the project name, plus a suffix is used to create the name of a new EGL package to contain the mapGroupName.egl file. This new EGL package is placed within the original project. Similarly, if the map group and its maps are spread across several Smalltalk applications within a configuration map, the configuration map name, plus a suffix is used to create the name of a new EGL package to contain the mapGroupName.egl file. For both Java and Smalltalk, you can control the suffix with a Stage 1 preference.
  - If the map group and its maps are spread across **several Java projects**, then the migration set name, plus a suffix is used to create the name of a new EGL project that contains the mapGroupName.egl file. Similarly, if the map group and its maps are spread across several Smalltalk configuration maps, the migration set name, plus a suffix is used to create the name of a new EGL

project that contains the mapGroupName.egl file. For both Java and Smalltalk, you can control the suffix with a Stage 1 preference.

- Each UI record is placed in a file called uiRecordName.egl, where uiRecordName is the name of the UI record.
- All the remaining parts are placed as follows:
  - If the part is **used by only one** program in the migration set, the part is placed as follows:
    - If the part is in the same package as the program, then the part is placed in the same file as the program. For example, the main function of a program (ProgramA-MAIN) is placed in the same file as the program (ProgramA) provided the function is not used in any other programs. The file is named for the program – ProgramA.egl.
    - If the part is in a different package from the program that uses it, the part is placed as follows:
      - If the part is in a common project or package, the part is placed in the file called commonParts.egl in the part's original package. You control the name for *commonParts* with a Stage 1 preference.
      - If the part is not in a common project or package, the part is also placed in the file called commonParts.egl in the part's original package.
  - If the part is **used by several** programs in the migration set, then the part is placed in the file called commonParts.egl within its original package. For example, if ProgramA calls ProgramB and passes RecordR, then RecordR is placed in the file called commonParts.egl in the EGL package that corresponds to the original Java package or Smalltalk application that contains RecordR.
  - If the part is **not used** by any programs in the migration set, the part is placed into a file as follows:
    - If the part is in a common Java project or package, then the part is placed in the file called commonParts.egl within the EGL package that corresponds to the original Java package that contains the part. Similarly, if the part is in common Smalltalk configuration map or application, then the part is placed the file called commonParts.egl within the EGL package that corresponds to the original Smalltalk application that contains the part.
    - If the part is not in a common Java project or package, then the part is placed in the file called unusedParts.egl within the EGL package that corresponds to the original Java package that contains the part. Similarly, if the part is not in a common Smalltalk configuration map or application, then the part is placed in the file called unusedParts.egl within the EGL package that corresponds to the original Smalltalk application that contains the part. You control the name for *unusedParts* with a Stage 1 preference.
- There are the following special considerations:
  - Any function used as an edit routine on a map or UI record contributes to whether the function is used or not used. However, the migration tool always places the function with either the program or in the commonParts file. The migration tool never places the edit function in a file that is created for the map group or in the file that is created for the UI record.
  - Any shared item that is used in a table or UI record contributes to whether the data item is used or not used. However, the migration tool always places the data item with either the program or in the commonParts file. The migration tool never places the data item in a file that is created for the table or in the file that is created for the UI record.

Note: If you migrate multiple migration sets or migration set versions without clearing out the migration database, **the first migration set version processed in Stage 1 that contains a part edition controls the project, package and file name for the EGL part.** To ensure that parts are placed according to the definition of each migration set version, you should clear out the migration database between versions. Alternatively, migrate the most recent version of the migration set through Stage 1 so that any part edition that has not changed since earlier migration set versions is placed into an EGL file based on its current usage. For example:

- A part that was previously used by only one program might now be used by several programs. Migrating the most recent version of the migration set first causes the part to be placed into a common parts EGL file rather than with the program that was the original (and sole) user of the part.
- A part that was previously not used by any programs might now be used by one or more programs. Migrating the most recent version of the migration set first causes the part to be placed based on its current usage, rather than in the unusedParts.egl file.

The Stage 1 migration tools for Java and Smalltalk are provided as sample code. You can modify the Stage 1 migration tools to place parts differently based on your own library management philosophy. For example:

- If ProgramX calls ProgramY and passes records ProgramY-Parm and Common-Parm, you might want ProgramY-Parm to be placed in the file with ProgramY and Common-Parm to be placed in the commonParts file. Given knowledge of your naming conventions, you can modify the Stage 1 migration tool to change the file placement algorithm.
- For large packages, you might want to split the parts into separate files by part type or by the first few characters of the part name.
- If the same part edition appears in multiple migration set versions, but should be placed in different EGL projects, packages, or files depending on the migration set version, you might want to update the migration database for the new EGL project, package, and file name for each part whenever you process a migration set version. If you make this change, be sure to process each migration set version completely through Stages 1 – 3 before starting to migrate the next migration set version.
- If you used a strategy of placing one program per Java package and one package per project, you might want to combine packages or projects to reduce the number of EGL projects and packages you need to manage in your source code repository. Similarly, if you used a strategy of placing one program per Smalltalk application and one application per configuration map, you might want to combine applications or configuration maps when creating your EGL projects and packages.

Migrating with a program

Normally when you migrate, you specify a migration set that identifies all the Java projects or Smalltalk configuration maps that should be migrated as a group. Using the migration set, the migration tool migrates programs and their associates first. This enables the tool to use the context of a specific program to assist in resolving situations where the EGL language is more precise or more restrictive than VisualAge Generator. The first program to migrate, together with its associates, determines the EGL syntax for any ambiguous situation within that program or its associates. A different program might result in a different resolution for the same ambiguous situation in a shared data item, common record, map, table or function.

Because a part version is only migrated once, the first program that uses the common part controls the resolution of any ambiguous situation for its associates.

Consider the example in which ProgramA is a main transaction program using display maps and ProgramB is a main batch program using printer maps. The programs share common functions that display the HEADER and DETAIL maps. The common functions also use the SET map PAGE statement to clear the screen or force a page eject. In this case, if ProgramA migrates first, the migration tool creates the EGL source for the functions to use the display statement and clearScreen system library function. If ProgramB migrates first, the migration tool creates the EGL source to use the print statement and the pageEject system library function.

Whenever you migrate programs and their associates, the first program that uses a shared data item, common record, map, table, or function controls the resulting EGL code. In most cases, because the programs use the common code in the same way, this technique provides the most appropriate migration of your VAGen source. However, as you can see from this example, the specifics of what you intended the common code to accomplish might not be reflected in the resulting EGL source. In this example, regardless of which program migrates first, you will not be able to test or generate the program that migrates second. In VisualAge Generator Compatibility mode, you can use the display statement to resolve the problem with the I/O statement. However, to resolve the problem with the choice of clearScreen or pageEject might require adding a new variable, TEXT-OR-PRINT, that each program initializes and which the common function tests to determine whether to execute the clearScreen or pageEject system library function.

Migrating with associated parts

If a program and its associates are not available, the migration tool makes use of all the parts that are available in the migration set (or in the External Source Format file if you are migrating in single file mode). In this case, if the additional part that is needed for cross-part migration is available, the migration tool can make a decision with a high probability that it is the correct choice.

Consider the example in which a map variable field specifies an edit routine. If a VAGen table that is named the same as the edit routine is available in the same migration set (or the External Source Format file), then the migration tool assumes that this is the table that would always be used and migrates to the validatorDataTable property. If there is a function that is named the same as the edit routine, then the migration tool migrates to the validatorFunction property. In either case, because there is a part with the same name as the edit routine, the migration tool has a high probability that it made the correct choice. If a table or function with the same name as the edit routine is not available, then the migration tool processes the map variable field as though it was migrating without associated parts.

In many cases, migration with associated parts can provide very similar migration to what you would achieve when you migrate programs with their associates. The disadvantage of migrating without the program is that you can quickly shift from migrating with associated parts to migrating without associated parts even within a single function based on the specific statement that is being migrated and the other parts that are included in the migration set.

Migrating without associated parts

Sometimes even when a program is available, not all of its associates are included in the migration set. Or you might be migrating some common parts that were used in the past by a subsystem, but which are not currently in use. In this case, the associates of a part that is being migrated might not be available. The migration tool still converts the part using one of the following techniques:

- **Flexibility in EGL syntax.** For example, a DISPLAY I/O option is migrated without an associated map. In this case the migration tool makes the choice of using a display statement and includes a warning message in the migration log. Even if the migration tool guessed incorrectly, because you use VisualAge Generator Compatibility mode, the display statement will be accepted even if the form is a print form.
- **Intelligent guess.** For example, a map variable field specifies an edit routine, but there is no part named the same as the edit routine in the migration set. In this case, the migration tool makes use of other information. The tool looks at the following to try to determine whether to use the validatorDataTable or validatorFunction property:
  - Length of the edit routine name, because 8 or more characters indicate it is a function.
  - Edit routine name is EZEC10 or EZEC11, which indicate it is a function.
  - Edit message is also specified, because the message can only be used with an edit table or EZEC10 or EZEC11.

  Any of these enable the migration tool to make an intelligent choice between setting the validatorDataTable or validatorFunction property. If there is nothing to make a definitive choice, the migration tool uses the validatorFunction property and includes an error message in the migration log. If the migration tool guessed incorrectly there should also be an error in the Problems view.
- **Deliberately invalid syntax.** For example, a SET map PAGE is migrated without an associated map. In this case, the migration tool could make the choice between using an EGL converseLib.clearScreen function for a text form and an EGL converseLib.pageEject function for a print form. However, both choices are equally probable. Therefore, the migration tool creates intentionally invalid syntax and converts to converseLib.EZE_SETPAGE. This results in an error in the Problems view and forces you to correct the problem.
- **Direct conversion without information due to missing associates.** (The missing associates can result in problems undetectable by the migration tools.) For example, RecordA specifies that it is redefining the storage of RecordB. In VisualAge Generator, the redefinition information is stored in the record definition for RecordA. When you generate, RecordA and RecordB must be available and the redefinition is done for the RecordA in the program. In EGL the redefinition information is only stored in the program. If RecordA is not available when migrating the program, the migration tool has no way to detect that RecordA needs to include the redefines property within the program. Without the redefines property, EGL test and generation treat RecordA and RecordB as separate data areas. **The program will not run the same as in VisualAge Generator** -- data might not be initialized correctly and abends could occur. This is why we strongly encourage you to generate and test your migrated programs.

Controlling the order for processing migration sets

The Stage 1 migration tool processes migration sets in the following order:

- If you specify a .pln file or a directory containing .pln files, the Stage 1 migration tool processes the migration sets within a single .pln file in the order in which

they are listed within the file. If there are multiple .pln files in a directory, the Stage 1 migration tool processes the files in alphabetical order.

- If you do not specify a .pln file or a directory containing .pln files, the Stage 1 migration tool processes the Java high-level PLP projects that match the specifications in alphabetical order. If multiple versions of the same Java high-level PLP project are requested, the Stage 1 migration tool processes the versions in order based on the date/time stamp. Similarly, the Stage 1 migration tool processes the Smalltalk high-level configuration maps that match the specifications in alphabetical order. If multiple versions of the same Smalltalk high-level configuration map are requested, the Stage 1 migration tool processes the versions in order based on the date/time stamp.
- If you need more control over the order in which migration sets are added to the migration database, run the Stage 1 tool multiple times.

The Stage 2 and 3 migration tools process migration sets in the following order:

- The Stage 2 and 3 migration tools process the migration sets in the same order they are listed in the .vgmig file. By default, if all the migration set names are unique, this is the same order in which the migration sets are listed in the VAGen Migration wizard and is the same order in which the migration sets were added to the migration database in Stage 1.
- If you need to change the order, deselect Migrate now and save the .vgmig file. Double-click on the .vgmig file to change the order and then save the file. Right-click on the .vgmig file and then select Start Migration from the context menu. Alternatively, run Stage 2 and 3 multiple times, specifying just one migration set each time, in the order in which you want the migration to occur.

Note: You should not process multiple versions of a migration set using online mode.

Overwriting and merging files

The Stage 2 and 3 migration wizards provide several related preferences that control processing for multiple versions of the same migration set. These preferences are as follows:

- Migrate remaining VAGen parts.
- Import into workspace -- with or without Override existing files.
- Save migrated files to temporary directory.

Migrate remaining VAGen parts controls whether the migration tool converts all parts in the migration set to EGL.

- For the purposes of the *Migrate remaining VAGen parts* preference, UI records are treated like other records. This preference does not consider UI records to be generatable parts.
- If you do not select *Migrate remaining VAGen parts*, only generatable parts and their associates are converted into EGL and stored in the migration database. Data items, records, and functions are not converted unless they are an associate of one or more generatable parts. Control parts are not converted. Deselecting *Migrate remaining VAGen parts* can be useful if you are migrating a subsystem project and a common project in a single migration set. In this situation, the following happens:
  - For the subsystem project, only parts that are actually used within the subsystem are converted.
  - For the common project, any generatable parts and their associates are converted. In addition, any data items, records, and functions that are used

by the subsystem are also converted. Other data items, records, and functions that might be used by other subsystems but which are not used by the current subsystem are not converted to EGL.

There are two advantages of deselecting *Migrate remaining VAGen parts*:

- For the subsystem project, you have the opportunity to clean up your code because the migration tool only converts parts that are actually used.
- For the common project, you can defer converting parts until they are actually used by another subsystem. When you include the common project in the migration set for another subsystem, any additional parts used by this subsystem are converted to EGL and stored in the migration database. This is particularly useful if your common project has associates in various subsystems or contains parts that are associates of generatable parts in various subsystems. Deferring the migration of the common parts until a subsystem uses the part enables the common parts to migrate "with associates." When you migrate the next migration set that contains the common project, your selection for *Override existing files* controls what happens to the originally migrated common parts files.

- If you select *Migrate remaining VAGen parts*, the generatable parts and their associates are converted to EGL and stored in the migration database. Then any data items, records, and functions that are not associates of generatable parts are converted to EGL. All control parts are also converted to EGL. There are two advantages of selecting *Migrate remaining VAGen parts*:
  - For the subsystem project, all the parts are converted to EGL regardless of whether they are used or not. This is useful if you must preserve code for historical purposes.
  - For the common project, selecting *Migrate remaining VAGen parts* is particularly useful if you know that the parts in the common project do not have associates in the subsystem projects that you plan to migrate in the future. You can convert all the common parts one time and have the EGL stored in the migration database. Then if the common project is included in the migration set for other subsystems, the EGL is already converted and available to be imported into the workspace or saved into the temporary directory with the new subsystem.

  If you select *Migrate remaining VAGen parts* for your first migration set version, you should continue to select *Migrate remaining VAGen parts* for other migration set versions. You should also specify *Override existing files*. By specifying both options you ensure that all the parts in the migration set are included in the EGL file.

Import into workspace controls whether the migration tool builds the EGL projects, packages, and files in your workspace. If you select *Import into workspace*, there are additional options that you can select.

- If you are migrating multiple versions of a migration set, you can choose which version to have imported into your workspace at the end of migration. You can choose either the *Latest version* (most recent version) or the *Oldest version*. The advantage of selecting the latest version is that this is the version which you are most likely to want to generate for additional testing. The advantage of selecting the oldest version is that this positions you to store the EGL projects, packages, and files that correspond to the oldest version into your source code repository first.
- You can specify how you want to handle the situation in which an EGL file that is being created by the current migration already exists in your workspace.

- If you select *Override existing files*, the EGL file is replaced by a new file containing **only** parts in the current migration set. The migration tool does not convert VAGen part editions again if they were already converted for a previous migration set. However, the migration tool does include the EGL for the part editions in the file if the parts are included in the current migration set. Select *Override existing files* if you decide to change your VAGen Migration Preferences or Database I/O Preferences or to modify your Rename User Exit Preferences. In this situation, you could restore your database to the end of Stage 1 and then run Stage 2 and 3 again with your new preferences. Specifying *Override existing files* enables you to run Stage 2 and 3 without having to clean out the EGL workspace first. Selecting *Override existing files* is also useful if you specify *Migrate remaining VAGen parts*. In this situation, if you migrate another version of a migration set, the EGL files are replaced by new files containing the part editions that are included in the current migration set version.
- If you do not select *Override existing files*, the existing EGL file is modified to contain any additional parts that are in the current migration set. **Parts that are already in the EGL file are not changed, even if the current migration set uses a different part edition.** Deselecting *Override existing files* is useful only if you do not specify *Migrate remaining VAGen parts* and you are migrating just one version of a common project, but with several different subsystems. In this situation, you can gradually build up the EGL files for a common project in stages as you migrate different subsystems. Only the common parts used by the first subsystem are initially included in the EGL file. When you migrate the second subsystem, the migration tool adds any additional parts required for the second subsystem into the EGL file. The migration tool does a merge of the original file and the additional parts so that the parts continue to be organized alphabetically within part type.

You can select *Import into workspace* when you are migrating multiple versions of a migration set. However, the better technique is to deselect *Import into workspace* and instead select *Save migrated files to temporary directory*. Using the temporary directory enables the migration tool to create all the migration set versions.

Save migrated files to temporary directory enables you to migrate multiple versions of a migration set and store all the versions outside the workspace. This option requires the use of multiple simultaneous instances of the EGL development environment. Therefore, due to the large amount of memory resource required, it is recommended only for batch mode. When you select *Save migrated files to temporary directory*, you must also specify a high level directory. The migration tool creates a subdirectory for each migration set version within this high level directory. *Save migrated files to temporary directory* works particularly well if you also specify *Migrate remaining VAGen parts*. In this situation, each subdirectory corresponding to a migration set version contains **all** the parts from the VAGen project versions that are included in the migration set version.

General rules

There are some general rules that govern what the migration tool does when migrating your source code. The rules are as follows:

- Any new variables that are added to support the EZE words or other statements must be added to the program. They cannot safely be added as local storage in a function. This is because a segmented converse is not supported if any function currently in the stack has local storage, parameters, or a return value. Because the function context is not known, there is no way to determine whether the function would be in a function stack that leads to a segmented converse.

Therefore any new variables are added to the program, not as function local storage. See "Intermediate variables required for migration" on page 87 for details.

- You might have parts from Cross System Product or older releases of VisualAge Generator that were migrated to VisualAge Generator 4.5, but never modified within VisualAge Generator 4.5. In some cases, information is missing from the External Source Format or is specified in a way that is not supported in EGL. The migration tool attempts to supply the missing information or correct the information. This includes the following:
  - For main transactions, if the VAGen segmentation information is missing, the migration tool defaults the EGL segmented property to *no*.
  - For SQL records, if the SQL data code is missing, the migration tool converts the item to a fixed length item.
  - For SQL functions, the migration tool attempts to create any missing required SQL clauses based on the record specified as the I/O object.
- Within a function, the migration tool converts all statements to something. This preserves your IF / ELSE / END and WHILE / END logic. However, the resulting statements might not be syntactically correct. For example:
  - If an EZESYS value is not supported in EGL, the migration tool uses the VAGen value. There will be a message in the Problems view if the value is not supported.
  - The EZESCRPT special function word is commented out. There is no corresponding EGL replacement. Because EZESCRPT could not be used in an IF, WHILE, or TEST statement the structure of your function's logic is preserved. The migration tool issues an error message. There will not be an error in the Problems view.
- When trying to resolve a part reference without a program, the migration tool looks at the parts in the migration set. Therefore it is important that you define your migration sets to include groups of projects that are reasonable to use together. For example:
  - Do not include projects from several subsystems that have conflicting part names.
  - Do include common Java project or common Smalltalk applications when migrating a subsystem.
- There are some things the migration tool does **not** do during migration:
  - The migration tool does not add import statements for the following situations because these are not associates in VisualAge Generator:
    - For a function that transfers to a program using a CALL, DXFR, or XFER statement. If you are generating for Java, you must add the import statement for the package containing the program within the file containing the function or fully qualify the program name with the package name. Alternatively, you can use an entry in a linkage options part to specify the name of the package where the program is located.
    - For build parts in *.eglbld* files. VAGen control parts, such as the generation options parts, do not list their associated parts, so the information is not readily available to the migration tool. In addition, due to the way EGL processes build descriptor parts, you will likely need to do some reordering of the *nextBuildDescriptor* values (VAGen /OPTIONS). This reordering will in turn require modification of any imports the migration tool might have done.

Note: The Stage 1 migration tool analyzes the parts in the migration set to determine the associates for each part. To ensure that only parts for the migration set are included in the analysis, the Stage 1 migration tool deletes any Java projects from the workspace before loading the migration set specified by a high-level PLP project. Similarly, the Stage 1 migration tool deletes any Smalltalk configuration maps before loading the migration set specified by a high-level configuration map. Because the analysis of associates is limited to the migration set, the migration tool does not set the EGL build path property to specify EGL projects that are not included in the migration set. In addition, the migration tool does not include import statements for EGL packages that are not included in the migration set.

- EGL does not permit implicit items. VisualAge Generator permits implicit items, but does not recommend them. Implicit items are items that are used in a program, but which are not explicitly defined in a record, table, or map used by the program. The migration tool does not create definitions for implicit items due to the performance impact of evaluating every unqualified data item to determine whether it is an implicit item. You should provide definitions for implicit items before you migrate. To resolve the problem before you migrate, validate the program in VisualAge Generator to determine whether the program actually uses implicit items. If implicit items are used, VAGen validation provides a message with the correct definition of the item. If you do not create a definition for the implicit item before you migrate, there will be an error in the Problems view and you can correct the problem in EGL.
- The migration tool does not attempt to set the containerContextDependent property. This is something you can add later to specific common records or functions that have the need to reference other parts that are provided by a subsystem. See the section "containerContextDependent Property" on page 36 for more details of how to use this property for records and functions.
- The migration tool assumes that the VAGen syntax is valid and that a program using the parts included in your migration set can be successfully validated in VisualAge Generator. The migration tool does not attempt to repair invalid syntax. For example:
  - If the elements of a map array have different edit characteristics or attributes, the characteristics for the first element of the array determine what is migrated to EGL. The migration tool does not issue a message.
  - If the lengths of shared data items in a record have changed so that the length of a parent item does not match the sum of the lengths of items in its substructure, the migration tool does not change any item lengths and does not issue a message. There will be an error in the Problems view indicating that sum of the lengths of the children does not match the length of the parent.
- The migration tool does not attempt to improve inefficient code even if it results in syntax errors in EGL. For example:
  - If the same record is listed twice in a program's Tables and Additional Records list, the migration tool does not remove it and does not issue a message. There will be an error in the Problems view. Similarly, if the same table is listed twice in a program's Tables and Additional Records list, the migration tool does not remove the extra table and does not issue a message. There will be an error in the Problems view.
  - If a record is not used in a program, but is listed in a program's Tables and Additional Records list, the migration tool does not remove it and does not issue a message. There will not be an error in the Problems view. Similarly,

if a table is not used in a program, but is listed in the program's Tables and Additional Records list, the migration tool does not remove the table and does not issue a message. There will not be an error in the Problems view.

- If a working storage record is listed in the program's Tables and Additional Records list and the record only contains level 77 items, the migration tool does not remove the record and does not issue a message. There will be an error in the Problems view indicating the record cannot be found. This is because the only record that now exists includes your Level77 suffix preference as part of the record name.
- If a VAGen program includes a map group or a help map group, an actual map group part did not have to exist. For example, if the program never DISPLAYs or CONVERSEs a map or if the program never uses a map as a called parameter, an actual map group part did not have to exist. In this situation, the migration tool includes the use statement for the formGroup, but does not include the import statement in the program because the map group was not an associate of the program in VisualAge Generator. The migration tool does not issue an error message. EGL requires an actual formGroup part. If there is no formGroup part or if the formGroup part is not in the same package as the program, there will be an error in the Problems view indicating that the formGroup specified in the program's use declarations cannot be found.

– The migration tool does not necessarily detect or provide warning messages for the use of facilities that were not documented in VisualAge Generator, even if there is no equivalent EGL support. For example:

- The VAGen EZEBYTES function is only documented to support items and records. There was undocumented support for maps. The EGL sysLib.bytes function only supports items and records. The migration tool does not provide a warning message if you used EZEBYTES for a map. There will be an error in the Problems view.
- If a CALL statement specifies an unqualified item as an argument, and there are multiple definitions for this item name within the program, VAGen gives precedence to the level 77 item in the program's primary working storage record. EGL requires that the item be qualified. The migration tool does not add the qualification for you and does not provide a warning message. There will be an error in the Problems view.

Determining how to organize your EGL source code

Before you attempt to organize your source code for EGL, you need to understand the following:

- The differences between the VisualAge Generator and EGL products in terms of the following:
  – The facilities the products provide for organizing code.
  – The way the products determine which parts to consider during development, test, and generation.
  – How the products track the changes you make to a part.
- The capabilities provided by the migration tool to help you achieve the final organization you want in EGL.
- The limitations and tradeoffs of various source code organization techniques in EGL.

Differences in product capabilities for organizing your code

VisualAge Generator and EGL provide different methods for organizing your source code. VAGen on Java uses projects and packages. VAGen on Smalltalk uses configuration maps and applications. EGL uses projects, packages, and files.

VAGen on Java code organization

In VAGen on Java, the source code is organized into Java projects and packages. For example, you might have ProjectA that includes all the packages that contain code unique to SubsystemA, ProjectB that includes all the packages that contain code unique to SubsystemB, and ProjectCommon that includes all the packages that are shared by multiple subsystems.

The Java projects that you add into your workspace determine the source code that is considered when you develop, test, or generate your VAGen programs. You can use a project that contains a Project List Part (PLP) to point to other projects that must be added to your workspace at the same time. For example, in addition to specifying all the packages that contain code unique to SubsystemA, ProjectA can include a PLP part that specifies that ProjectCommon is a VAGen required project. Specifying the VAGen required project ensures that whenever you load ProjectA into your workspace, the correct version of ProjectCommon and all the package versions it contains is also loaded so that you have all the parts needed to develop, test, and generate. You can add projects that contain duplicate part names into your workspace, but you cannot test or generate if there are duplicate parts in your workspace.

When you make a change to a part, VisualAge Generator creates a new edition of the part in your workspace and in the ENVY repository. VisualAge Generator uses a technique called versioning to freeze the code at a known level. The ENVY repository stores all the versions of a Java project or package, but you can only have one version in your workspace at a given time. Tools provide a way of comparing the version in your workspace with previous versions in the ENVY repository to see what has changed at the project, package, or part level. To keep track of changes, you can use different versions of the same Java project for development, each level of test, or production. An alternative technique for tracking changes is to have one project for development, one for each level of test, and one for production.

VAGen on Smalltalk code organization

In VAGen on Smalltalk, the source code is organized into Smalltalk configuration maps and applications. For example, you might have ConfigurationMapA that includes all the applications that contain code unique to SubsystemA, ConfigurationMapB that includes all the applications that contain code unique to SubsystemB, and ConfigurationMapCommon that includes all the applications that are shared by multiple subsystems.

The Smalltalk configuration maps that you load into your image determine the source code that is considered when you develop, test, or generate your VAGen programs. Configuration maps provide an easy way of specifying which Smalltalk applications to load into your image. For example, in addition to specifying all the Smalltalk applications that contain code unique to SubsystemA, ConfigurationMapA can specify that ConfigurationMapCommon is a required configuration map. Specifying the required configuration map ensures that whenever you load ConfigurationMapA into your image, the correct version of ConfigurationMapCommon and all the application versions it contains is also

loaded so that you have all the parts needed to develop, test, and generate. You cannot load two applications or configuration maps into your image if they contain duplicate part names.

When you make a change to a part, VisualAge Generator creates a new edition of the part in your image and in the ENVY manager. VisualAge Generator uses a technique called versioning to freeze the code at a known level. The ENVY manager stores all the versions of a Smalltalk configuration map or application, but you can only have one version loaded into your image at a given time. Tools provide a way of comparing the version in your image with previous versions in the ENVY manager to see what has changed at the configuration map, application, or part level. To keep track of changes, you can use different versions of the same Smalltalk configuration map for development, each level of test, or production. An alternative technique for tracking changes is to have one Smalltalk configuration map for development, one for each level of test, and one for production.

EGL code organization

In EGL, the source code is organized into projects, packages, and files. For example, you might have ProjectA that includes all the packages that contain code unique to SubsystemA, ProjectB that includes all the packages that contain code unique to SubsystemB, and ProjectCommon that includes all the packages that are shared by multiple subsystems. This is similar to VAGen on Java, but differs in two important ways:

- EGL does not have a concept similar to the PLPs in VAGen on Java. Instead, you must determine which projects to load into your workspace so that all the parts necessary to develop, debug, and generate are available.
- The EGL files provide a more detailed organization of your source code. For example within ProjectA, you might have one package for data that is shared by the programs in SubsystemA. This package might include all the data item parts for SubsystemA and the records that are used by multiple programs in SubsystemA. You might organize this package into files in several ways, including any of the following:
  - One file that contains all the data items and records.
  - One file that contains all the data items and another file that contains all the records.
  - One file that contains the data items that start with the letters A through M, another file that contains the data items that start with the letters N through Z, and one file that contains all the records.

EGL requires that program, DataTable, and FormGroup parts must each be in a unique file, but the file can also contain other parts. For example, you might have a file for ProgramX that contains the ProgramX part as well as functions and records that are unique to ProgramX.

When you create an EGL project, you use the EGL Build Path to specify any other projects to consider when you develop, test, or generate your EGL programs, DataTables, or FormGroups. The EGL Build Path for a project limits which other projects are considered when searching for a part name. EGL also uses import statements within each file to determine which packages to include from within the projects listed in the EGL Build Path when searching for a part name. You can have duplicate part names in your workspace, but the part names within the EGL Build Path and the set of import statements must be unique.

When you make a change to a part and save the file, EGL stores the file into the file system and replaces the previous file. You use a source code repository to

retain multiple versions of the code. The source code repository provides tools such as checkout and checkin, version control, and comparison tools so that you can compare what is in your workspace with other versions of the code in the source code repository. The source code repository also enables developers to share their changes. There are a number of source code repositories that you can use with EGL. Some examples are CVS and IBM Rational ClearCase. Regardless of the source code repository you select, you can only have one version of a project, package, or file loaded into your workspace at a given time.

Organization capabilities provided by the migration tool

The Stage 1 migration tool determines the placement of each part in the EGL project, package, and file organization. By default, the Stage 1 migration tool for Java preserves your VAGen on Java project and package structure by converting each VAGen on Java project to an EGL project and converting each VAGen on Java package to an EGL package. Similarly, the Stage 1 migration tool for Smalltalk preserves your VAGen on Smalltalk configuration map and application structure by converting each VAGen on Smalltalk configuration map to an EGL project and converting each VAGen on Smalltalk application to an EGL package. The only exception to this default preservation policy occurs if maps and their corresponding map group are in multiple Java projects or packages or multiple Smalltalk configuration maps or applications. In the exception case, the migration tool merges the maps and their map group into a new EGL package or project, depending on the original placement of the maps and map group. See "Placing parts in EGL files" on page 38 for details of the exception case and how the Stage 1 migration tool assigns VAGen parts to files.

There might be situations, such as those described in"Limitations and tradeoffs of EGL source code organization techniques" on page 53, in which you want to organize your EGL projects, packages, and files differently from the default used by the Stage 1 migration tool. For this reason, the Stage 1 migration tool is shipped as a sample program. You can modify the Stage 1 tool to better suit your environment. The following white papers provide sample modifications to the Stage 1 tool:

- *File Location* white papers:
  - *How to Modify the EGL File Location Algorithm used by Stage 1 of the VisualAge Generator on Java to Enterprise Generation Language Migration Tool.*
  - *How to Modify the EGL File Location Algorithm used by Stage 1 of the VisualAge Generator on Smalltalk to Enterprise Generation Language Migration Tool.*
- *Project Consolidation* white papers:
  - *How to Consolidate Projects and Packages during Stage 1 of the VisualAge Generator on Java to Enterprise Generation Language Migration Tool.*
  - *How to Consolidate Projects and Packages during Stage 1 of the VisualAge Generator on Smalltalk to Enterprise Generation Language Migration Tool.*

The two *File Location* white papers show examples of modifying the parts placement algorithms for common and unused parts to split the commonParts.egl and unusedParts.egl files into smaller files based on the part type and the first character of the part name. The two *Project Consolidation* white papers show examples of merging multiple Java projects or Smalltalk configuration maps into a single EGL project and merging multiple Java packages or Smalltalk applications into a single EGL package.

All four white papers are available in the ″Migrations″ section of the page at:
`http://www.ibm.com/developerworks/rational/products/egl/egldoc.html`

Limitations and tradeoffs of EGL source code organization techniques

EGL works best when you organize your projects along functional lines. This technique can help minimize the number of EGL projects you need in your workspace, thereby improving performance. Your VAGen on Java projects and packages or your VAGen on Smalltalk configuration maps and applications might already be organized along functional lines. In this case, you might be able to use the default Stage 1 migration tool. However, you need to consider other factors that might cause you to alter the default EGL project and package strategy or the default file placement algorithm used by the Stage 1 migration tool.

The main factor to consider is that **the size of EGL projects, packages, and files matters**. The size can affect any of the following:

- Time required for opening or saving a file.
- EGL build time that is required to validate the parts. If you turn on the workbench preference to **Build Automatically**, an EGL build occurs whenever you save a file. If you do not turn on this preference, an EGL build occurs when you request it. As a minimum, an EGL build must occur before you attempt to debug or generate your code.
- EGL generation time that is required to generate the Java or COBOL source code.

The following table shows the limitations and tradeoffs of project, package, and file sizes.

Table 9. Limitations and tradeoffs of project, package, and file sizes

	Limitations	Advantage of Smaller	Advantage of Larger
Project	• Maximum of 1500 projects. • Some source code repositories might have a smaller maximum.	• If you only need a subset of the projects, then the workspace is smaller so the EGL build time might be quicker. • Smaller projects load quicker from the source code repository. • Minimizes the chance that two developers need to make changes to the same project at the same time.	• Fewer projects in the EGL Build Path. • Less likelihood of cycles and fewer cycles in the EGL Build Path. • Fewer projects to scroll through. • Fewer projects to load from the source code repository.

Table 9. Limitations and tradeoffs of project, package, and file sizes (continued)

	Limitations	Advantage of Smaller	Advantage of Larger
Package		• An import statement of the form: `import package.*` includes fewer part names so the EGL build time might be quicker. • Minimizes the chance that two developers need to make changes to the same package at the same time.	• Fewer import statements in each file. • Fewer packages to scroll through.
File	• Performance to open or save a file degrades for large file sizes. • No maximum size, but practical size is <200K.	• When you save a file, there are fewer parts to check for changes so the EGL build time might be quicker. • With good naming conventions, you can quickly find the file containing a specific part. • Minimizes the chance that two developers need to make changes to the same file at the same time.	• Fewer files to scroll through.

Given the tradeoffs in Table 9, you should avoid creating giant EGL projects, packages, or files. Conversely, you should avoid creating lots of tiny EGL projects, packages, or files. Both extremes can adversely affect performance. For example, a file that contains 30,000 data items is probably very large and might take several minutes to open or save. Conversely, having 30,000 files, each with just one data item, results in too many files to reasonably scroll through in the various workbench views. A compromise approach is better. For example, one possible compromise if the first character of the data item names is evenly split across the alphabet, is to create multiple files, with each file containing all the data items that start with the same character. This technique creates smaller files that are quicker to open, but minimizes the total number of files.

Other factors that you should consider when structuring your EGL projects, packages, and files are as follows:

- Consider your source code repository. Some considerations based on the source code repository you select might include the following:
  - Whether the source code repository supports checkout and checkin at the project, package, or file level.

  - Whether the source code repository supports version control at the project, package, or file level.
  - How the source code repository deals with the situation in which several developers might need to make changes to the same project, package, or file at the same time and how likely that situation is to occur given the organization of your EGL projects, packages, and files.
- If you use a source code repository, it might have support for the concepts of ownership or access control. If so, you need to consider the following:
  - Your ownership strategy should reflect how development and maintenance responsibilities are divided. Organizing your source code along functional lines is useful if one person or group is responsible for developing and maintaining a functional area.
  - Whether there are restrictions that limit access to certain programs or parts. For example, access to a program that writes payroll checks might be limited to just one or two developers. In this case, you might need to put the program in an EGL project by itself so that you can restrict access to that project.

What is new for the VAGen migration tool since EGL 5.1.2?

The following functions are new or improved since EGL 5.1.2 General Availability. Depending on your level of maintenance for the WebSphere Developer 5.1.2 product, you might already have some of the Stage 1 enhancements.

- Stage 1 has been changed as follows:
  - Updated DDL for the migration database. You must rerun SetupTables.bat and rerun Stage 1 to place your source code in the migration database.
  - Externalized the EGL reserved word list and included the reserved word list version in the log information.
  - Added new checkStage1.bat file to check the results of Stage 1 for errors.
- Both Stage 2 and 3 and single file mode migration now include the following changes:
  - Support for the new EGL syntax.
  - Optionally invoke a user exit to enable you to rename parts during Stage 2 migration or during single file migration. For example, you can write a user exit to change a hyphen (-) to an underscore (_).
  - New VAGen Syntax Migration Preferences to enable you to specify the following for fields in SQL records:
    - The migration tool should omit the SQL column name if it is the same as the item name.
    - The migration tool should always omit the *isNullable* = yes property.
    - The migration tool should only include the *isReadOnly* = yes property if there is only one SQL table specified for the SQL record and the VAGen Read Only property is set to yes.
  - New VAGen Syntax Migration Preference to enable you to specify that the migration tool should change the decimal comma to a decimal point, even if your workstation uses a locale that defaults to the decimal point.
- Stage 2 to 3 migration now also do the following:
  - Add import statements for dataItem parts that specify a validatorFunction or validatorDataTable property.
  - Sort parts in a file by the EGL part name within the part type.

The following EGL changes provide better support for migrated VAGen programs:

- Numeric variables can now be used in string concatenation. This provides support for VAGen SQL I/O execution time statement build that is migrated to the EGL prepare statement.
- The Java runtime environments now permit you to change the EGL product messages similar to the capability provided in VisualAge Generator.

What is new for the VAGen migration tool since EGL 6.0 iFix?

The following functions are new or improved since EGL 6.0 iFix:

- Both Stage 2 and 3 and single file mode migration now include the following changes:
  - Better support for the user exit that enables you to rename parts during Stage 2 migration or during single file migration.
  - New VAGen Migration Preferences to enable you to minimize the use of VisualAge Generator Compatibility mode.

What is new for the VAGen migration tool since EGL 6.0.0.1?

The following functions are new or improved since EGL 6.0.0.1:

- Support for migrating Web transaction programs and UI records. Also support for migrating generation options related to Web transactions.
- Support for migrating DL/I records, DL/I function I/O, PSB parts, EZEDL* special functions words, and the CSPTDLI special function word. Also support for migrating generation options, resource association options, and linkage table options related to the IMSVS and IMSBMP environments, including GSAM and message queue support.

  Note: If you used a previous version of the migration tool to migrate parts that use language elements related to Web transactions, IMS, or DL/I, see Appendix I, "Required modifications if you migrated with a previous version of the migration tool," on page 425 for details of what you must change by hand to match the EGL language.

What is new for the VAGen migration tool since EGL 6.0.1?

The following functions are new or improved since EGL 6.0.1:

- Stage 1 Smalltalk now supports subapplications. See "Mapping page" on page 139 for details on the new Collapse subapplication preference.
- Syntax migration improvements:
  - For single file mode, parts are now sorted by part name within part type in each file.
  - Record declarations within programs are now sorted by record name.
  - SQL comparison operations using the not sign are now converted to code page independent operators.
  - DL/I record declarations are not automatically added to a program based on the program's PSB. The only DL/I record declarations that are added to the program are the ones necessary for the I/O options used by the program.
  - Maps containing arrays now use the indexOrientation, columns, linesBetweenRows, and spacesBetweenColumns properties to provide position information for standard arrays. This enables you to use the EGL Form Editor for the maps.

  - The migration tool always sets the sign property when migrating data items, fields on maps, and nonshared fields in UI records.
- Stage 2 and 3:
  - The migration tool adds an import statement if a function references a table.
  - Better merging logic if multiple migration sets are migrated at the same time or when parts are renamed using the Renamer User Exit.
  - Performance improvements. To take advantage of these improvements, do the following:
    - If you are running Stage 1, rerun the setupDatabase.bat and setupTables.bat files. Then follow the instructions for Stage 2 under "Setting DB2 performance information" on page 155.
    - If you previously created a migration database in Stage 1 and want to make the performance improvements available for that database, do the following:
      - From a DB2 Command Window, navigate to the directory where **setupIndex.bat** file is located.
        - For Java, this is *VisualAge-for-Java-install-directory*\ide\vgmigration.
        - For Smalltalk, this is *VisualAge-Smalltalk-install-directory*.
      - If you changed the default migration database name (VGMIG) or the default schema name (MIGSCHEMA), change the following files to use your database name and schema name:
        - createIndex.sql
        - runStats.bat
      - Run **setupIndex.bat**.

What is new for the VAGen migration tool since EGL 6.0.1.1?

The migration tool itself has not changed significantly for this interim release (6.0.1.1 ifix3) of the *Migration Guide*. However, the *Migration Guide* has been updated with new information as follows:

- Chapter 1 has been changed as follows:
  - Updated and expanded the section on "Terminology used in this book" on page 3 based on the availability of IBM Rational COBOL Generation Extension for zSeries and IBM Rational COBOL Runtime for zSeries.
  - Updated and expanded the section on "Planning your migration" on page 4.
  - Added the section on "References" on page 15. This section also includes a list of the available white papers related to migrating from VisualAge Generator to EGL.
- Chapter 2 has added the following sections:
  - "Determining how to organize your EGL source code" on page 49
- Chapter 9 has added the following sections:
  - "Converting VAGen preparation templates and procedures to EGL build scripts" on page 193
  - "Converting VAGen runtime templates" on page 194
  - "Converting the VAGen reserved words file" on page 195
  - "Installing the EGL server product" on page 197
  - "Planning for dual maintenance of your source code" on page 200
- Chapter 10 has added the following sections:

  - "Differences in SQL support" on page 210. This consolidates information on SQL previously scattered throughout the chapter and expands the information based on customer experience.
  - Information about the migration of VAGen runtime environment variables and runtime properties.
- Appendix B added the following sections:
  - "Preparation templates and procedures" on page 348
  - "Runtime templates" on page 350
  - "Runtime environment variables" on page 352
  - "vgj.properties" on page 354
- Appendix E has been changed as follows:
  - Expanded the explanation for some messages and added new messages based on customer experience and enhancements to the EGL validation messages.
  - Added section "Reference information for messages - name resolution and qualification rules" on page 404. This section provides information that is useful in resolving messages that result from the differences between VisualAge Generator and EGL for name resolution when there is a field with the same name as another record, form, or dataTable.
- Appendix F has updated the list of APARs required for VisualAge Generator.

Known restrictions for the migration tools

General

Be sure to review the EGL restrictions, specifically any restrictions for validation, debugging, or generation.

Stage 1 on Java and Smalltalk

- If you migrate multiple migration sets or migration set versions without clearing out the migration database, the first migration set version that contains a part edition controls the project, package and file name for the EGL part. This generally does not cause a problem if the following are true:
  - If your parts do not move between Java packages and you do not have differently named migration sets that include the same Java package name.
  - If your parts do not move between Smalltalk applications and you do not have differently named configuration maps that include the same Smalltalk applications.

  If your situation differs from what is described above, the workaround is to migrate one migration set version all the way through Stages 1 – 3, then clear out the migration database, and then migrate the next migration set version all the way through Stages 1 – 3.

Stages 2 and 3

- Restrictions for the VAGen Migration wizards:
  - The Cancel button on the progress window is inoperable. You cannot cancel the Stage 2 or 3 migration tool after it starts other than by using the Task Manager.
- If you want to switch back and forth between your migration database and your application databases, you must shut down the EGL development environment each time you switch.

- Stage 2 and 3 are not supported on Linux environments.

Syntax migration

- The migration tool correctly converts SQL keywords used as column names within the SQL record structure. However, the migration tool does not handle SQL keywords used as column names within the SQL defaultSelectCondition for a record or within the SQL clauses for a function. The workaround is to modify the SQL defaultSelect Condition or SQL clause as described in "SQL reserved words requiring special treatment" on page 225. This section provides a list of SQL keywords and details of the syntax required for the SQL defaultSelectCondition and SQL I/O statements.
- See "containerContextDependent Property" on page 36 for details on limitations on your use of this property.

Chapter 3. Handling ambiguous situations

There are a number of situations where the migration tool might not have all the information from VisualAge Generator needed to produce the corresponding EGL statement. These situations are called ambiguous situations because the corresponding EGL statement could change or produce different results depending on the inputs from VisualAge Generator. In these ambiguous situations, the migration tool might not migrate to EGL statements that match what you intended in VisualAge Generator. In many of the ambiguous situations, the EGL statements that are produced vary, depending on your migration process:

- Whether you migrate with a program and its associates, and if so, the order in which programs are migrated.
- Whether you migrate without a program, but with the necessary associated parts, so that cross-part migration can still be accomplished.
- Whether you migrate without associates, so that the migration tool is limited in the information it has available to make an intelligent choice.

Migrating with a program and its associates is the preferred way of migrating with associates because it guarantees the maximum information. The tables that follow explain the differences between migrating with and without associated parts for the following part types:

- Shared data items
- Records
- Tables
- Map groups and maps
- Programs
- Functions, including I/O statements
- Other statements
- EZE words

The tables also show some potential problems that can arise for these ambiguous situations and suggest possible solutions for these problems. No one solution is best for every situation. For example, when there are two parts with the same part name, renaming the one that is the least frequently used would have the least effect in other areas of your code.

Handling ambiguous situations for data items

PACK data items with even length

VisualAge Generator: The length for PACK data items is specified as the number of digits, up to a maximum of 18. Even lengths are recorded within the shared data item definitions and for nonshared data items within record definitions. However, in most editors, and in test and generation, the length that is used is the next higher odd length, with a maximum of 18. Only the SQL Record Editor displays the even length. For even length items used as host variables in SQL WHERE clauses or in SQL statements that specify Execution Time Statement Build, test and generation create a temporary variable with the even length.

EGL: The decimal primitive type is the replacement for the VAGen PACK type. In VisualAge Generator Compatibility mode, EGL test and generation provide the same support as in VisualAge Generator. For decimal items with even precision, test and generation increase the precision by one in all records and use a temporary variable with the even precision in SQL where clauses or prepare statements. If VisualAge Generator Compatibility mode is not specified, EGL uses the precision specified for the data item.

Associated part needed for migration: Not applicable.

Table 10. Pack data items with even length

Migrating with the associated part	Migrating without the associated part
The migration tool migrates pack data items based on the VAGen Migration Preference *Do not honor evensql=y for items or variables*. If the preference is not selected, the migration tool does the following: • Uses the even or odd length specified in VisualAge Generator for shared data item definitions, regardless of whether the item is ever used in an SQL row record. • Uses the even or odd length specified in VisualAge Generator for nonshared items in all record definitions, because the item might be used as a host variable in an SQL where clause or prepare statement. • Uses an odd length (or 18 if the item is the maximum length) for nonshared items in tables, function parameters, function return values, and function local storage because the information to determine an even number of digits was not recorded in VisualAge Generator in these situations. If the preference is selected, the migration tool always uses an odd length (or 18 if the item is the maximum length) for all items or variables. The tool issues a warning message for any data item that specifies evensql=y.	The migration tool does the same things as mentioned in the *Migrating with the associated part* column.

Table 10. Pack data items with even length (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem 1: A problem arises if you select the preference so that evensql=y is migrated to an odd length. In this situation, there might be a runtime performance impact due to using host variable lengths that do not match the SQL column definition. **Solution 1:** Review the migration log information for any dataItem part that specified evensql=y. Review any SQL table and view definitions to determine whether the definitions match the dataItem part definition. Also review any SQL where clauses and prepare statements that use variables that specify the dataItem part as a type definition. **Potential Problem 2:** A problem also arises if you deselect the preference so that evensql=y is honored during migration and you later decide to eliminate the use of VisualAge Compatibility mode. In this situation, overflow might occur due to having fewer significant digits than in VisualAge Generator Compatibility mode. **Solution 2:** Review all decimal dataItem part definitions and primitive fields in EGL records for even length items. Assess whether overflow might occur for any of these items.	**Potential Problems:** The same potential problems and solutions as listed in the *Migrating with the associated part* column apply.

Shared edits and messages

VisualAge Generator: A shared dataItem part definition can specify default edits and messages for both maps and UI records.

EGL: There is only one set of edit and message properties for a dataItem part definition. The migration tool merges the map and UI properties for the data items.

Associated part needed for migration: Not applicable.

Table 11. Shared edits and messages

Migrating with the associated part	Migrating without the associated part
The migration tool merges map and UI edits as follows: • For *each* edit or message, the migration tool does the first of the following that applies: – If a UI edit is specified, the migration tool converts the UI edit and its associated message information to the corresponding EGL properties. – If only a map edit is specified, the migration tool converts the map edit and its associated message to the corresponding EGL properties. – If the UI message is specified without its associated UI edit, the migration tool converts the UI message to the corresponding EGL property. – If the map message is specified without its associated map edit, the migration tool converts the map message to the corresponding EGL property. – If UI and map edit and message information are not specified, the migration tool does not set the corresponding EGL properties. The normal EGL defaults apply. • In VisualAge Generator, Justify and Hex edit are only specified for map edits, so they are always used to set the corresponding EGL properties. • For a numeric data item, the migration tool migrates as follows: – If the sign edit is not specified, the migration tool sets the EGL sign property to leading if any UI edit is specified. – If no UI edits are specified, the migration tool sets the EGL sign property to none.	Except as noted later in "Map edit routine for shared data items" on page 64, the migration tool migrates the default edits and messages in the same way both with and without the associated parts.
Potential Problem 1: A problem only arises if conflicting map edits and UI edits exist in VisualAge Generator and you really intend the edits to differ between maps and UI records. The problem does not occur until the item is added to a text or print form. **Note:** If you never used VAGen Web Transactions, only map edits should exist in VisualAge Generator and you should not have a problem. **Possible Solution:** Other than adding a comment to the dataItem part definition to list the VAGen map item edits and messages, there is nothing you can do for the dataItem part definition. If you add the item to a text or print form, you can override any properties that need to differ for that particular form. **Potential Problem 2:** A problem can also arise if you use the item in an EGL VGUI record. The item might have some additional edits or messages that were migrated from the VAGen map edits. **Solution:** Always review the edits for fields defined with a type definition in a VGUI record.	The same potential problems mentioned in the *Migrating with the associated part* column apply. You can use the same solutions.

Map edit routine for shared data items

VisualAge Generator: A shared data item definition can have a map edit routine that is a table, a function, or EZEC10 or EZEC11. The edit message is only used if the edit routine is EZEC10, EZEC11, or a table.

EGL: A data item can have both a validatorDataTable and a validatorFunction. The data item can also have both a validatorDataTableMsgKey and a validatorFunctionMsgKey.

Associated part needed for migration: Either the table or the function part.

Table 12. Map edit routine for shared data items

Migrating with the associated part	Migrating without the associated part
The first time the shared data item is migrated, the migration tool does the first of the following that applies: • If the editRoutineName is EZEC10 or EZEC11, the migration tool sets the validatorFunction property to the EGL equivalent system library function. The migration tool also sets the validatorFunctionMsgKey to the edit message, if any. • If the editRoutineName is a function, then the migration tool sets the validatorFunction property. The migration tool omits the validatorFunctionMsgKey because it is not used in VisualAge Generator. The migration tool also adds the function as an associate of the data item part so that an import statement is created in Stage 3. • If the editRoutineName is a table, then the migration tool sets the validatorDataTable property. The migration tool also sets the validatorDataTableMsgKey to the edit message, if any. The migration tool also adds the table as an associate of the data item part so that an import statement is created in Stage 3. • If the edit routine *is not* specified but the edit message *is* specified, the migration tool sets the validatorDataTableMsgKey to the edit message. **Note:** Even when migrating in program context, the editRoutineName might not be available if the shared item is not used on a map or if its edits on the map differ from what was specified in the shared item definition.	If a function or table with the same name as the editRoutineName is not available, the migration tool does the first of the following that applies: • If the editRoutineName is EZEC10 or EZEC11, the migration tool sets the validatorFunction property to the EGL equivalent system library function name. The migration tool also sets the validatorFunctionMsgKey to the edit message, if any. • If the editRoutineName is longer than 7 characters, it must be a function name, so the migration tool sets the validatorFunction property. The migration tool omits the validatorFunctionMsgKey because it is not used in VisualAge Generator. • If an edit message is specified, the migration tool sets the validatorDataTable and validatorDataTableMsgKey. • Otherwise, the migration tool sets the validatorFunction property and issues an error message. If the edit routine *is not* specified but the edit message *is* specified, the migration tool sets the validatorDataTableMsgKey to the edit message.
Potential Problem: A problem only arises if a function and dataTable have the same name, most likely in different subsystems. In this situation, one subsystem uses a function and another subsystem uses a dataTable. The problem does not occur until the item is added to a text form. **Possible Solution:** Rename the dataTable so there are no longer two parts with the same name. Specify both a validatorFunction and validatorDataTable property for the item definition. If you add the item to a text form, delete the validatorFunction or validatorDataTable property, whichever is not needed for that particular form. **Disadvantage:** You must modify your programs and forms to use the new dataTable name.	**Potential Problem 1**: A problem arises if the migration tool guesses incorrectly. **Possible Solution**: Correct the data item definition. **Potential Problem 2**: The same problem listed under the *Migrating with the associated part* column can also occur. You can use the same solution.

Fill characters for shared data items

VisualAge Generator: The default fill character for map edits is null for character, mixed or DBCS; blank for numerics; and 0 for hex. The default fill character for UI edits is blank for character, mixed, DBCS, unicode, and numerics, and 0 for hex. Null is not a valid fill character for UI records. A different fill character can be specified for map edits and UI edits.

EGL: There is only one default fillCharacter property for a dataItem part. The migration tool merges the map and UI fillCharacter properties for the data items.

Associated part needed for migration: Not applicable.

Table 13. Fill characters for shared data items

Migrating with the associated part	Migrating without the associated part
The first time the shared data item is migrated, the migration tool does the first of the following that applies: • If the UI edits specify a fill character, the migration tool migrates the character to the EGL fillCharacter property. The tool converts N to N because null fill is not valid for UI records in VisualAge Generator. • If the map edits specify a fill character, the migration tool migrates the character to the EGL fillCharacter property. The tool converts N to null fill. • If neither the UI edits nor the map edits specify a fill character, the migration tool does not set the EGL fillCharacter property.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: A problem only arises if you add a field using a type definition to a dataItem part that was migrated using one type of edits to a different type of user interface (form or VGUI record). **Possible Solution:** Always review the fill character when adding a new field to a form or VGUI record.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Handling ambiguous situations for records

Redefined records

VisualAge Generator: The redefined record type provides a different data item layout for another record. The redefined record specifies the name of the record it is redefining. For example, RecordA is a REDEFINED record that redefines RecordB. VisualAge Generator determines whether RecordA is really a redefinition of RecordB based on the use of RecordA within the program. If RecordA is used as a called parameter, RecordA is not treated as a redefinition of RecordB.

EGL: RecordA is a basicRecord. Redefinition information is only provided within a program definition -- not in the definition of RecordA.

Associated part needed for migration:

- When migrating a redefined record: not applicable.
- When migrating a program: the redefined record (RecordA).

Table 14. Redefined records

Migrating with the associated part	Migrating without the associated part
When migrating a redefined record, the migration tool does the following: • Migrates the redefined record (RecordA) to a basicRecord. • Includes a VAGen Info comment in RecordA indicating it redefined RecordB. • Issues an informational message that RecordA redefines RecordB.	When migrating a redefined record, the migration tool does the same thing mentioned in the *Migrating with the associated part* column.
When migrating a program, if RecordA is available, the migration tool does the following: • If RecordA is treated as a redefinition of RecordB in VisualAge Generator, the migration tool includes the redefines property in the declaration for RecordA. • If RecordA is not treated as a redefinition of RecordB in VisualAge Generator, the migration tool does not include the redefines property in the declaration for RecordA.	When migrating a program, if RecordA is not available, the migration tool does not know that RecordA is a redefined record. The migration tool does *not* include the redefines property in the declaration for RecordA.
Considerations for new use: A problem only arises if you need to use RecordA and RecordB in a new program. You must remember to include the redefines property for RecordA whenever you want RecordA to be treated as a redefinition of RecordB.	**Potential Problem:** A problem arises if the VAGen program uses RecordA as a redefinition. Immediately after migration, the program will not be a valid EGL program because the definition for RecordA and the import statement will be missing. There will be an error in the Problems view. If you migrate RecordA and add the import statement to the program, this will convert the program into a valid EGL program. However, there will be two data areas -- one for RecordA and one for RecordB. EGL will not detect this change during validation or generation. **The program will not run the same as in VisualAge Generator**. **Solution:** If you migrate additional records or add import statements to a program, review the record definitions for a VAGen Info comment. If there is a VAGen Info comment specifying that that RecordA is a redefinition for RecordB, update the program to include the *redefines* property for the declaration of RecordA. **Considerations:** The same considerations for new use listed under the *Migrating with the associated part* column can also occur.

Level 77 items in records

VisualAge Generator: Working storage records can have level 77 items.

EGL: Records cannot have level 77 items.

Associated part needed for migration:

- When migrating a working storage record: not applicable.
- When migrating a program: the primary working storage record.
- When migrating a function: the working storage record.

Table 15. Level 77 items in records

Migrating with the associated part	Migrating without the associated part
When migrating any working storage record that contains level 77 items, the migration tool does the following: • Splits the working storage record that contains level 77 items into two basicRecords -- one for the working storage structure and one for the level 77 items. The new level 77 record name is the original working storage record name with a customer-supplied suffix. • Places the new level 77 record in the same file with the original working storage record. • Issues an informational message that the level 77 record is being created.	When migrating any working storage record that contains level 77 items, the migration tool does the same things mentioned in the *Migrating with the associated part* column.
When migrating a program, if the primary working storage record is available and contains level 77 items, the migration tool adds a record declaration to the program for the new level 77 record if the primary working storage record contained level 77 items.	When migrating a program, if the primary working storage record is not available, the migration tool does not know whether the primary working storage record contains level 77 items. The migration tool does *not* include a record declaration for a level 77 record.
When migrating a function, if the working storage record is available, the migration tool changes qualified references to the level 77 items within the function to use the new level 77 record name.	When migrating a function, if the working storage record is not available, the migration tool does *not* change the qualification of item names.
Potential Problem: A problem only arises for the level 77 item if there are two records of the same name, possibly in different subsystems, and the item is a level 77 item in one record and not in another. **Possible Solution:** Move the item to a (new) common record and change the item qualification in all functions. Alternatively, do not qualify the item in the functions. **Considerations for new use:** There is a potential problem if you specify the original working storage record as the inputRecord property for a new program. Be sure to consider whether you also need to add a declaration for the new level 77 record.	**Potential Problem 1:** A problem arises if the primary working storage record contained level 77s and the program used the level 77s. Validation for the program will fail due to missing item definitions. **Solution:** Add the level 77 record to the program. **Potential Problem 2:** A problem arises for a function if the qualified data item is really a VAGen level 77 item. **Solution:** Modify the function to provide the correct qualifier for the data item. **Potential Problem 3:** The same problem listed under the *Migrating with the associated part* column can also occur. You can use the same solution. **Considerations:** The same considerations for new use listed under the *Migrating with the associated part* also apply.

Alternate specification records

VisualAge Generator: A record can specify another record as the alternate specification (altspec) record. For example, if RecordA specifies an altspec of RecordB, then RecordB provides the structure for RecordA. For SQL records, RecordB also provides the list of SQL tables and keys for RecordA. If RecordA specifies a key item, that item is merged with the keys from RecordB when determining the default selection condition. For DL/I segment records, the field names in RecordB are also the names of the fields in the DL/I PSB.

EGL: A record can embed another record to obtain the record structure. Only the record structure is included. Each SQL record must explicitly state its entire set of

SQL tables and keys. For DL/I segment records, if RecordB is also a DL/I segment, then RecordB can provide the dliFieldName property to specify the name of the field in the DL/I PSB. Alternatively, if RecordB is not a DL/I segment, then RecordA can provide the dliFieldName property as an override to the embed statement.

Associated part needed for migration: If RecordA is an SQL record or a DL/I segment, you need the record specified as the altspec record (RecordB).

Table 16. Alternate specification records

Migrating with the associated part	Migrating without the associated part
If RecordA is an SQL record that specifies an alternate specification of RecordB and RecordB is available, the migration tool does the following for RecordA: • Creates the list of table names from the list of tables specified in RecordB. • Creates the list of keys by merging the following: – The items, if any, in RecordB that specified key=yes. – The item, if any, in RecordA that is specified as the key item. The order of the keys is the order in which the items appear in the structure of RecordB. • Includes the embed statement pointing to RecordB. • Migrates any !itemColumnName variables in the default selection conditions of RecordA to the corresponding SQL column names from RecordB.	If RecordA is an SQL record that specifies an alternate specification of RecordB, and RecordB is not available, the migration tool does the following for RecordA: • Sets the tableNames property to ###TABLES_NOT_FOUND### • Sets the keyItems property to ###KEYS_NOT_FOUND###, followed by the item, if any, that is specified as the key item in RecordA. • Includes the embed statement pointing to RecordB. • Migrates any !itemColumnName variables in the default selection conditions of RecordA to !itemColumnName without any substitution. • Issues error messages that the tables and keys could not be determined. • Issues an error message if there are any !itemColumnName variables.
If RecordA is a DL/I segment record that specifies an alternate specification of RecordB and RecordB is available and is not a DL/I segment record, the migration tool does the following for RecordA: • Includes the embed statement pointing to RecordB. • Includes an override statement for each field from RecordB that must be renamed. The override statement sets the dliFieldName property to the original VAGen field name so that the DL/I field name is available in EGL.	If RecordA is a DL/I segment record that specifies an alternate specification of RecordB and RecordB is not available, the migration tool does the following for RecordA: • Includes the embed statement pointing to RecordB. • Issues an error message that the tool cannot determine whether any override statements are required to preserve the dliFieldName information.

Table 16. Alternate specification records (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem 1: A problem only arises for SQL if the definition for RecordB differs, generally in different subsystems. **Solution 1:** Duplicate the definition of RecordA so that each subsystem has its own definition of RecordA. Alternatively, specify *containerContextDependent=yes* for RecordA. **Potential Problem 2:** A problem also arises for DL/I if the definition for RecordB differs, generally in different subsystems. **Solution 2:** The solution is the same as that described in Solution 1.	**Problem 1:** EGL validation for SQL record RecordA results in messages in the Problems view. **Solution 1:** Edit RecordA and include the appropriate table and key information based on RecordB. Also replace any !itemColumnName variables in the default selection condition with the corresponding SQL column names from RecordB. **Potential Problem 2:** A problem arises for DL/I segment RecordA if RecordB contains fields that must be renamed due to reserved words or because they start with the # or @ symbol. In this case, if the field is used in a default SSA and the renamed field name is longer than 8 characters or contains a character such as underscore that is invalid for DL/I, then there will be a message on the Problems list. **Solution 2:** Edit RecordA and include the override statements to specify the DL/I field name. **Potential Problem 3:** A problem also arises for DL/I segment RecordA if the renamed field is used in a default SSA and is a valid DL/I name. In this case, there will be a runtime error when you run the program. **Solution 3:** Edit RecordA and include the override statements to specify the DL/I field name.

Different definitions with the same record name

VisualAge Generator: Records include shared data items based on the projects and packages currently in the workspace. This enables different subsystems or programs to have different definitions of the same record name.

EGL: Provides the containerContextDependent=yes property for record definitions. This property enables you to specify that the dataItem parts used for type definitions are based on the program's part name space.

Associated part needed for migration: Not applicable. You should have complete understanding of your VAGen part structure for all subsystems to be able to set this record property.

Table 17. Different definitions with the same record name

Migrating with the associated part	Migrating without the associated part
The migration tool does not set the *containerContextDependent=yes* property for record definitions. If you need this capability, you must set the property for each record that requires it.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.

Reserved words and UI record names

VisualAge Generator: VisualAge Generator does not have reserved words. VisualAge Generator permits the # and @ symbols as the first character of a UI record name or an item in a UI record.

EGL: EGL has reserved words. In addition, EGL does not permit the # or @ symbol as the first character of a record name. A UI record name cannot be a reserved word and the name cannot start with the # or the @ symbol. A field in a UI record cannot be a reserved word and the name cannot start with the # or the @ symbol.

Associated part needed for migration: Not applicable.

Table 18. Reserved word and UI record names

Migrating with the associated part	Migrating without the associated part
When migrating a UI record, if the record name is a reserved word or starts with the # or @ symbol, the migration tool does the following: • Renames the UI record by including the Renaming prefix at the beginning of the record name. This is identical to the renaming that the migration tool does for other VAGen records. You can specify the Renaming prefix by setting the VAGen Migration Syntax Preference. • Includes the alias property and sets it to the original VAGen name for the UI record. • Changes the .egl file name for the UI record to match the renamed UI record during Stage 3 of migration. • Issues a warning message.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
When migrating an item in a UI record, if the item name is a reserved word or starts with the # or @ symbol, the migration tool does the following: • Renames the item by including the Renaming prefix at the beginning of the item name. This is identical to the renaming that the migration tool does for fields in other VAGen records. • Includes the alias property for the field and sets it to the original VAGen name for the field.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
The migration tool treats a UI record like any other record for the purposes of renaming. The tool uses the EGL part name for all references to a UI record, including the following: • Program part: – First UI record – Record declaration • UI record part - First UI record in the Link parameters • Function part - any use of the record in a statement	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: None. The alias property provides the same JSP name as in VAGen.	**Potential Problem:** None. The alias property provides the same JSP name as in VAGen.

Handling ambiguous situations for tables

Reserved words and table names

VisualAge Generator: VisualAge Generator does not have reserved words. The # or @ symbols are not valid in VAGen table names.

EGL: EGL has reserved words. In addition, EGL does not permit the # or @ symbol as the first character of a part name. A dataTable name cannot be a reserved word.

Associated part needed for migration: Not applicable.

Table 19. Reserved words and table names

Migrating with the associated part	Migrating without the associated part
The migration tool does not rename the table for you. The migration tool used in Stage 1 of migration issues an error message if the table name matches the reserved word list. If you do not change the table name, the migration tool used in Stage 2 of migration also issues an error message.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: A problem only arises if a dataTable name matches the reserved word list. EGL validation results in a message in the Problems view. **Solution:** Rename the table in VisualAge Generator before you migrate, or rename the dataTable in EGL after you migrate. If you change the name in VisualAge Generator, be sure to change all references to the table in programs, maps, functions, UI records, and data item definitions. If you change the name in EGL, you must change the name of the dataTable and all references to it. This includes references in the following places: • Program use declaration statements • Logic statements in programs and functions • Data item validatorDataTable properties • Form field validatorDataTable properties • VGUI record validatorDataTable properties If you want to keep the original table name as the name for the generated dataTable, set the *alias* property to the original dataTable name. If you do not specify the *alias* property, be sure to change any non-EGL references to the dataTable name, including CICS program definitions.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Handling ambiguous situations for map groups and maps

Reserved words and formGroup names

- **VisualAge Generator:** VisualAge Generator does not have reserved words. The # or @ symbol are not valid in VAGen map group names.
- **EGL:** EGL has reserved words. In addition, EGL does not permit the # or @ symbol as the first character of a part name. A formGroup name cannot be a reserved word.
- **Associated part needed for migration:** Not applicable.

Table 20. Reserved words and formGroup names

Migrating with the associated part	Migrating without the associated part
The migration tool does not rename the formGroup for you. The migration tool used in Stage 1 of migration issues an error message if the map group name matches the reserved word list. If you do not change the map group name, the migration tool used in Stage 2 of migration also issues an error message.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: A problem only arises if the formGroup name matches the reserved word list. EGL validation results in a message in the Problems view. **Solution:** Rename the map group in VisualAge Generator before you migrate or the formGroup in EGL after you migrate. If you rename the map group in VisualAge Generator, be sure to rename all the maps that belong to the map group. Also change all references to the map group in all program definitions. If you rename the formGroup in EGL, you must change the name of the formGroup and all references to it, including references in program use declaration statements. If you want to keep the original map group name as the name for the generated formGroup, set the *alias* property to the original map group (formGroup) name. If you do not specify the *alias* property, be sure to change any non-EGL references to the formGroup name, including CICS program definitions.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Map group and formGroup requirements

VisualAge Generator: A map group is only required if there is a floating area specification.

EGL: A formGroup is always required to contain the forms.

Associated part needed for migration: The map group and all maps in the map group.

Table 21. Map group and formGroup requirements

Migrating with the associated part	Migrating without the associated part
If a map group does not exist, the migration tool does the following: • Creates a formGroup for all maps with the same map group name. • Puts all the forms for the same formGroup in the same EGL file. • Nests the forms within the formGroup definition if not migrating with single file migration. • Issues an error message indicating that the formGroup requires editing to nest the forms if migrating in single file mode.	The migration tool does the same things mentioned in the *Migrating with the associated part* column. However, if you do not have the map group and all its maps in the same migration set, there can be problems as described below.

Table 21. Map group and formGroup requirements (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem: None. All maps for the map group should be included in the same migration set. Because the migration set represents what is generated, the migration set should include all maps in the map group. If you are migrating in single file mode, be sure to include all the maps in the map group in the same External Source Format file.	**Potential Problem:** If all maps for the same map group name are not included in the same migration set (or External Source Format file for single file mode migration), the formGroup will not include all the forms. **Possible Solution 1:** Be sure the migration set includes all maps with the same map group name. **Possible Solution 2:** Add the missing forms to the EGL file and nest them within the formGroup definition.

Floating areas and starting positions

VisualAge Generator: VisualAge Generator permits, but does not recommend, having different floating area sizes and starting positions for different device types that have the same device size.

EGL: EGL formGroups and print forms only specify the device size. EGL text forms specify both the device size and the form size. EGL only permits one set of margin specifications for a device size.

Associated part needed for migration: Not applicable.

Table 22. Floating areas and starting positions

Migrating with the associated part	Migrating without the associated part
The migration tool does the following: • Issues an error message if two or more devices have the same device size but different floating area sizes or starting positions. • Includes the EGL equivalent device size and margin specifications for each VAGen floating area specification. If two or more VAGen devices convert to identical EGL device size and margin specifications, the migration tool only includes one entry for EGL.	The migration tool does the same things mentioned in the *Migrating with the associated part* column.
Potential Problem: A problem only arises if two or more devices with the same device size specify different floating area sizes or starting positions in VisualAge Generator. EGL validation results in a message in the Problems view. **Possible Solution:** Review the error messages. Edit the formGroup definition to specify the one floating area size and starting position that you require for this device size.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Map groups, maps, and device sizes

VisualAge Generator: VisualAge Generator supports device sizes for display maps with a depth and width of 6x40, 12x40, 16x64, and 255x160.

EGL: EGL supports common device sizes for text forms, but does not permit device sizes of 6x40, 12x40, 16x64, and 255x160 for COBOL generation. These devices are supported for Java generation..

Associated part needed for migration: Not applicable.

Table 23. Map groups, maps, and device sizes

Migrating with the associated part	Migrating without the associated part
When migrating a map group, the migration tool includes the original depth and width in the *screenSize* property within the *ScreenFloatingArea* property. The tool also issues a warning message.	The migration tools does the same thing as mentioned in the *Migrating with the associated part* column.
When migrating a display map, the migration tool includes the original depth and width in the *screenSizes* property for the migrated text form. The tool also issues a warning message.	The migration tools does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: These devices are not supported by EGL COBOL generation. There will be an error during generation. **Solution:** If you generate for COBOL, edit the *formGroup* and the text form in EGL and either remove or change the obsolete screen size.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Map names and help map names

VisualAge Generator: Map names are two-part names consisting of the map group and the map name. The main map group and the help map group for a program can both contain a map with the same name. For example, for Program X, main map group GROUPA and help map group GROUPH can each contain a map named MAP1. A map name is limited to 8 characters. A map name can be the same as the program name. The # and @ symbols are not valid in VAGen map group names, but the # and @ symbols are permitted in the map name portion of a map name.

EGL: Form names do not include the formGroup name. Instead, text and print forms are defined within a formGroup part. EGL also requires that all form names in the main formGroup and help formGroup be unique (no duplicate form names in the two formGroups for a program). EGL does not permit a form name to be the same as the name of a program. In addition, EGL does not permit the form name to be a reserved word or to use the # or @ symbol as the first character of the form name. EGL allows form names to be longer than 8 characters at definition time. At generation time, if an alias is specified, the alias is used as the form name. For COBOL generation, the form name or the alias is limited to 8 characters. Duplicate names are permitted in the main formGroup and help formGroup for the generated code.

Associated parts needed for migration: When migrating a map group, you need the program and its map group, help map group, and all the maps in both map groups.

Table 24. Map names and help map names

Migrating with the associated parts	Migrating without the associated parts
Based on the first program to migrate either the main map group or the help map group, the migration tool does the following: • Performs any renaming for map names due to reserved words or the # or @ symbol being used as the first character of the map name portion of the name. Maps in both the program's main map group and help map group are renamed as necessary. • Checks the names of *all* maps in the program's help map group for duplicate names with the main map group. • Compares the program name to the names of all maps in the program's main map group and help map group. If a map in the help map group does not have the same name as any map in the main map group, the migration tool does not change the help map name. If a map in the help map group has the same name as any map in the program's main map group, the migration tool does the following: • If the help map contains only constants, the migration tool does the following: – Renames the help map to helpMapName plus a customer-specified suffix. – Includes the alias property with the original help map name. – Changes the helpForm property for any map to specify the new help map name. • If a map in the help map group contains variables, the migration tool does the following: – Issues an error message. – Does not rename the map. – Migrates the map. This is because the map could be used by some other program that specifies the help map group as that program's main map group. If a map in the help map group only contains constant fields and the map name is the same as the program name, the migration tool renames the help map. The same processing is done as occurs when renaming can be done for conflicting map names in the help map group and main map group. If a map in the help map group contains any variable fields and is named the same as the program name or if a map in the main map group is named the same as the program, the migration tool does not rename the map. The same processing is done as occurs when renaming cannot be done for conflicting map names in the help map group and main map group.	When migrating map groups, if a program is not available, the migration tool does not know that two map groups are related and does not know whether a map group is ever specified as a help map group. The migration tool does the following: • Performs any renaming for map names due to reserved words or the # or @ symbol. • Does *not* check for additional renaming of help maps.

Table 24. Map names and help map names (continued)

Migrating with the associated parts	Migrating without the associated parts
Potential Problem 1: A problem can arise if a formGroup is used as a main formGroup in one program and a help formGroup in another program. **Possible Solution:** Separate the help formGroup into two formGroups, one containing only help forms and the other containing forms with variable fields. Specify the formGroup that contains only help forms as the help formGroup for the original program. Specify the formGroup containing the forms with variable fields as the main formGroup and the formGroup containing only the help forms as the help formGroup for the second program. **Potential Problem 2:** A problem arises if a map in the help formGroup contains variable fields and has the same name as a map in the main formGroup. **Possible Solution:** Same as possible solution for Problem 1. **Potential Problem 3:** A problem can arise if the same help formGroup is shared by multiple programs. In this case, the migration tool might not rename all the help forms that need to be renamed for the various programs. **Possible Solution:** Rename all the necessary forms in the help formGroup by adding your help map suffix to the name. Include the alias property to provide the original help map name for use during generation. Change all corresponding text forms in all formGroups to specify the new help form name.	**Potential Problem:** A problem only arises if the formGroup is used in a program and there is a conflict between the form names in the main formGroup and help formGroup. **Possible Solutions:** The same solutions as shown for *Migrating with the associated part* apply.

Numeric variable fields

VisualAge Generator: A numeric field on a map has one length. The length should be long enough to allow for all the digits, the decimal point, sign, currency symbol, and numeric separator. However, if the field is not long enough at runtime, VisualAge Generator omits the currency symbol and numeric separator. VisualAge Generator also omits the sign if it is positive. If necessary to fit into the space allowed, VisualAge Generator drops the high order digits.

EGL: Variable fields on a form specify both a type definition, which includes the number of digits and decimals, and a fieldLen property that specifies the space that the data occupies on the form. If the fieldLen is not big enough to contain all the digits and formatting characters at runtime, EGL issues a runtime message.

Associated part needed for migration: Not applicable.

Table 25. Numeric variable fields

Migrating with the associated part	Migrating without the associated part
When migrating a numeric field on the map, the migration tool sets the length and fieldLen as follows: • The migration tool always sets the fieldLen to the same length as specified for the variable field in VisualAge Generator. • The migration tool sets the length and decimals in the type definition as follows: – If the variable field does not specify decimals, the migration tool sets the length in the type definition to the fieldLen. – If the variable field specifies decimals, the migration tool sets the length in the type definition to fieldLen minus 1 to allow for entry of the decimal point. This technique avoids any overflow problems that might occur at run time.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: If the field length on the form is not large enough at run time to contain all the digits, decimal point, sign, currency symbol, and numeric separator characters, EGL issues a run time error message. **Solution:** Change the form definition so that the fieldLen is large enough to contain the largest possible number that will occur at run time and all the formatting characters that you specify.	The same problem listed under the *Migrating with the associated part column* can occur. You can use the same solution.

Map variable fields and edit routines

VisualAge Generator: A map variable field can have an edit routine that is a table, a function, EZEC10, or EZEC11. The edit message is only used if the edit routine is EZEC10, EZEC11, or a table.

EGL: A form field can have both a validatorDataTable and a validatorFunction. A form field can also have both a validatorDataTableMsgKey and a validatorFunctionMsgKey.

Associated part needed for migration: Either the table or function part.

Table 26. Variable map fields and edit routines

Migrating with the associated part	Migrating without the associated part
The first time the map is migrated, the migration tool does the first of the following that applies: • If the editRoutineName is EZEC10 or EZEC11, the migration tool sets the validatorFunction property to the EGL-equivalent system library function. The migration tool also sets the validatorFunctionMsgKey to the edit message, if any. • If the editRoutineName is a function, then the migration tool sets the validatorFunction property. The migration tool omits the validatorFunctionMsgKey because it is not used in VisualAge Generator. • If the editRoutineName is a table, then the migration tool sets the validatorDataTable property. The migration tool also sets the validatorDataTableMsgKey to the edit message, if any.	If a function or table with the same name as the editRoutineName is not available, the migration tool does the first of the following that applies: • If the editRoutineName is EZEC10 or EZEC11, the migration tool sets the validatorFunction property to the EGL equivalent system library function name. The migration tool also sets the validatorFunctionMsgKey to the edit message, if any. • If the editRoutineName is longer than 7 characters, it must be a function name, so the migration tool sets the validatorFunction property. The migration tool omits the validatorFunctionMsgKey because it is not used in VisualAge Generator. • If an edit message is specified, the migration tool sets the validatorDataTable and validatorDataTableMsgKey. • If an edit message is not specified, the migration tool sets the validatorFunction property and issues an error message.
Potential Problem: A problem only arises if a function and dataTable have the same name (most likely in different subsystems) and two programs share the same formGroup (most likely in the same subsystem) and one program expects to use the function and the other program expects to use the dataTable. **Possible Solution:** Review programs that share a formGroup. If the situation arises, create a separate formGroup to use the validatorDataTable. **Disadvantage:** There are now two formGroups to maintain. You can minimize this disadvantage by moving identical forms to a common file and then specifying the use formName statement in each formGroup to point to the common forms.	**Potential Problem:** A problem only arises if the migration tool guesses incorrectly. Any program that uses this form might expect a dataTable when the migration tool specified a function. **Possible Solution:** Review the uses of maps that have error messages.

Map fields and the numeric hardware attribute

VisualAge Generator: VisualAge Generator supports the numeric hardware attribute for character constant fields, character variable fields, and numeric variable fields. The numeric hardware attribute prevents the end user from typing non-numeric data in a variable field.

EGL: EGL only supports the *isDecimalDigit* attribute for character variable fields. Numeric fields have a soft edit to ensure that only valid numeric characters and formatting characters such as a sign or decimal point are entered into the field.

Associated part needed for migration: Not applicable.

Table 27. Map fields and the numeric hardware attribute

Migrating with the associated part	Migrating without the associated part
The migration tool does the following: • For any character variable on a map that specified the numeric hardware attribute, the tool includes *isDecimalDigit = yes* property. • For any character constant on the map, the tool always omits the *isDecimalDigit* property. • For any numeric variable field on the map, the tool always omits the *isDecimalDigit* property.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: The end users will notice a slight change at run time because they will be able to type non-numeric data into numeric fields. EGL will issue a runtime error message if this occurs. **Possible Solution:** Consider notifying your end users that this is an expected difference when changing from VAGen-generated code to EGL-generated code.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Map arrays and attributes

VisualAge Generator: VisualAge Generator permits, but does not recommend, using different attributes for the elements of an array. For example, in VisualAge Generator the protection, input required, require fill on input, numeric hardware attribute, modified data tag, and light pen detect can vary for each element of the map array.

EGL: In EGL, the only properties that can be overridden for an array item are the field presentation properties (color, highlight, intensity, protect, modified, and outline) plus cursor, position, and value.

Associated part needed for migration: Not applicable.

Table 28. Map arrays and attribute fields

Migrating with the associated part	Migrating without the associated part
The migration tool uses the following properties for the first element of the array (array index 1) to set the EGL equivalent properties: input required, require fill on input, numeric hardware attribute, and light pen detect. EGL uses the properties for the first element of the array for **all** the elements of the array.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: A problem only arises if you used different attributes for the elements of the array. **Possible Solution:** Change the properties for the first element of the array to the least restrictive values and add logic in a validatorFunction to verify that each element of the array meets the necessary criteria. Also notify your end users of any differences in the appearance of the form at runtime.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Unnamed map variable fields

VisualAge Generator: VisualAge Generator permits, but does not recommend, unnamed variable fields on a map. At generation time, unnamed variable fields are converted into constants. Programs and functions can never reference the unnamed variable field.

EGL: EGL does not permit unnamed variable fields on a form.

Associated part needed for migration: Not applicable.

Table 29. Unnamed map variable fields

Migrating with the associated part	Migrating without the associated part
For any unnamed variable fields on the map, the migration tool checks to see if any of the following are specified: • Initial value • Protect = yes • Cursor = yes • Outlining other than ″No outlining″ • Highlighting other than ″No highlighting″ If any of the above are specified, the migration tool creates a constant field with the corresponding EGL properties and issues a warning message.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
If none of the properties (or only default values) are specified for the unnamed variable field, the migration tool does the following: • Does not create a constant field on the form. • Issues a warning message.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problems: None. You could not reference the field in VisualAge Generator.	**Potential Problems:** None.

Unprotected map constants

VisualAge Generator: VisualAge Generator supports the use of unprotected constants on a map. At test and generation time, unprotected constants are treated as though the protection is set to autoskip.

EGL: EGL does not support the use of unprotected constants on a form. For constants on text forms, EGL supports both protect=yes and protect=skip. For print forms, EGL does not support the protect property.

Associated part needed for migration: Not applicable.

Table 30. Unprotected map constants

Migrating with the associated part	Migrating without the associated part
When migrating a form, for an unprotected constant field, the migration tool does the following: • If the form is a text form, the migration tool sets the EGL protect property to skip and issues an error message. • If the form is a print form, the migration tool omits the protect property and does not issue a message. The protect property is not used in EGL print forms.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: None.	**Potential Problem:** None.

Fields at row=0, column=0

VisualAge Generator: VisualAge Generator 4.5 tolerates fields positioned at row=0, column=0 from older releases of Cross System Product or VisualAge Generator. However, VisualAge Generator 4.5 does not provide a way to create fields at this position. You cannot set attribute information for fields positioned at row=0, column=0.

EGL: EGL does not support fields positioned at row=0, column=0. Every field must include an attribute byte.

Associated part needed for migration: Not applicable.

Table 31. Fields at row=0, column=0

Migrating with the associated part	Migrating without the associated part
When migrating a form, if a field is positioned at row=0, column=0, the migration tool does the following: • If the field is a constant field and the first character of the value is blank, the migration tool does the following: – Removes the first character from the value and reduces the field length by 1. – Sets the position property to [1,1]. – Includes default presentation properties for the field. – Issues a warning message. • If the field is a constant field and the first character of the value is not blank OR if the field is a variable field, the migration tool does the following: – Does not change the value or the field length. – Sets the position property to [0,0]. – Includes default presentation properties for the fields. – Issues an error message.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.

Table 31. Fields at row=0, column=0 (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem 1: If the field cannot be changed and is at position=[0,0], there will be an error in the Problems view. **Solution 1:** Modify the form and change the position of the field. You might need to move other fields or reposition constants to make room for the attribute byte for the field. Also review the default presentation properties to ensure that the correct color, highlighting, and so on are used. **Potential Problem 2:** If a constant field is changed to position=[1,1], there might be a different runtime appearance due to the default presentation properties. **Solution 2:** Review the migration warning messages and be sure to test any forms where the migration tool adjusted the position of a field.	**Potential Problem:** The same problems listed under the *Migrating with the associated part* column can occur. You can use the same solutions.

Handling ambiguous situations for programs

Program names and reserved words

VisualAge Generator: VisualAge Generator does not have reserved words. The # and @ symbols are not valid in VAGen program names.

EGL: EGL has reserved words. In addition, EGL does not permit the # or @ symbol as the first character of a part name. A program name cannot be a reserved word.

Associated part needed for migration: Not applicable.

Table 32. Program names and reserved words

Migrating with the associated part	Migrating without the associated part
The migration tool does not rename the program for you. The migration tool used in Stage 1 of migration issues an error message if the program name matches the reserved word list. If you do not change the program name, the migration tool used in Stage 2 of migration also issues an error message.	The migration tool does the same as mentioned in the *Migrating with the associated part* column.

Table 32. Program names and reserved words (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem: A problem only arises if a program name matches the reserved word list. EGL validation results in a message in the Problems view. **Solution:** Rename the program. You can do this either in VisualAge Generator or in EGL after you migrate. If you rename the program in EGL, you must change the name of the program and all references to it, including references on call, transfer, and show statements and references in linkage option parts. Also change the names of any bind control or link edit parts that correspond to this program. If you want to keep the original program name as the name for the generated program, set the *alias* property to the original program name. If you do not specify the *alias* property, be sure to change any non-EGL references to the program name, including CICS program definitions.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Implicit data items in programs

VisualAge Generator: VisualAge Generator permits, but does not recommend, the use of implicit data items (items that are not explicitly defined in a record, map, table, called parameter list, function parameter list, or function local storage).

EGL: EGL does not permit implicit data items.

Associated part needed for migration: Not applicable.

Table 33. Implicit data items in programs

Migrating with the associated part	Migrating without the associated part
The migration tool does not create definitions for implicit items for you. The migration tool used in Stage 2 of migration issues a warning message if the program allows implicit items.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: A problem only arises if the program actually uses implicit items. Review the "TO DO" list log for any programs that allow implicit items. If the program actually used implicits there will be errors in the Problems view. **Solution:** You can add a definition for the implicit item to the program either in VisualAge Generator or in EGL. VAGen validation shows the definition that is needed for the implicit item.	The same problem listed under the *Migrating with the associated part* column can occur. You can use the same solution.

Associated program parts

VisualAge Generator: The program's associates can be in multiple projects and packages for VisualAge Java or in multiple configuration maps and applications for VisualAge Smalltalk.

EGL: The program's associates can be in multiple projects, folders, packages, and files.

Associated parts needed for migration: For a program: All associates.

Note: See "EGL build path and import statements" on page 35 for additional information on import statements.

Table 34. Associated program parts

Migrating with the associated part	Migrating without the associated part
The migration tool does the following: • Includes a package statement to specify the package in which the EGL file is to be placed. • Includes import statements in the EGL file for any packages that contain associates needed by any of the parts in the current file and which are in a different package from the current file. The import statements are only included if you migrate using Stages 1 through 3. • For the program the migration tool does the following: – Includes a declaration for the program's primary working storage record. If there are level 77s in the VAGen primary working storage record, the tool also includes a declaration for the new level 77 item record. – Includes declarations for all records in the VAGen Tables and Additional Records list, including the redefines property, if applicable, for any VAGen redefined records. – Includes declarations for all I/O records. – Includes declarations for records used as parameters on MQ API calls (the records specified as attributes of an MQ Message record in VisualAge Generator). – Includes declarations for UI records that are used as the First UI Record, in a CONVERSE, or an XFER statement. – Includes declarations for DL/I segment records that the program references in I/O options, either directly or because they are in the hierarchical path to the I/O object. – Includes use declarations for any tables in the VAGen Tables and Additional Records list. – Includes a use declaration for a message table if the table is explicitly referenced in a statement in the program. – Includes a use declaration for each map within the program's map group that the program references in a converse, display, or close I/O option, in an XFER with a map statement, as a called parameter, or as the First Map of the program. – Includes a use declaration for the program's help map group. – Includes a variable declaration for the program's PSB.	The migration tool makes use of all program associates that are available.

Table 34. Associated program parts (continued)

Migrating with the associated part	Migrating without the associated part
Potential problem: None.	**Potential Problem 1:** A problem only arises if there are missing parts. If the migration tool detects missing parts, it issues a warning message that identifies the missing parts. The migration tool does not make any assumption about the missing part(s). This can result in a variety of problems in the migrated program, including the following: • Missing import statements. • Missing level 77 record declaration. • Missing redefines property for VAGen redefined records. • Missing I/O record declarations. • Missing declarations for records used as parameters on MQ API calls. • Missing UI record declarations. • Missing DL/I segment record declarations for segments referenced in SSAs. • Missing use declaration for a message table if the table is explicitly referenced in a statement in the program. • Missing use declaration for maps within the map group. Except for the missing redefines property, there will be errors in the Problems view to help you identify the problem(s). ***Note: the migration tool does not detect all missing parts.*** **Possible Solution 1A:** Change your migration set to include all the parts that are needed to validate the program in VisualAge Generator. Migrate the program again using the new migration set so that all the program's associates are migrated together. **Possible Solution 1B:** Locate the missing parts in EGL and correct the EGL program. **Potential Problem 2:** For missing level 77 items, see "Level 77 items in records" on page 67. **Potential Problem 3:** For missing redefined records, see "Redefined records" on page 66.

Program with EZEDLPCB in called parameter list

VisualAge Generator: VisualAge Generator uses EZEDLPCB[*n*] to indicate that a program is to receive a PCB as a parameter. *n* must be a numeric literal. The value of *n* must be 0 (for the I/O PCB) or a number that corresponds to one of the PCBs defined in the PSB part for the program.

EGL: EGL uses a variable name with a type definition of xxxx_PCBRecord to indicate that a program is to receive a PCB as a parameter. xxxx must be IO, ALT, DB, or GSAM based on the type of the PCB. EGL also requires the pcbParms property to provide the mapping of the PCB variable name to its corresponding position in the program's PSB record.

Associated part needed for migration: The PSB part.

Table 35. Program with EZEDLPCB in called parameter list

Migrating with the associated part	Migrating without the associated part
When migrating the program, if the program specifies EZEDLPCB[*n*] as a parameter and the PSB part is available, the migration tool does the following: • Includes the variable pcb*n* as a parameter and specifies the type definition based on the corresponding PCB in the PSB as follows: – The migration tool sets the type definition of EZEDLPCB[0] to IO_PCBRecord. – If *n* corresponds to a PCB in the PSB part, the tool sets the type definition based on the PCB type in the PSB. – If *n* is greater than the number of PCBs in the PSB part, the tool issues a message and sets the type definition to EZE_UNKNOWN_PCB_TYPE. • Lists all the pcb*n* variables in their corresponding place in the pcbParms property. The I/O PCB is pcb0 and, if specified as a parameter, is listed in the first position of the pcbParms property. The remaining pcb*n* variables are listed at position *n*+1 in the pcbParms list.	When migrating the program, if the program specifies EZEDLPCB[*n*] as a parameter and the PSB part is not available, the migration issues a message and does the following: • Includes the variable pcb*n* as a parameter and specifies the type definition as follows: – The migration tool sets the type definition of EZEDLPCB[0] to IO_PCBRecord. – The migration tool issues a message and sets the type definition of all other pcb*n* variables to EZE_UNKNOWN_PCB_TYPE. • Issues a message and sets the pcbParms property to EZE_UNKOWN_PCB_MAPPING.
Potential Problem: A problem only arises if the PSB part contains fewer PCBs than the highest value of *n* for an EZEDLPCB[*n*] parameter. **Solution:** The program is invalid in VisualAge Generator. Review your program logic to determine whether to change the program parameter list or the program's PSB part.	**Potential Problem 1:** The correct PCB type definitions and pcbParms property must be provided. **Solution:** Locate the program's PSB part. Edit the program and correct the PCB type definitions. Also provide the correct mapping of the pcb*n* variables for the pcbParms property.

Intermediate variables required for migration

VisualAge Generator: Some VAGen statements require intermediate variables to provide the equivalent support in EGL.

EGL: EGL provides system library functions that provide some information required for VAGen migration. This support is only available in VisualAge Generator Compatibility mode.

Associated part needed for migration: Not applicable.

Table 36. Intermediate variables required for migration

Migrating with the associated part	Migrating without the associated part
When migrating any program, the migration tool always includes declarations for the following: • *custPrefix*EZEREPLY • *custPrefix*EZE_ITEMLEN • *custPrefix*EZE_WAIT_TIME If the VAGen Migration Preference *Do not initialize old EZESYS values* is not selected, the migration tool also does the following: • Includes a declaration for *custPrefix*EZESYS. • Includes an initialization statement to set the value of *custPrefix*EZESYS to the old VAGen EZESYS value. *custPrefix* is the same prefix that is used for changing part names that conflict with reserved words. Use the VAGen Migration Preferences to set its value.	The migration tool does the same things mentioned in the *Migrating with the associated part* column.
The 4 variables are used for migrating the following: • VAGen service routines if the (REPLY option is not specified. In this situation, the current value of handleSysLibraryErrors must be saved and restored. • The TEST nnn, +nnn, or -nnn statement which has no direct equivalent in EGL. An EGL system library function is used to determine the length of the data the user entered. • The EZEWAIT function. In this situation, the migration tool adds logic to convert the time to seconds. • References to EZESYS in statements other than IF, WHILE, and TEST where the old VAGen value is required.	The migration tool does the same things mentioned in the *Migrating with the associated part* column.
Potential Problems: A problem only arises if you select the VAGen Migration Preference *Do not initialize old EZESYS values* during migration and you use EZESYS in statements other than IF, WHILE, or TEST. In this situation the migration tool uses *custPrefix*EZESYS in the statement, but programs do not have a declaration and initialization statement for *custPrefix*EZESYS. There will be an error in the Problems view. **Potential Solution 1:** Change your EGL logic to use the new values for sysVar.systemType. **Potential Solution 2:** Add a declaration and an initialization statement for *custPrefix*EZESYS to any program that needs to use the old VAGen value for EZESYS.	The same problem listed under *Migrating with the associated part column* can occur. You can use the same solutions.

Handling ambiguous situations for functions, including I/O statements

DISPLAY statement for maps

VisualAge Generator: *DISPLAY* is used for both display maps and printer maps.

EGL: Two separate statements are used:

- *display form* is used for text forms.
- *print form* is used for print forms.

In VisualAge Generator Compatibility mode, *display form* is accepted if the form is a print form.

Associated part needed for migration: The map is needed to determine the device type. The first map with this map name in any available map group is the map that the migration tool uses. When migrating in program context, the migration tool only looks at the program's main map group.

Table 37. Display statement for maps

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if a map with this name is available, the migration tool converts to the following: • *display textForm* if the map is a display map • *print printForm* if the map is a printer map	If a map with this name is not available, the migration tool does the following: • Converts to *display form* • Issues a warning message that the map type could not be determined

Table 37. Display statement for maps (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem 1: The first program that migrated used a print form so the migration tool migrated to the print statement. Another program uses the same function, but with a text form. **Solution 1:** Use VisualAge Generator Compatibility mode. Edit the function and change the print statement to a display statement. **Potential Problem 2:** A problem arises if you want to eliminate the use of VisualAge Generator Compatibility mode and two programs use the function -- one with a text form and one with a print form. **Possible Solution 2A:** If a specific target environment always uses display maps and other environments always use print maps, you could change the EGL function to something similar to the following: `if (sysVar.systemType is zoscics)` `  DISPLAY_FUNCTION();` `else` `  PRINT_FUNCTION();` `end` where DISPLAY_FUNCTION and PRINT_FUNCTION use the display and print statements, respectively. **Possible Solution 2B:** Assuming the function migrated to a display statement, change the function from the following: `before-logic` `display textForm;` `after-logic` to the following: `before-logic-function();` `display textForm;` `after-logic-function();` Putting the before-logic and after-logic into separate functions enables you to keep most of the logic in common functions. Then you can make a copy of the modified display function and change it to use print map, but still use the common before-logic-function and after-logic-function. ***Disadvantage:*** This has the potential to ripple back into functions that use the original DISPLAY function.	**Potential Problem:** The same potential problems and possible solutions as listed in the *Migrating with the associated part* column apply.

I/O error routine

VisualAge Generator: A function that does file or database I/O can specify an I/O error routine. The I/O error routine can be a main function or a non-main function; the syntax is the same. VisualAge Generator determines at test or generation time whether the I/O error routine is a main function or non-main function for the program. When a main function is used as the I/O error routine, VisualAge Generator pops the function stack back to the top of the stack, starts the stack over again with only the (I/O error routine) main function on the stack, and then invokes the main function. When a non-main function is used as the I/O

error routine, VisualAge Generator adds the non-main function to the current function stack and then invokes the function.

EGL: The *try* block and *onException* statement are used for error handling. The syntax for an onException statement supports the following:

- Transferring back to a main function using *exit stack functionName;*
- Invoking a non-main function using *nonmainfunctionName();*
- Invoking a main function with *mainfunctionName();* This form is not supported by VisualAge Generator. EGL adds the main function to the current function stack and then invokes the main function.

Associated part needed for migration: The program with its list of main functions.

Table 38. File and database I/O error routines

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if there is a program available, the migration tool does the following: • Changes an I/O error routine that specifies a program main function to: `try` `  I/O-Statement;` `  onException  exit stack functionName;` `end` • Changes an I/O error routine that specifies a non-main function to: `try` `  I/O-Statement;` `  onException functionName();` `end`	If there is no program available, the migration tool does the following: • Assumes that the function named in an I/O error routine is a non-main function and changes it to the following: `try` `  I/O-Statement;` `  onException functionName();` `end` • Does not issue a warning message due to the high volume of messages that could be issued and the likelihood that messages will be ignored or hide other serious error messages.
Potential Problem: A problem arises if this function is used in a program where the I/O error routine differs in its use as a main or non-main function from the original program. **Note:** There will not be a message in the Problems view. Generation will not detect an error. *However, the program will not run the same as in VisualAge Generator.* Instead of popping the stack as in VisualAge Generator, EGL will add the main function to the stack. **Possible Solution:** If this situation arises, create a new version of this I/O function with the proper syntax for transferring to a main function. ***Disadvantage:*** This technique has the potential to ripple back into other functions that invoke the I/O function.	**Potential Problem:** A problem arises if this function is used in a program where the I/O error routine is a main function. **Note:** There will not be a message in the Problems view. Generation will not detect an error. *However, the program will not run the same as in VisualAge Generator.* Instead of popping the stack as in VisualAge Generator, EGL will add the main function to the stack. **Possible Solution:** The same solution listed for *Migrating with the associated part* applies.

SQL I/O statements

VisualAge Generator: For SQL I/O, test and generation expand a single I/O option into multiple SQL statements as needed based on the record definition and the use of Execution Time Statement Build. Test and generation always create the tables clause for the I/O statement from the SQL record definition.

EGL: SQL statements must be explicitly specified in the EGL program. If an SQL statement is modified, *all* SQL clauses except the into clause are required. Execution Time Statement Build is replaced by the prepare statement followed by an open, get, or execute statement.

Associated part needed for migration: The SQL record and the record specified as the alternate specification record, if any.

Table 39. SQL I/O statements

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the SQL record and its alternate specification record are available, the migration tool creates the corresponding EGL statement(s) based on the record definition, the SQL statement within the function, and the use of Execution Time Statement Build. If the SQL statement in the function was modified, the migration tool does the following: • Builds the EGL SQL statement with all clauses, including the *into* clause. • Creates any required tables clause from the table names in the SQL record or, if applicable, its alternate specification record. • Creates any other missing clauses that are required for this SQL I/O statement based on the record definition for the I/O object, or if applicable, the record definition for the I/O object's alternate specification record. • Converts any !itemColumnNames from the item name to the corresponding SQL column name. • Does not review the SQL statement for the SQL reserved words that require special treatment. See "SQL reserved words requiring special treatment" on page 225 for the list of reserved words and the changes you must make to your SQL statement if you use one of these reserved words as a table or column name. **Note:** • See "SQL I/O and missing required SQL clauses" on page 93 for details on problems related to missing SQL clauses. • See "SQL I/O and !itemColumnName" on page 95 for details on problems related to using !itemColumnNames.	If the SQL record or its alternate specification record are not available, the migration tool only has the SQL statement modifications and Execution Time Statement Build information to use in creating the EGL SQL statements. Because the migration tool does not have a record definition available, the migration tool does the following: • Builds the EGL SQL statement with all clauses, including the *into* clause. • Uses EZE_UNKNOWN_SQLTABLE as the table name and T1 as the table label in any tables clause. • Uses EZE_UNKNOWN_SQL_*clausename* for any missing SQL clauses, where *clausename* is the External Source Format key word for the missing SQL clause (for example, SELECT or VALUES). • Uses !itemColumnNames for any column name variables. • Issues an error message that the function needs to be reviewed. • Does not review the SQL statement for the SQL reserved words that require special treatment. See "SQL reserved words requiring special treatment" on page 225 for the list of reserved words and the changes you must make to your SQL statement if you use one of these reserved words as a table or column name. **Note:** • See "SQL I/O and missing required SQL clauses" on page 93 for details on problems related to missing SQL clauses. • See "SQL I/O and !itemColumnName" on page 95 for details on problems related to using !itemColumnNames.

Table 39. SQL I/O statements (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem 1: A problem only arises if there are two records with the same name that have different SQL table names or table labels. This might occur in different subsystems or when generating using different tables for test and production. **Possible Solution 1A:** If the problem is due to changing the qualification for a table name between test and production, change to use unqualified table names and specify the qualification information at BIND time. **Possible Solution 1B:** If the problem is due to different table names in different subsystems, make a copy of the record and rename it. Then make a copy of the I/O function to use the new record name. Correct the new I/O function to have the proper tables clause. ***Disadvantage:*** This has the potential to ripple back into functions that use this I/O function. **Possible Solution 1C:** If the problem is due to different table names in different subsystems, change the record to use the *tableNameVariables* property and modify all functions that do I/O for this record to set the table name variable before invoking the I/O function -- possibly in each program's main function. Alternatively, make the change to table name host variables in VisualAge Generator and migrate the program, record and function again. ***Disadvantage:*** There are potential performance implications because this changes from static to dynamic SQL. **Potential Problem 2:** A problem arises if any SQL table name or column name is one of the SQL reserved words that requires special treatment. The migration tool does not enclose these SQL reserved words in double-quotes. There will be an error in the Problems view. **Solution 2A:** Edit the function and enclose the SQL table name or column name in double quotes. See "SQL reserved words requiring special treatment" on page 225 for the list of SQL reserved words and an example of the required syntax.	**Potential Problem 1:** A problem arises for any modified SQL statement or any SQL statement that uses Execution Time Statement Build. Depending on whether the record is missing and which specific SQL clauses are missing from the SQL statement, there might be errors in the Problems view. **Solution:** Review the migration log for any messages related to missing SQL clauses or table names. Alternatively, search the workspace for any occurrences of EZE_UNKNOWN_SQL. Determine the proper tables clause based on the record definition. See "SQL I/O and missing required SQL clauses" on page 93 for information about recreating the SQL clause in EGL. See "SQL I/O and !itemColumnName" on page 95 for information about correcting any !itemColumnName variables. **Other potential problems:** The same potential problems and solutions as shown for *Migrating with the associated part* apply.

SQL I/O and missing required SQL clauses

VisualAge Generator: VisualAge Generator 4.5 stores all the SQL clauses if you modified any SQL clause. However, some earlier versions of Cross System Product and VisualAge Generator only stored the clause that you modified. If a function from an earlier version was never modified in VisualAge Generator 4.5, then some of the required SQL clauses might be missing.

EGL: If any SQL clause is modified, all SQL clauses for the SQL statement must be specified.

Associated part needed for migration: The SQL record and the record specified as the alternate specification record, if any.

Table 40. SQL I/O and missing SQL clauses

Migrating with the associated part	Migrating without the associated part
If the SQL record and its alternate specification record are available, and if any SQL clause is present, but some clauses are missing, the migration tool creates the missing clauses as shown in the next rows of this table. Based on the first migration of this function, the migration tool uses the SQL record and its alternate specification record, if any, to create the missing clauses.	If the SQL record or its alternate specification record are not available, and if any SQL clause is present, but some clauses are missing, the migration tool creates the missing clauses as shown in the next rows of this table. Based on the first migration of this function, the migration tool creates intentionally invalid EGL syntax if the SQL record or its alternate specification record is not available.
Missing tables clause: The migration tool creates the tables clause by listing all the SQL tables and table labels from the record. The migration tool includes both SQL table names and table name host variables in the same order that they appear in the VAGen record definition.	**Missing tables clause:** The migration tool sets the SQL table name to EZE_UNKNOWN_SQLTABLE, sets the table label to T1 and issues an error message.
Missing SELECT clause: The migration tool creates a select clause by listing all the SQL column names from the record in the same order that the items appear in the record.	**Missing SELECT clause:** The migration tool sets the SQL column names for the select clause to EZE_UNKNOWN_SQL_SELECT and issues an error message.
Missing INTO clause: The migration tool creates the into clause by listing all the item names from the record in the same order that the items appear in the record.	**Missing INTO clause:** The migration tool sets the item names for the into clause to EZE_UNKNOWN_SQL_INTO and issues an error message.
Missing INSERTCOLNAME clause: The migration tool creates the list of column names to be inserted for a VAGen ADD function by listing the SQL column names from the record in the same order that the items appear in the record. The migration tool omits the SQL column name for any item that is identified as read only.	**Missing INSERTCOLNAME clause:** The migration tool sets the SQL column names for the list to EZE_UNKNOWN_SQL_INSERTCOLNAME and issues a error message.
Missing VALUES clause: The migration tool creates the values clause for a VAGen ADD function by listing the item names from the record in the same order that the items appear in the record. The migration tool omits the item name for any item that is identified as read only.	**Missing VALUES clause:** The migration tool sets the item names for the values clause to EZE_UNKNOWN_SQL_VALUES and issues an error message.
Missing FORUPDATEOF clause: The migration tool creates the for update of clause by listing the SQL column names from the record in the same order that the items appear in the record. The migration tool omits the SQL column name for any item that is included in the EGL keyItems property or any item that is identified as read only.	**Missing FORUPDATEOF clause:** The migration tool sets the SQL column names for the for update of clause to EZE_UNKNOWN_SQL_FORUPDATEOF and issues an error message.
Missing SET clause: The SET clause is not required. If the SET clause is missing from a REPLACE I/O statement, the statement is a default SQL replace. The migration tool never creates a set clause.	**Missing SET clause:** The migration tool does the same thing as mentioned in the *Migrating with the associated part column*.
Missing WHERE clause: The WHERE clause is not required. The migration tool never creates a *where* clause.	**Missing WHERE clause:** The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.

Table 40. SQL I/O and missing SQL clauses (continued)

Migrating with the associated part	Migrating without the associated part
Missing ORDERBY clause: The ORDERBY clause is not required. The migration tool never creates an *order by* clause.	**Missing ORDERBY clause:** The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: A problem only arises if there are two records with the same name (generally in different subsystems) that have different item names or SQL column names. **Possible Solution:** Make a copy of the function for use in the second subsystem and modify the new function to use the correct item names and SQL column names. ***Disadvantage:*** This has the potential to ripple back into functions that use this I/O function.	**Potential Problem 1:** A problem arises for any modified SQL statement or any SQL statement that uses Execution Time Statement Build. **Solution 1A:** Review the list of error messages for any messages related to missing SQL clauses. Modify the SQL I/O function to include the missing clauses. The information you need to build the missing clause is in the corresponding row in the *Migrating with the associated part* column. **Solution 1B:** Edit the function in VisualAge Generator and use the SQL Editor to make a trivial change such as adding a blank at the end of a line. Save the SQL clauses and then migrate the function again. Be sure to include the record definition so that the migration tool can include the SQL table information in the EGL I/O statement. **Potential Problem 2:** The same potential problem and solution as shown for *Migrating with the associated part* apply.

SQL I/O and !itemColumnName

VisualAge Generator: For SQL I/O, VisualAge Generator permits the use of !itemColumnName in some clauses of the SQL statements. Test and generation determine the SQL column name that corresponds to the item name in the SQL row record.

EGL: The use of !itemColumnName is not supported.

Associated part needed for migration: The SQL record and the record specified as the alternate specification record, if any.

Table 41. SQL I/O and !itemColumnName

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the SQL record and its alternate specification record are available, the migration tool converts any !itemColumnNames to the corresponding SQL column name based on the SQL record or, if applicable, its alternate specification record.	If the SQL record or its alternate specification record are not available, the migration tool does the following: • Uses !itemColumnNames for any column name variables. • Issues an error message that the function needs to be reviewed.
Potential Problem: A problem only arises if there are two records with the same name (generally in different subsystems) that have different SQL column names corresponding to an !itemColumnName. **Possible Solution:** Make a copy of the function for use in the second subsystem and modify the new function to use the correct SQL column names. ***Disadvantage:*** This has the potential to ripple back into functions that use this I/O function.	**Potential Problem 1:** A problem arises for any modified SQL statement or any SQL statement that uses Execution Time Statement Build. **Solution:** Review the list of error messages for any messages related to !itemColumnNames. Modify the SQL I/O function to include the correct column names based on the SQL row record. **Potential Problem 2:** The same potential problem and solution as shown for *Migrating with the associated part* apply.

SQL I/O with multiple updates

VisualAge Generator: For SQL I/O, if there are multiple UPDATE or SETUPD functions in a program, each SQL REPLACE function must specify the name of its corresponding UPDATE or SETUPD function. This is not required for non-SQL I/O. SETUPD is not supported for non-SQL I/O.

EGL: For SQL I/O, if there are multiple get forUpdate or open forUpdate statements, each SQL replace statement must specify the name of its corresponding get or open statement. Each get and open statement specifies a resultSetID. The replace statement specifies the resultSetID for the corresponding get or open statement. The resultSetID is not applicable for non-SQL I/O.

Associated part needed for migration: The record that is the I/O object.

Table 42. SQL I/O with multiple updates

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the record is available, the migration tool creates the corresponding EGL statement(s) based on the record type. For SQL, the migration tool does the following: • Always includes a resultSetID when migrating any UPDATE or SETUPD function. The resultSetID is created using the function name and a customer-specified suffix. • Includes the resultSetID when migrating any REPLACE function that specified a corresponding UPDATE or SETUPD function name. The resultSeID is created using the corresponding UPDATE or SETUPD function name and a customer-specified suffix. For non-SQL, the migration tool always omits the resultSetID when migrating an UPDATE or REPLACE function. There are no SETUPD functions for non-SQL I/O.	When migrating an UPDATE function, if the record is not available, the migration tool does the following: • Attempts to determine if this function is for SQL I/O by checking if the function also has SQL clauses or any SQL-specific information such as Execution Time Statement Build, single row select, or cursor with hold. • If the migration tool can determine that this UPDATE statement is for an SQL record, the migration tool includes the resultSetID in the get statement. • Otherwise, the migration tool does not include the resultSetID. The migration tool issues a warning message. When migrating a SETUPD function, the migration tool always includes the resultSetID because SETUPD is only valid for SQL. When migrating a REPLACE function, the migration tool includes the resultSetID if the function specifies a corresponding UPDATE or SETUPD function name.
Potential Problem: None.	**Potential Problem:** A problem only arises if an unmodified UPDATE function really does refer to an SQL record and is used in a program where there are multiple *get* or *open forUpdate* statements. In this case, each *replace* statement will include a resultSetID, but the *get* statement that was migrated for the VAGen UPDATE statement will not include the resultSetID. Generation for the program will fail. **Solution:** Modify the function to include the resultSetID for the *get* statement.

DL/I I/O and comparison value items

VisualAge Generator: For DL/I I/O, if the comparison value item is not qualified, VisualAge Generator gives precedence to the record that corresponds to the segment specified for the current Segment Search Argument (SSA). If the comparison value item is not found in that record, VisualAge Generator looks next

in working storage records and then in other DL/I segment records such as the I/O object. Items in the function's local storage or parameter list are ignored. Records in the function's local storage or parameter list are considered, but only for items that are uniquely named for the program.

EGL: For DL/I I/O, if the comparison value item is not qualified, EGL follows the normal EGL qualification rules. EGL looks first at items in the function's local storage or parameter list; then fields in records in the function's local storage, parameter list, or I/O object; and finally all variables in the program.

Associated part needed for migration: DL/I segment record and the record specified as the alternate specification record, if any.

Table 43. DL/I I/O and comparison value items

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the comparison value item is not qualified, the migration tool looks for the DL/I segment record associated with the current SSA. If the DL/I segment record and its alternate specification record are available, the migration tool checks the record for the comparison value item as follows: • If the item is in the record, the migration tool qualifies the comparison value item with the DL/I segment record name. • If the item is not in the record, the migration tool does the following: – Uses EZE_UNKNOWN_QUALIFIER as the record name. – Issues a message indicating that it cannot determine the qualification for the item.	If the DL/I segment record or its alternate specification record are not available, the migration tool does the following: • Uses EZE_UNKNOWN_QUALIFIER as the record name. • Issues a message indicating that it cannot determine the qualification for the item.
Potential Problem: A problem only arises if the comparison value item is not qualified and is not in the associated DL/I segment record or its alternate specification record. **Possible Solution:** Review your program logic to determine the correct qualification to use. You can also review the generated COBOL source code from the last time you generated the program. In VisualAge Generator, at some points in time, the rules for the qualification of the comparison value item varied. Due to these variations, do not regenerate the program using your current release of VisualAge Generator unless you are certain that the release has not changed since the last time you generated the program.	**Potential Problem 1:** A problem arises for any unqualified comparison value item. **Solution:** Modify the DL/I I/O function to include the correct qualification for the comparison value item. Be sure to check the DL/I segment record associated with the qualification statement first. **Potential Problem 2:** The same potential problem and solution as shown for *Migrating with the associated part* apply.

Handling ambiguous situations for other statements

Implicit data items in statements

VisualAge Generator: VisualAge Generator permits, but does not recommend, the use of implicit data items (items that are not explicitly defined in a record, map, table, called parameter list, function parameter list, or function local storage).

EGL: EGL does not permit implicit items.

Associated part needed for migration: Not applicable.

Table 44. Implicit data items in statements

Migrating with the associated part	Migrating without the associated part
See "Implicit data items in programs" on page 84	See "Implicit data items in programs" on page 84

Level 77 items in statements

VisualAge Generator: Only working storage records can contain level 77 items. A program can reference level 77 items only in the primary working storage record.

EGL: Level 77 items are not permitted.

Associated part needed for migration: When migrating a function, you need the working storage record.

Table 45. Level 77 items in statements

Migrating with the associated part	Migrating without the associated part
See "Level 77 items in records" on page 67	See "Level 77 items in records" on page 67

Table references in statements

VisualAge Generator: If a function references a table, the table is not considered to be an associate of the function.

EGL: If a function references a DataTable, the file containing the function must include an import statement for the DataTable.

Associated part needed for migration: Table.

Table 46. Table references in statements

Migrating with the associated part	Migrating without the associated part
If the table is available, the migration tool adds the table as an associate of the function during Stage 2 migration. Stage 3 migration then adds the corresponding import statement to the file containing the function.	If the table is not available, the migration tool does not add the table as an associate of the function. The import statement is not added during Stage 3.
Potential Problem: None.	**Potential Problem:** A problem arises if the import statement is not present due to the need to import a part in the same package as the table, either for the function or for some other part in the same file as the function. **Solution:** Add the import statement to the file containing the function.

Assignment statements

VisualAge Generator: Assignment statements are permitted for records and maps and result in a "move corresponding." *MOVE* statements are permitted for items.

EGL: Assignment statements can only be used for data items or for a byte-by-byte move of a record. Assignment statements cannot be used for maps. The *move*

byName statement is required for a *move corresponding* of records and maps. The *move* statement without a modifier can be used for items, but assignment statements are preferred.

Associated part needed for migration: Not applicable.

Table 47. Assignment statements

Migrating with the associated part	Migrating without the associated part
To preserve as much common code as possible, the migration tool does the following if both the source and target of an assignment or move statement are unqualified, unsubscripted names: • Checks the function's parameter list, local storage, and I/O object to try to determine whether the source or target of an assignment or MOVE statement is an item, record, or map. If the migration tool can make the determination, it migrates as follows: – To an assignment statement if the source or target is an item. – To a *move byName* statement if the source or target is a record or map. • If the migration tool cannot determine the part type, it migrates assignment and MOVE statements to a move statement without a modifier.	This is handled the same as mentioned in the *Migrating with the associated part* column.
Potential Problem: None. Test and generation convert the move statement without a modifier to a VAGen MOVE statement. This is an item to item move or a move byName (move corresponding), depending on the actual source and target of the move. Any program can use the function without modifying it.	**Potential Problem:** None. The same situation mentioned in the *Migrating with the associated part* column applies.

FIND statement

VisualAge Generator: The search column in the FIND statement is optional. The default is the first column of the VAGen table.

EGL: The FIND statement is replaced by an *if* statement. The search column is required.

Associated part needed for migration: The VAGen table.

Table 48. FIND statement

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the search column is not explicitly specified and the table is available, the migration tool expands the table to get the name of search column from the first column of the table.	If the search column is not explicitly specified and the table is not available, the migration tool does the following: • Sets the search-column to `EZE_UNKNOWN_SEARCH_COLUMN` • Issues an error message that the function will need to be modified with the proper column name.

Table 48. FIND statement (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem: A problem only arises if two dataTables, probably in different subsystems, have the same dataTable name, but different search column names. **Solution:** For the second subsystem, add a field as a substructure for the first column in the dataTable. The name of this new field should be the same as the search column in the first subsystem. This technique enables you to share the common function without changing any code in the second subsystem.	**Potential Problem 1:** The search column name must be provided. There will be an error in the Problems view. **Solution:** Edit the function and specify the correct column name for the dataTable. **Potential Problem 2:** The same potential problem and solution as shown for *Migrating with the associated part* apply.

RETR statement

VisualAge Generator: The search and return columns for the RETR statement are optional. The search column defaults to the first column of the VAGen table. The return column defaults to the second column.

EGL: The RETR statement is replaced by an *if* statement. The search and return columns are required.

Associated part needed for migration: The VAGen table.

Table 49. RETR statement

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the search or return column is not explicitly specified and the table is available, the migration tool expands the table to get the following: • The name of search column from the first column of the table. • The name of the return column from the second column of the table.	If the search column or return column is not explicitly specified and the table is not available, the migration tool does the following: • Sets the search column to `EZE_UNKNOWN_SEARCH_COLUMN` • Sets the return column to `EZE_UNKNOWN_RETURN_COLUMN` • Issues an error message that the function will need to be modified with the proper column names.
Potential Problem: A problem only arises if two dataTables, probably in different subsystems, have the same dataTable name, but different search or return column names. **Solution:** For the second subsystem, add a field as a substructure for the first column in the dataTable. The name of this new field should be the same as the search column in the first subsystem. Substructure the second column of the dataTable with the name of the return column in the first subsystem. This technique enables you to share the common function without changing any code in the second subsystem.	**Potential Problem 1:** The search and return column names must be provided. There will be an error in the Problems view for each missing column. **Solution:** Edit the function and specify the correct column names for the dataTable. **Potential Problem 2:** The same potential problem and solution as shown for *Migrating with the associated part* apply.

SET map PAGE statement

VisualAge Generator: *SET map PAGE* is used for both display and print maps.

EGL: Two separate statements are used. The map name is not specified:

- *clearScreen()* for text (display) forms
- *pageEject()* for print forms

Associated part needed for migration: The map is needed to determine the device type. The first map with this map name in any available map group is the map that the migration tool uses. When migrating in program context, the migration tool only looks at the program's main map group.

Table 50. SET map PAGE statement

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the map is available, the migration tool converts SET map PAGE to the following: • *clearScreen()* for a text form • *pageEject()* for a print form The migration tool also includes a comment with the original map name.	If the map is not available, the migration tool does the following: • Converts SET map PAGE to EZE_SETPAGE(). • Includes a comment with the original map name. • Issues an error message that it was unable to determine the map type.
Potential Problem: Any program that uses a different map type from what was determined when the function migrated *might behave differently at run time*. This is because clearScreen only applies to text forms and pageEject only applies to print forms. No error will appear in the Problems view. Generation will not fail for the program. **Possible Solution:** If a specific target environment does printing and other environments always use display maps, change the EGL function to something similar to the following: `if (sysVar.systemType is zosbatch)` `  pageEject();` `else` `  clearScreen();` `end` Similar logic can be used based on transaction code, user ID, and so on, depending on the specific details of your system.	**Potential Problem 1:** If the function containing the statement is used in a program, EGL validation results in a message in the Problems view. If the function is not used in a program, there is no message in the Problems view. **Solution:** Edit the function and change EZE_SETPAGE() to either *clearScreen()* or *pageEject()*, depending on the map type. **Potential Problem 2:** The same potential problem and solution as shown for *Migrating with the associated part* apply.

SET mapItem attributes

VisualAge Generator: VisualAge Generator tolerates attributes such as protect, highlighting, and color for variables and constants on printer maps.

EGL: With the exception of underline, EGL does not support attributes for print forms.

Associated part needed for migration: Not applicable.

Table 51. SET mapItem attributes

Migrating with the associated part	Migrating without the associated part
When migrating a printer map, the migration tool omits attributes that are not supported by EGL for print forms. When migrating a function, the migration tool migrates the SET statement without regard to whether the map is a display map or printer map.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: There is no problem for a text form. A problem only arises if the function includes logic to set attributes such as color, highlight, or protect for a print form. There will be an error in the Problems view. **Solution:** If the function is only used for print forms, modify the function to remove the set statement. If the function is used with both text and print forms, make a copy of the function for use with print forms. Modify the new function to remove the set statements and use this new function for any print forms. ***Disadvantage:*** This has the potential to ripple back into functions that use the function with the set statement.	**Potential Problem:** The same potential problem and solution as listed in the *Migrating with the associated part* column apply.

Checking for IN literal or scalar

VisualAge Generator: VisualAge Generator supports the IF or WHILE statement checking for a data item IN a literal or scalar. In this situation, VisualAge Generator sets the value of EZETST and does a comparison for equality.

EGL: EGL does not support checking a data item for IN a literal or scalar.

Associated part needed for migration: Not applicable.

Table 52. Checking for IN literal or scalar

Migrating with the associated part	Migrating without the associated part
For an IF or WHILE statement that checks a data item IN a literal, the migration tool does the following to match the VAGen behavior: • Adds a statement to initialize sysVar.arrayIndex to 0. • Changes the *if* or *while* statement to compare equal (For example, if a == "b"). • Adds a statement immediately after the *if* or *while* to set sysVar.arrayIndex to 1. For an IF or WHILE statement that checks a data item IN another data item, the migration tool does not attempt to determine if the second data item is an array or a scalar. The migration tool migrates to an EGL *in* comparison. (For example: if a in b).	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.

Table 52. Checking for IN literal or scalar (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem: There is no problem if the comparison is for a literal. A problem only arises if the second data item is actually a scalar. In this case, there will be an error in the Problems view. **Solution:** Modify the function to initialize sysVar.arrayIndex to 0 before the *if* or *while* statement and to set sysVar.arrayIndex to 1 immediately after the *if* or *while* statement. Also change the *if* or *while* statement to compare using == rather than *in*.	**Potential Problem:** The same potential problem and solution as listed in the *Migrating with the associated part column* apply.

Checking SQL and map items for NULL

VisualAge Generator: IF, WHILE, and TEST support checking either an SQL item or a map item for NULL.

EGL: SQL items can be checked for null. Map items can be checked for blanks.

Associated part needed for migration: The record or map. If the item is not qualified, you need the program and all of its associates.

Table 53. Checking SQL and map items for NULL

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the item is qualified, the migration tool does the following: • Checks the qualifier to determine if it is a record or map. • Converts to checking for *null* if the qualifier is an SQL record. • Converts to checking for *blanks* if the qualifier is a map.	The migration tool tries to determine the type of the item as follows: • If the item is qualified and the qualifier is not available, the migration tool does the following: – Checks if the qualifier is also the function's I/O object. If so, the CONVERSE and DISPLAY I/O options guarantee the I/O object is a map. The CLOSE I/O option is valid for either a record or map. Other I/O options guarantee the I/O object is a record. – Also checks the function's parameter list and local storage. If the qualifier is found, the qualifier is a record. • If the migration tool can determine that the item is in an SQL record or on a map, the tool migrates to the following: – *null* for an SQL record – *blanks* for a map item • If the migration tool cannot determine that the item is in an SQL record or on a map, then the tool does the following: – Converts to EZE_NULL. – Issues an error message indicating that this statement should be reviewed.

Table 53. Checking SQL and map items for NULL (continued)

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the item is not qualified, the migration tool does the following: • Checks the function's parameter list to see if the item is specified there as either an SQLITEM or a MAPITEM parameter. If so, the tool migrates on that basis. • If the program and its associates are available, the migration tool uses the VAGen qualification rules to determine which record or map contains the item and then migrates on that basis.	If the item is not qualified, the migration tool checks the function's parameter list to see if the item is specified there as either an SQLITEM or a MAPITEM. If the migration tool can determine that the item is in an SQL record or on a map, the tool migrates to the following: • *null* for an SQL record • *blanks* for a map item If the migration tool cannot determine that the item is in an SQL record or on a map, then the tool does the following: • Converts to EZE_NULL. • Issues an error message indicating that this statement should be reviewed.
Potential Problem: None.	**Potential Problem 1:** A problem arises if the migration tool uses EZE_NULL. There will be an error in the Problems view. **Solution:** Edit the function and change EZE_NULL to *null* for an SQL item or *blanks* for a form variable field.

I/O error values UNQ and DUP

VisualAge Generator: UNQ and DUP are always soft errors for non-SQL and hard errors for SQL. UNQ and DUP are always set for SQL based on the -803 SQL code. If an I/O error routine is specified for the function, the error routine gets control for the following:

- any soft error
- any hard error if EZEFEC = 1
- for DL/I I/O, any hard error if EZEDLERR or EZEFEC = 1

EGL: Duplicate is always a soft error and indicates the I/O was successful. Unique is always a hard error and indicates the I/O failed. Duplicate is not supported for SQL. The *try* block and *onException* statement are used for error handling. If an onException statement is specified for the I/O statement, the onException statement gets control for the following:

- any soft error
- any hard error if handleHardIOErrors = 1
- for DL/I I/O, any hard error if handleHardDLIErrors or handleHardIOErrors = 1

Associated part needed for migration: The record that is used in the statement.

Table 54. I/O error values UNQ and DUP

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the record is available, the migration tool does the following: • If the record is non-SQL, the migration tool changes DUP to *duplicate* and UNQ to *unique*. • If the record is SQL, the migration tool changes both DUP and UNQ to *unique*.	If the record is not available, the migration tool tries to determine the type of the record as follows: • If the statement specifies the same record as the function's I/O object, the migration tool checks to see if the function also has SQL clauses, or any SQL-specific information, such as Execution Time Statement Build, single row select, cursor with hold or an UPDATE/SETUPD function. If so, the migration tool assumes that the record is SQL and converts DUP and UNQ to *unique*. • In other situations such as the following, the migration tool cannot determine the record type: – If the record is used as the I/O object of the function but the function does not have SQL-specific information. – If the record is not used as the I/O object of the function. In the previous situations, and in other situations when the migration tool cannot determine the record type, the migration tool does the following: – Converts UNQ to *unique*. – Converts DUP to *EZE_DUPLICATE* and issues an error message.

Table 54. I/O error values UNQ and DUP (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem: A problem only arises if the same record name has different definitions, one for SQL and one for non-SQL, most likely in different subsystems. If the non-SQL record is available when the function is migrated, then there will be an error if the function is used with an SQL record and checks for duplicate. If the SQL record is available when the function is migrated, then the additional information conveyed by the duplicate check will not be available for the non-SQL record. **Possible Solution:** Copy the function and use the original function for SQL and the new function for non-SQL. ***Disadvantage:*** This has the potential to ripple back into functions that use the original function that checked for UNQ or DUP. **Potential Problem for SQL:** None. DUP and UNQ were always set the same way and *unique* continues to be a hard error. **Potential Problem 1 for non-SQL:** A problem arises if you do *not* set handleHardIOErrors (EZEFEC) = 1 for the program. In this case, because *unique* is now a hard error, the onException statement will not get control and the program will end. **Solution:** Make sure your programs specify *handleHardIOErrors = 1;* **Potential Problem 2 for nonSQL:** A problem also arises if you are explicitly testing for hardIOError (HRD). In this case, because *unique* is now a hard error, hardIOError will test true in EGL in some cases, even though it did not test true in the past on VisualAge Generator. Validation and generation will not detect an error. *However, the program might not run the same as it did in VisualAge Generator.* **Possible Solution:** You might need to reorder the testing of the I/O error values in your program logic.	**Potential Problem 1:** EZE_DUPLICATE is not valid in EGL. **Solution:** Edit the function and change EZE_DUPLICATE to *duplicate* or *unique* based on the record type. **Other Potential Problems:** The same potential problems and solutions as shown for *Migrating with the associated part* apply.

I/O error value LOK

VisualAge Generator: LOK is always a soft error for OS/400®. If an I/O error routine is specified for the function, the error routine gets control for the following:

- any soft error
- any hard error if EZEFEC = 1

EGL: *LOK* is replaced by *deadlock*, but it is a hard error. The *try* block and *onException* statement are used for error handling. If an onException statement is specified for the I/O statement, the onException statement gets control for the following:

- any soft error
- any hard error if handleHardIOErrors = 1

Associated part needed for migration: Not applicable.

Table 55. I/O error value LOK

Migrating with the associated part	Migrating without the associated part
The migration tool always changes *LOK* to *deadlock*.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem 1: A problem arises if you do *not* set handleHardIOErrors (EZEFEC) = 1 for the program. In this case, because deadlock is a hard error, the *onException* statement will not get control and the program will end. **Solution:** Make sure your programs specify *handleHardIOErrors = 1;* **Potential Problem 2:** A problem also arises if you are explicitly testing for hardIOError (HRD) . In this case, because *deadlock* is a hard error, hardIOError will test true in EGL in some cases where it did not test true in VisualAge Generator. Validation and generation will not detect an error. *However, the program might not run the same as it did in VisualAge Generator.* **Possible Solution:** You might need to reorder the testing of the I/O error values in your program logic.	The same potential problems as in the *Migrating with the associated part* column can occur. You can use the same solutions.

Handling ambiguous situations for EZE words

For some EZE word replacements, an extra item variable must be declared in the EGL program. The extra item variable is never declared as a local item variable in the function because a segmented converse cannot be done if there is any function open in the stack down to the segmented converse that has local storage, parameters or return values. Adding the extra item variable to the program avoids breaking any segmented converse.

EZELTERM

VisualAge Generator: EZELTERM is the conversation ID in a Web Transaction program and the terminal ID in all other program types.

EGL: sysVar.conversationID is the conversation ID in a VGWebTransaction program. sysVar.terminalID is the terminal ID in all other program types. sysVar.conversationID and sysVar.terminalID are treated as synonyms so either provides the correct information based on the program type.

Associated part needed for migration: The program.

Table 56. EZELTERM

Migrating with the associated part	Migrating without the associated part
Based on the first migration of this function, if the program is available, the migration tool converts EZELTERM based on the program type as follows: • If the program is a Web Transaction program, the migration tool uses: sysVar.conversationID • Otherwise, the migration tool uses: sysVar.terminalID	If the program is not available, the migration tool always converts EZELTERM to: `sysVar.terminalID`

Table 56. EZELTERM (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem: None. sysVar.conversationID and sysVar.terminalID are treated as synonyms.	**Potential Problem:** None. sysVar.conversationID and sysVar.terminalID are treated as synonyms.

EZESYS

VisualAge Generator: *EZESYS* is generally used in IF, WHILE, and TEST statements with literal values specified by VisualAge Generator. However, EZESYS is permitted in other statements.

EGL: The EGL system variable *sysVar.systemType* has different values from VisualAge Generator. When EZESYS is used in statements other than IF, WHILE, and TEST, the migration tool does not know what values the program might be expecting and so must use the original VAGen values. The EGL system library function *VGLib.getVGSystemType* provides the old VAGen values.

Associated part needed for migration: Not applicable.

Table 57. EZESYS

Migrating with the associated part	Migrating without the associated part
When migrating any program, if the VAGen Migration Preference *Do not initialize old EZESYS values* is not selected, the migration tool does the following: • Includes a declaration for *custPrefix*EZESYS. • Includes an initialization statement to set the value of *custPrefix*EZESYS to the old VAGen EZESYS value. If the preference is selected, the migration tool does not include the declaration or initialization statement. *custPrefix* is the same prefix that is used for changing part names that conflict with reserved words. Use the VAGen Migration Preferences to set its value.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.

Table 57. EZESYS (continued)

Migrating with the associated part	Migrating without the associated part
Based on the first migration of the function, the migration tool does the following: • If EZESYS is used in an IF, WHILE, or TEST statement, the migration tool converts EZESYS to `sysVar.systemType` The migration tool converts the EZESYS values to their EGL equivalent value. If the EZESYS value does not have an equivalent EGL value, the migration tool migrates it ″as is″. For example, the migration tool converts MVSBATCH to the EGL equivalent zosbatch. The migration tool migrates OS2 and NTCICS to the same value as in VisualAge Generator. See Table 121 on page 298 for specifics of which values are converted. • If EZESYS is used in any other statement, the migration tool does the following: – Issues a warning message that this use will result in the old VAGen EZESYS values – Uses *custPrefix*`EZESYS` to replace EZESYS in the statement.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.

Table 57. EZESYS (continued)

Migrating with the associated part	Migrating without the associated part
Potential Problem 1: A problem arises if you select the VAGen Migration Preference *Do not initialize old EZESYS values* during migration and you use EZESYS in statements other than IF, WHILE, or TEST. In this situation the migration tool uses *custPrefix*EZESYS in the statement, but programs do not have a declaration and initialization statement for *custPrefix*EZESYS. There will be an error in the Problems view. **Potential Solution 1A:** Change your EGL logic to use the new values for sysVar.systemType. **Potential Solution 1B:** Add a declaration and an initialization statement for *custPrefix*EZESYS to any program that needs to use the old VAGen value for EZESYS. **Potential Problem 2:** A problem arises for EZESYS values that migrate as they are where there are no EGL equivalent values (for example, TSO or AIXCICS). There will be an error in the Problems view. **Possible Solution 2:** Modify the function and change the logic so that sysVar.systemType is not checked for values that are not valid in EGL. **Potential Problem 3:** A problem arises if you want to use the new EGL values in statements other than if and while. **Possible Solution 3:** Modify the function and change the logic to use sysVar.systemType instead of *custPrefix*EZESYS Be sure to change the old VAGen values to the new EGL values in any dataTables that you use for comparisons.	The same potential problems mentioned in the *Migrating with the associated part* column apply. You can use the same solutions.

EZEWAIT

VisualAge Generator: EZEWAIT specifies the time to wait in hundredths of a second.

EGL: *sysLib.wait*, which is the replacement for EZEWAIT, specifes the time to wait in seconds.

Associated part needed for migration: Not applicable.

Table 58. EZEWAIT

Migrating with the associated part	Migrating without the associated part
When migrating any program, the migration tool always includes a declaration for *custPrefix*EZE_WAIT_TIME.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.

Table 58. EZEWAIT (continued)

Migrating with the associated part	Migrating without the associated part
When migrating a function, if EZEWAIT is used, the migration tool includes logic to calculate the time to wait in seconds and stores the result in *custPrefix*EZE_WAIT_TIME.	The migration tool does the same thing as mentioned in the *Migrating with the associated part* column.
Potential Problem: None. However, if you use the function in a new program, be sure to include a declaration for *custPrefix*EZE_WAIT_TIME in the program.	The same potential problem mentioned in the *Migrating with the associated part* column applies.

Part 2. Migrating from VisualAge Generator 4.5 on Java to EGL

Chapter 4. Stage 1 — Extracting from Java

Before you can extract your source code from VisualAge Generator, you must install the Stage 1 migration tool that runs on VisualAge for Java. You must also create the DB2 migration database that is used to store the data you are migrating from VisualAge Generator 4.5 (VAGen 4.5) to EGL.

Installing the Stage 1 migration tool on VisualAge for Java

The VisualAge Generator to EGL Stage 1 migration tool is shipped as a self-extracting file called VAGenMigJava.exe To install this file, do the following:

1. Upgrade to VisualAge Generator 4.5 with FixPak 5. Also review Appendix F, "Situations where incorrect External Source Format causes problems in creation of EGL," on page 411 for additional VisualAge Generator APARs that might be necessary for your specific situation.
2. On your system, determine where VisualAge for Java is installed.
3. Shut down VisualAge for Java.
4. Run the self-extracting file VAGenMigJava.exe, which is in the following subdirectory of your Rational Developer installation directory:

   `\egl\eclipse\plugins\com.ibm.etools.egl.vagenmigration_`*`version`*`\database`

   where *version* is the highest numbered version for the vagenmigration plugin. For example, if you installed maintenance for RAD 6.0.1 ifix3, the version number is 6.0.1.003.

   Note: If you installed and kept a previous version of the developer product before installing the product that you are using now, the installation directory of interest may be the directory that was used in the earlier install.
5. When the GUI prompt appears, navigate to the drive and directory where VisualAge for Java is installed. (For example, c:\Program Files\IBM\VisualAge for Java.) Then click **Extract**.

When the self-extracting executable runs, it extracts the following files into your VisualAge for Java installation directory:

- \ide\vgmigration\MigPreferences.xml
- \ide\vgmigration\VGMigReserved.txt
- \ide\vgmigration\checkStage1.sql
- \ide\vgmigration\createdatabase.sql
- \ide\vgmigration\createindex.sql
- \ide\vgmigration\createtables.sql
- \ide\vgmigration\checkStage1.bat
- \ide\vgmigration\runStats.bat
- \ide\vgmigration\SetupDatabase.bat
- \ide\vgmigration\SetupIndex.bat
- \ide\vgmigration\SetupTables.bat
- \ide\vgmigration\deletemigsets.bat
- \ide\features\com-ibm-vgj-mig\

This last directory contains the feature for the Stage 1 migration tool on Java. It also contains the .xml files and their corresponding .dtd files that are used by the Stage 1 migration tool on Java.

Adding the migration feature

To be able to use the Stage 1 migration tool, you must add the IBM VisualAge Generator EGL Migration feature. To do this, perform the following steps:

1. Start VisualAge Generator on Java.
2. Add the ″IBM VisualAge Generator EGL Migration″ feature as follows:
   a. From the Workbench window, press F2.
   b. Select **Features** in the left column and then **Add Feature** in the right column. Click **OK**.
   c. Select **IBM VisualAge Generator EGL Migration -** *versionNumber*. Click **OK**. The migration feature will be loaded.
   d. Click the **Projects** tab in the Workbench. You should see the ″IBM VisualAge Generator EGL Migration″ project in your workspace.

Creating the migration database

See “Creating the DB2 migration database” on page 413 for information on creating the migration database. You need to use the SetupDatabase.bat and SetupTables.bat files that were placed in your VisualAge Java installation directory, in subdirectory \ide\vgmigration directory.

Setting Stage 1 preferences

When you installed the Stage 1 migration tool on VisualAge for Java, the installation process created a sample preferences file called MigPreferences.xml in the directory *VisualAge-Java-installation-directory*\ide\vgmigration. You should make a copy of the MigPreferences.xml file for backup purposes before you modify any preferences. You might also want to copy the MigPreferences.xml to a directory outside the VisualAge for Java installation directory and make your modifications in the copy. This avoids accidentally overwriting your modifications if you install a new version of the migration tool.

You can use a text editor or the GUI editor that is provided with the Stage 1 migration tool to edit the MigPreferences.xml file. To use the GUI editor, do the following:

1. Start VisualAge Generator for Java.
2. In the Workbench window, click on the **Projects** tab.
3. Navigate to the *IBM VisualAge Generator EGL Migration* project.
4. Expand the migration project and then expand the package *com.ibm.vgj.mig*.
5. Within the package, select the **PreferencesUI** class.
6. Right-click on the **PreferencesUI** class and then click **Properties** from the context menu.
7. Select the **Program** tab.
8. On the Program page, specify the following in the **Command line arguments** field to point the MigPreferences.xml file you want to edit:

   ```
   -p filename
   ```

   where *filename* is the drive, directory, and file name of your MigPreferences.xml file.

9. Click on **OK** to save the properties.
10. Right-click on the **PreferencesUI** and then click **Run** or **Run main...** (Or you can click the running man icon from the tool bar.) The Stage 1 GUI preferences editor opens and loads the file that you pointed to in the program properties.

Note:

- If you do not use currently use Project List Parts (PLPs), see "Migration plans and high-level PLP projects" on page 128.
- For preferences that require a drive and directory, you can specify the information in either of two ways:
  - An absolute path. For example: d:\tempMig\MySystem\
  - A relative path. In this case the path is relative to the working directory. For example, ..\tempMig\MySystem results in a path of :

    ```
    VisualAge-Java-installation-directory\ide\project_resources
          \IBM VisualAge Generator EGL Migration\tempMig\MySystem.
    ```
- If you do not specify a drive and directory for the log, debug, and report files, the files are written to the working directory which is:

  ```
  VisualAge-Java-installation-directory\ide\project_resources
       \IBM VisualAge Generator EGL Migration
  ```

The preferences you can modify are described in the following sections, based on the page within the GUI in which the preference appears:

- Build Plans
- Mapping
- Renaming
- Execution

Build Plans page

The Build Plans page identifies where the Stage 1 migration tool is to read or write the migration plan file (or files), as well as which projects and versions you want to migrate from your repository.

- **Migration Specification.** The Migration Specification identifies where the migration tool is to write the migration plan file or files that the Stage 1 tool creates based on your repository filters. Alternatively, if you have already created the migration plan file (or files), the Migration Specification identifies where the migration tool is to read the migration plan file (or files).

  Note:

  - Migration plan files have the file extension *.pln* before they are used to load the migration database and *.done* after they have been successfully processed.
  - See "Running the Stage 1 tool" on page 127 for information on setting the *-o* (override) option for the VAGenToEGLMigration class, which is the actual Stage 1 migration tool.

- *Plan directory.* This is the target directory where you want your migration plan file (or files) to be placed by the Stage 1 migration tool or in which the Stage 1 tool can find your existing migration plan file (or files).
- *Plan file name.* An optional file name of the migration plan file you are creating or using to load the migration database. When you run the Stage 1 migration tool, this file name is used in conjunction with the *-o* (override) option you specify for the VAGenToEGLMigration class as follows:

- If you include the *-o* option in the properties for the VAGenToEGLMigration class, the Stage 1 migration tool does the following based on the file name you specify in the Migration Specifications:
  - If you do not specify a Plan file name, the migration tool deletes **all** the .pln files in the specified Plan directory before creating new plan files. The migration tool creates one plan file for each migration set. In this case, the migration Plan file names are of the form *migrationSetName_version*.pln.
  - If you specify a Plan file name, the migration tool deletes **only** the specified .pln file from the specified Plan directory before creating a new .pln file with your specified Plan file name. In this case, the single Plan file lists all the migration sets.

  Use the *-o* option if you want the Stage 1 migration tool to create the migration plan files for you based on your repository filters and high-level PLP projects. If you need assistance creating a PLP project, see "Creating a high-level PLP project" on page 128.

– If you omit the *-o* option from the properties for the VAGenToEGLMigration class, the Stage 1 migration tool does not create any new migration plan files. Instead, the Stage 1 migration tool runs based on the Plan directory and Plan file name you specify in the Migration Specification:
  - If you do not specify a Plan file name, the migration tool runs using **all** of the .pln files in the specified Plan directory.
  - If you specify a Plan file name, the migration tool runs using only that one .pln file in the specified Plan directory.

  Omit the *-o* option if you have previously created the migration plan files and now want to run the Stage 1 migration tool to load the migration database using these files. See "Creating a migration plan file manually" on page 130 for details about creating your own migration plan files.

- **Repository filters.** The Repository Filters section enables you to control which projects and versions in your Java repository are considered by the Stage 1 migration tool. Limiting the projects and versions can greatly enhance the performance of the Stage 1 migration tool. You can specify multiple filters. The Stage 1 migration tool uses the *Projects* filter and the *Version depth* or *Version name* filters as follows:
  – The migration tool matches each VAGen project in the repository against the Projects filters.
    - If the project name does not match at least one of the Projects filters, the project is not considered for further processing.
    - If the project name matches at least one of the Projects filters, the versions of the project are processed as follows:
      - If you selected the Version depth filter, then the most recent versions of the project, up to the number specified by the Version depth filter, are considered for further processing. The default Version depth filter is 1.
      - If you selected the Version name filter, then each version name for the project is matched against the list of Version name filters. If the version name matches any of the Version name filters, then the version is considered for further processing.

      Note: Version depth and Version name are mutually exclusive. By default, the Version name filter is included in the

MigPreferences.xml file. If you want to use the Version depth filter, select the Version depth radio button and specify the number of versions you want to migrate.

– If the project name and version name result in the project version being considered for further processing, the Stage 1 migration tool does the following:
  - If the project version is a high-level PLP project, then the Stage 1 migration tool uses the project version as the basis for creating a migration set. Each version of the high-level PLP project results in a different migration set, assuming the version name matches the version filter.
  - If the project version is not a high-level PLP project, the project version is not considered for further processing. The project version might still be included in other migration sets; there just will not be a migration set specifically for this project version.

Specify the Repository Filters information as follows:

– *Projects filter.* The migration tool matches the project names in your repository to the Projects filter that you specify. You can specify multiple Projects filters. To add or remove filters, use the Add and Remove push buttons. To update a filter, overtype in the table. The filters are not case sensitive. You can use wildcards as follows:
  - A project filter of **xyz** matches any project name in the repository that has the string "xyz" anywhere in its name.
  - A project filter of *xyz** matches any project name in the repository that begins with "xyz".
  - A project filter of **xyz* matches any project name in the repository that ends with "xyz".
– *Version depth* filter. If a project name matches one of the Projects filters and you selected the Version depth filter, the Stage 1 migration tool processes the number of versions you have specified for the Version depth. The default is 1, in which case the Stage 1 migration tool only processes the most recent version of the project.
– *Version name* filter. If a project name matches one of the Projects filters and you selected the Version name filter, the Stage 1 migration tool uses the Version name filter to determine which, if any, of the project versions should be considered for migration. You can specify multiple version name filters. To add or remove filters, use the Add and Remove push buttons. To update a filter, overtype in the table. The filters are not case sensitive. You can use wildcards as follows:
  - A version name filter of **xyz** matches any project version name that has the string "xyz" anywhere in the version name.
  - A version name filter of *xyz** matches any project version name that begins with "xyz".
  - A version name filter of **xyz* matches any project version name that ends with "xyz".

Mapping page

The Mapping page enables you to control the placement of parts in EGL files and the name of some of the EGL projects, packages, and files that are created during migration.

- **File names.** The File names section enables you to control the names of two EGL files that are created during migration.

- *Common Parts* enables you to specify the name of an EGL file to contain parts that are common to multiple unique generatable parts within the scope of the migration set. Specify the file name without an extension or path. The migration tool creates a common parts file in each EGL package that contains parts that are used by (associated with) multiple generatable parts in the migration set or which are in VAGen projects or packages that are identified as common projects or packages. See "Placing parts in EGL files" on page 38 for details about whether a part is placed with a program or in the Common Parts file.
- *Unused Parts* enables you to specify the name of an EGL file to contain parts that are not used within the scope of the migration set. Specify the file name without an extension or path. The migration tool creates an unused parts file in each EGL package that contains parts that are not used by (associated with) any generatable part in the migration set, provided the corresponding VAGen project and package are not identified as common projects or packages.

- **Spanning Maps.** The Spanning Maps section enables you to specify suffixes that are used in the event that one of your map groups includes maps from multiple projects or packages.
  - *Project suffix* enables you to specify a suffix that the Stage 1 migration tool concatenates to the migration set name to create a new EGL project name. The migration tool only creates this new EGL project if a map group and its maps are in multiple VAGen projects within the migration set. The new project name is *migrationSetName_ProjectSuffix*. The migration tool concatenates the suffix to the migration set name after any Renaming rules are applied.
  - *Package suffix* enables you to specify a suffix that the Stage 1 migration tool concatenates to a project name to create a new EGL package name within an EGL project. The migration tool only creates this new EGL package if a map group and its maps are in multiple VAGen packages within a project. The new package name is *projectName_PackageSuffix*. The migration tool concatenates the suffix to the project name after any Renaming rules are applied.
- **Common Identifiers.** The Common Identifiers section enables you to specify a list of strings with wildcards that the migration tool can use in determining which VAGen projects and packages contain common (shared) parts.
  - The *Projects* list enables you to specify a list of strings that identifies projects that contain common parts. The migration tool matches this list of strings to each project name in the migration set to determine if the project contains common parts. If any string matches a project name, all parts within the project are considered to be "used." Each non-generatable part will either be placed in a program file or in the file specified by your Common Parts preference. The part will not be placed in the unused parts file even if the part is not used by any generatable part in the migration set. You can specify multiple Projects filters. To add or remove filters, use the Add and Remove push buttons. To update a filter, type over it in the table. The filters are not case sensitive. You can also use an * as a wildcard at the beginning or end of the string.
  - The *Packages* list enables you to specify a list of strings that identifies packages that contain common parts. The migration tool matches this list of strings to each package name in the migration set to determine if the package contains common parts. If any string matches a package name, all parts within the package are considered to be "used." Each non-generatable part will either be placed in a program file or in the file specified by your Common Parts preference. The part will not be placed in the unused parts file

even if the part is not used by any generatable part in the migration set. You can specify multiple Packages filters. To add or remove filters, use the Add and Remove push buttons. To update a filter, type over it in the table. The filters are not case sensitive. You can also use an * as a wildcard at the beginning or end of the string.

Renaming page

The Renaming page enables you to specify renaming rules for your projects, packages, and version names. The *Renaming Rules* section enables you to control the names of the EGL projects and packages that are derived from your VAGen project and package names. The number in the order column indicates the order in which the Stage 1 migration tool is to apply the renaming rules, with the lowest numbered rule applied first. To add or remove a renaming rule, use the Add and Remove push buttons. To update a renaming rule, overtype the contents of the cells in the table. You can double-click on any of the column headings to sort the rules based on that column. You specify a rule by specifying the following information:

- *Order* specifies the order in which the rules are to be applied.
- *From String* specifies the characters in the VAGen name that you want to change.
- *To String* specifies the characters you want to use in the resulting EGL name.
- *String Context* specifies the location in the VAGen name where the migration tool should look for the from string during renaming. The values are as follows:
  - *front* means the rule applies if the from string appears at the beginning of a project, package, or version name.
  - *back* means that the rule applies if the from string appears at the end of a project, package, or version name.
  - *any* means that the rule applies if the from string appears anywhere within a project, package, or version name.
  - *token* means that the rule applies only if the from string is an exact match for the project, package, or version name.
- *Mapping Context* indicates whether the migration tool is to apply the renaming rule to a project, package, or version name. The values for *Mapping Context* are as follows:
  - *project* means that the renaming rule only applies to VAGen project names.
  - *package* means that the renaming rule only applies to VAGen package names.
  - *both* means that the renaming rule applies to both VAGen project names and VAGen package names.
  - *version* means that the renaming rule applies to the version names for all project names. Use a version renaming rule if your version names include special characters such as a semicolon (;) that are not permitted in directory or file names. The default *MigPreferences.xml* file includes several version renaming rules to help ensure that your version names do not result in invalid directory or file names. The migration tools use the renamed versions to create the migration plan file names in Stage 1 and to create directory names in Stage 3 of migration.

Execution page

- **Execution Options.** The Execution Options section enables you to specify what you want the Stage 1 migration tool to do.
  - *Generate report* specifies that you want to create a migration report showing where each part will be placed in the EGL project, package and file structure.

This report is useful for reviewing the results of preferences you specified for Common Parts and Unused Parts file names, Spanning maps suffixes, Common Identifiers for projects and packages, and your renaming rules. If you select Generate report, the migration tool creates the report in the drive, directory and file you specify for the Report file name in the Verification section.

– *Update database* specifies that you want the Stage 1 migration tool to store the migration plan information, including the External Source Format for your parts, into the migration database.

You might run the Stage 1 migration tool in several steps as follows:

– Step 1 -- Deselect both Generate report and Update database. This enables you to review the migration plan files that are created an ensure that your Repository Filters are set correctly and will process the project versions that you want. If you are not satisfied with the project versions that are being selected, you can refine your Repository Filters and run this step again until you are satisfied with the project versions that the migration tool will process.

– Step 2 -- Select only Generate report. This enables you to review the report that shows how your VAGen projects, packages, and parts will be assigned to EGL projects, packages, and files during migration. If you are not satisfied with the placement of parts, you can refine your Mapping and Renaming rules and run the report again until you are satisfied with the placement of parts.

– Step 3 -- Select both Generate report and Update database. This provides you with a final report that records the information that is stored in the migration database.

Note:

– Generating the report can take some time. Therefore it is best to review the .pln files to be sure that the migration tool will process the project versions that you intend.

– The report files are overwritten if a report is generated. If you want to save previous report files, you must move the report files to a different directory or point to a new directory for your new report. Because the report files link to other files, renaming the report files will cause the links to be lost so the files are no longer viewable.

• **Database.** The Database section enables you to specify details about the migration database:

– *Database driver.* This value should always be COM.ibm.db2.jdbc.**app**.DB2Driver.

– *Database name.* This value should always be one of the following:

- jdbc:DB2:*databaseName* if you are using a local database.
- jdbc:*nodeName:databaseName* if you are using a remote database.

Note: In both cases, *databaseName* is the name of the migration database into which the migration tool is to write the migration set information. By default, the databaseName is VGMIG. If you changed the database name from VGMIG when you created the migration database, you must change the database name specified by this preference to match the name you used.

– *Schema* is the name used as the qualifier for the database tables. By default, the schema name is MIGSCHEMA. If you changed the schema name from MIGSCHEMA when you created the migration database, you must change the schema name specified by this preference to match the name you used.

- *Userid* is the user ID needed to connect to the migration database. If you not specify the Userid, the migration tool attempts to connect using your logon user ID. If this attempt fails, the migration tool displays a dialog window asking for the information.
- *Password* is the password needed to connect to the migration database. If you not specify the password, the migration tool attempts to connect using your logon password. If this attempt fails, the migration tool displays a dialog window asking for the information.

  Note: The password is not encrypted in the preferences file. If this is a concern, do not enter the password in the preferences file. Wait for the prompt.

- **Service.** The Service section enables you to specify details about the logging and debug information you want to capture during Stage 1. You can specify the following:
  - *Trace level* enables you to specify the level of information that you want to write to the log and debug files. Use the drop-down list to specify one of the following values:
    1. *Fatal* error messages are logged. If any of these messages occur, the migration database might be updated, but the migration plan file (.pln file) is not changed to have the .done file extension. This enables you to reprocess the .pln file.
    2. *Warning* messages, as well as fatal error messages are logged.
    3. *Informational* messages, as well as warning and fatal error messages are logged.
    4. *Debug* information, as well as informational, warning, and fatal error messages are logged. DEBUG is the only trace level that causes the migration tool to write information to the debug file.

    The Trace level only affects the log and debug files. All the messages are written to the Console window.
  - *Log file name* enables you to specify the drive, directory, and file name for a log file. You can create the log file with any file extension, but it is best viewed as an .xml file. If you omit the log file name, the migration tool writes the log information to a file named *miglog.xml* in the drive and directory that you specified in the Log file name field. If you do not specify a Log file drive and directory, the migration tool writes the log file to the working directory.
  - *Debug file name* enables you to specify the drive, directory, and file name for a debug file that might be needed by IBM support. You can create the debug file with any file extension, but it is best viewed as an .xml file. Information is only written to this file if the Trace level preference is set to *Debug*. If you omit the debug file name and you specify a Trace level of *Debug*, the migration tool writes the debug file information to a file *migdebug.xml* in the drive and directory that you specified in the Debug file name field. If you do not specify a Debug file drive and directory, the migration tool writes the debug file to the working directory.
- **Verification.** The Verification section enables you to specify the drive, directory, and file name for the verification report that is produced when you select the Generate report preference in the Execution Options section. If you select Generate report, you must enter a *Report file name*. You should always specify the .htm extension. If you do not specify a drive and directory, the migration tool writes the report file to the working directory.

Sample MigPreferences.xml file

The following is a sample MigPreferences.xml file:

```
<preferences>
  <database>
    <driver>COM.ibm.db2.jdbc.app.DB2Driver</driver>
    <uri>jdbc:DB2:VGMIG</uri>
    <schema>MIGSCHEMA</schema>
    <userid></userid>
    <password></password>
  </database>
  <migrationSpec>
    <directory>d:\tempMig\MyMigSet</directory>
    <filename></filename>
  </migrationSpec>
  <repositoryFilters>
    <projectName>MyProject*</projectName>
    <versionName></versionName>
  </repositoryFilters>
  <service>
     <tracelevel>4</tracelevel>
     <debugfile>d:\tempMig\MyMigSet\Stage1\migdebug.xml</debugfile>
     <logfile>d:\tempMig\MyMigSet\Stage1\miglog.xml</logfile>
  </service>
  <eglMapping>
     <renameRule order = "1">
       <fromString> </fromString>
       <toString></toString>
       <stringContext>any</stringContext>
       <mappingContext>both</mappingContext>
     </renameRule>
     <renameRule order = "101">
       <fromString>Project</fromString>
       <toString></toString>
       <stringContext>any</stringContext>
       <mappingContext>project</mappingContext>
     </renameRule>
     <renameRule order = "301">
       <fromString>.pkg</fromString>
       <toString></toString>
       <stringContext>any</stringContext>
       <mappingContext>package</mappingContext>
     </renameRule>
     <renameRule order = "302">
       <fromString>.sql</fromString>
       <toString>sql</toString>
       <stringContext>any</stringContext>
       <mappingContext>package</mappingContext>
     </renameRule>
     <renameRule order = "501">
       <fromString>:</fromString>
       <toString>_</toString>
       <stringContext>any</stringContext>
       <mappingContext>version</mappingContext>
     </renameRule>
     <renameRule order = "502">
       <fromString>/</fromString>
       <toString>_</toString>
       <stringContext>any</stringContext>
       <mappingContext>version</mappingContext>
     </renameRule>
     <renameRule order = "503">
       <fromString>\</fromString>
       <toString>_</toString>
       <stringContext>any</stringContext>
       <mappingContext>version</mappingContext>
     </renameRule>
```

```
    <renameRule order = "504">
      <fromString>|</fromString>
      <toString>_</toString>
      <stringContext>any</stringContext>
      <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order = "505">
      <fromString>?</fromString>
      <toString>_</toString>
      <stringContext>any</stringContext>
      <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order = "506">
      <fromString>*</fromString>
      <toString>_</toString>
      <stringContext>any</stringContext>
      <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order = "507">
      <fromString>&lt;</fromString>
      <toString>_</toString>
      <stringContext>any</stringContext>
      <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order = "508">
      <fromString>&gt;</fromString>
      <toString>_</toString>
      <stringContext>any</stringContext>
      <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order = "509">
      <fromString>&quot;</fromString>
      <toString>_</toString>
      <stringContext>any</stringContext>
      <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order = "510">
      <fromString> </fromString>
      <toString>_</toString>
      <stringContext>any</stringContext>
      <mappingContext>version</mappingContext>
    </renameRule>
    <verification>
       <generateReport>true</generateReport>
       <reportName>d:\tempMig\MyMigSet\report\MyReport.htm</reportName>
    </verification>
    <dbUpdate>true</dbUpdate>
    <spanningMapsProjectSuffix>MapsProject</spanningMapsProjectSuffix>
    <spanningMapsPackageSuffix>mapspackage</spanningMapsPackageSuffix>
    <commonPartsFileName>CommonParts</commonPartsFileName>
    <unusedPartsFileName>UnusedParts</unusedPartsFileName>
    <commonParts>
           <commonProject>*Common*</commonProject>
           <commonPackage>*common*</commonPackage>
    </commonParts>
  </eglMapping>
</preferences>
```

Before you run the Stage 1 tool — hints and tips

Before you run the Stage 1 migration tool, there are some things you might want to do to improve performance. You might also want to save your existing workspace for use after migration is completed.

Improving performance

Performance measurements have shown that the performance Stage 1 migration tool can be improved dramatically by starting with a clean workspace. In one series of tests, starting with a clean workspace reduced the time for Stage 1 to 25% - 30% of the time without a clean workspace. If your existing workspace is larger than 20 megabytes, starting with a clean workspace might help the Stage 1 tool performance.

To start with a clean workspace, do the following:

1. Shut down VisualAge Generator.
2. See "Saving your workspace" on page 126 if you want to keep a backup copy of your existing workspace to use after migration has completed.
3. Obtain a copy of a clean workspace (file name ide.icx) from the VisualAge Generator download site at:
   `ftp://ftp.software.ibm.com/ps/products/visualagegen/fixes/v4.5/FixPack5/windows`
4. Delete the *features.sav* and *projects.sav* files.
5. Restart VisualAge Generator.
6. Add the VisualAge Generator features that you need.
7. Add the ″IBM VisualAge Generator EGL Migration″ feature.
8. Shut down VisualAge Generator.

To reduce the time the Stage 1 migration tool spends analyzing which projects and versions to migrate, consider creating a repository that only contains the project versions that you want to migrate. If you have ongoing maintenance in VisualAge Generator while you are migrating, a separate migration repository also has the following advantages:

- There is a stable set of project versions to migrate. This is particularly important if you use the Version Depth preference to control what is to be migrated.
- You can compare the versions in the new migration repository against your maintenance repository to determine what additional project versions still need to be migrated.

If you do create a special repository, consider using it as a local repository to improve Stage 1 migration performance.

Saving your workspace

The Stage 1 migration tool deletes all projects that contain VAGen parts from your workspace at the beginning and end of Stage 1 processing. This helps to avoid duplicate parts in the workspace and ensures that only parts in the migration set are considered for the associate parts list during Stage 1. If you have a workspace that you wish to save, you should do the following before running the Stage 1 tool:

1. Shut down VisualAge Generator.
2. Save backup copies of the following files in your *VisualAgeForJava-installation-directory*\ide\program:
   - features.sav
   - projects.sav
   - ide.icx
   - ide.ini — not necessary to save if you do not change any preferences while running Stage 1

- hpt.ini — not necessary to save if you do not change any preferences while running Stage 1

3. Start VisualAge Generator.

When you are finished running the Stage 1 tool, do the following to restore your workspace:

1. Shut down VisualAge Generator.
2. Restore the files you backed up before running the Stage 1 tool.
3. Start VisualAge Generator.

Running the Stage 1 tool

After you have finished editing your preferences, you are ready to run the Stage 1 migration tool to extract your source code from the Java repository. To do this, perform the following steps:

1. Navigate to the *IBM VisualAge Generator EGL Migration* project.
2. Expand the migration project and then expand the package *com.ibm.vgj.mig*.
3. Within the package, select the **VAGenToEGLMigration** class.
4. Right-click on the **VAGenToEGLMigration** class and then click **Properties** from the context menu.
5. Select the **Program** tab.
6. On the Program page, specify the following in the **Command line arguments** field to point the MigPreferences.xml file you want to edit:

Table 59. Valid command line options for VAGentoEGLMigration class

Option	Meaning of option
—h	Display help information that shows the valid options
—p filename	Use "filename" as the name of the preferences file. You must fully qualify the file name, including the drive and directory.
—o	Overwrite the migration files if they exist and recreate them.

7. If this is the first time you are running the Stage 1 tool, do the following:
   a. In the same Properties window, select the **Class Path** tab.
   b. On the Class Path page, select the **Extra directories path** check box and then click on the **Edit** button for the Extra directories.
   c. Select the **Add Jar/Zip** button.
   d. In the File selection window, navigate to and select the db2java.zip file.
      - If you used the default install directory when you installed DB2, the file should be in the \SQLLIB\java directory.

      After you select the db2java.zip file, the file name appears in the Extra directories window. Click **OK** on the Extra Directories window.
   e. On the Class Path page, click the **Compute Now** button and then click **Yes** at the prompt.
8. Click on **OK** to save the properties.
9. Right-click on the **VAGenToEGLMigration** and then click **Run** or **Run main...** (Or you can pick the running man icon from the tool bar.) The Stage 1 migration tool starts and opens a Console window where it reports progress

and any error messages. The migration tool also writes the messages to the log file you specified in your migration preferences.

When the Stage 1 migration tool finishes, if you selected the Update database preference, then your migration plan information, including your VAGen code in External Source Format, is stored in the migration database. After reviewing your report and the Stage 1 messages, you might decide to make changes to your code in VisualAge Generator and run Stage 1 again. After you are satisfied with the results of Stage 1 and have your final External Source Format code stored in the migration database, you are ready to perform Stage 2 of the migration. To run the Stage 2 migration tool, you use the EGL development environment. See Chapter 6, "Stage 2—Conversion to EGL syntax," on page 155 for information about continuing your migration process.

Migration plans and high-level PLP projects

A migration plan file is simply an XML file that specifies the names of one or more migration sets and, for each migration set, the list of project names and versions that make up the migration set. The Stage 1 migration tool is designed to automatically create a migration plan file for you based on the repositoryFilter preferences for project and version names. The Stage 1 tool uses these filters to determine if a project version should be reviewed to determine if the project version is a high-level PLP project. The Stage 1 tool uses each high-level PLP project version as the basis for a migration set.

If you use PLP projects when generating your VAGen source code, then these PLP projects are the same ones you should use for migration. This is because the PLP projects provide groupings of parts that are used together during generation and therefore have all the associated parts for a set of programs.

If you do not currently use PLP projects, you can do one of the following:

- Create a high-level PLP project that specifies the list of project versions that you want to migrate as a group. Then you can use the Stage 1 migration tool to automatically create the migration plan for you.
- If you prefer not to create a high-level PLP project, you can create the migration plan file yourself using one of the following techniques:
  - If you have information in a database or other system that specifies what is needed for generation in terms of Java project versions, then you can write a tool to create the migration plan file or files automatically from your database.
  - Create the migration plan file or files manually.

Creating a high-level PLP project

Note: VisualAge Generator does not support PLPs if the project names or version names include DBCS characters. If your project or version names include DBCS characters, see "Creating a migration plan file manually" on page 130 for information on how to create the migration plan file without using a PLP.

To create a high-level PLP project for use in migration do the following in VisualAge Generator:

1. From the Workbench window, select the **Projects** tab.

2. Create a new Java project to contain the Project List Part. Be sure to give the project a different name than that of any of your existing projects. For example, create a project called MySubsystem1.
3. Select the new project, right-click and select **Manage -> Configure VAGen Required Projects** from the context menu.
4. In the Configure VAGen Required Projects window, select each project that you want to include in your migration set. For each project you can select a specific version to include in the migration set. Alternatively, you can select *Most recent edition*, which causes the migration tool to automatically include the version that is currently at the top of the list whenever you use this project during migration.
5. After you have selected all the project versions that you require for the migration set, click **OK**.
6. Version and release the high-level PLP project, for example MySubsystem1.
7. Test that the PLP project correctly loads the project versions you want for your migration set as follows:
   a. Delete the high-level PLP project and any other VAGen projects from your workspace.
   b. Click **Selected -> Add -> Project**.
   c. From the Add Project window, do the following:
      1) Select **Add projects from the repository**.
      2) Select the high-level PLP project that you just created and the version that you created.
      3) Also select **Add VAGen required projects**.
      4) Click **Finish**.
   d. The high-level PLP project and all the project versions it specifies are added to your workspace.
   e. From the VAGen Parts Browser, select **Tools -> Show Duplicate Parts**. There should not be any parts on the list. If there are, you need to change the high-level PLP project so that there are no duplicates.
   f. You might also want to run validation for your programs and tables to ensure that they are valid in VisualAge Generator and that you are not missing any parts.

You can chain PLP projects. For example, create a PLP project that lists the project versions for all your common projects. Then, for each subsystem, create a high-level PLP project for that subsystem that includes all the subsystem-specific project versions and the PLP project that specifies all the common project versions. This way you do not have list each common project version in every subsystem's high-level PLP project.

When you are ready to run the Stage 1 migration tool, do the following:

- When you set your Stage 1 preferences, on the **Build plans** page, in the Repository Filters section, set the Projects list so that a filter in the list matches the high-level PLP project you created.
- When you instruct the Stage 1 tool which preferences file to use, also specify the *-o* option. The *-o* option instructs the Stage 1 migration tool to create the migration plan files for you based on your high-level PLP projects and to overwrite any existing migration plan files.

Creating a migration plan file manually

If you already have external controls that determine what project versions to add to your workspace when you generate in VisualAge Generator, you might decide to create the migration plan file manually or to develop a tool to create the migration plan file automatically from your external information. The migration plan file must have a *.pln* file extension and the following format:

```
<migrationDefinition>
    <migrationSet name="migrationSet1" version="migrationSet1Version1"
         vgName="migrationSet1" vgVersion="migrationSet1Version1">
       <project name="projectName1" version="projectName1Version1"></project>
       <project name="projectName2" version="projectName2Version1"></project>
        .
        .
        .
       <project name="projectNameN" version="projectNameNVersion1"></project>
    </migrationSet>
    <migrationSet name="migrationSet2" version="1.1"
        vgName="migrationSet2"  vgVersion="1.1">
       <project name="projectNameA" version="projectNameAVersion1"></project>
       <project name="projectNameB" version="projectNameBVersion1"></project>
        .
        .
        .
       <project name="projectNameZ" version="projectNameZVersion1"></project>
    </migrationSet>
</migrationDefinition>
```

In the previous example, the following applies:

- migrationSet1 is a name that you can use to refer to a group of projects that must be migrated together. The migration set name is stored in the migration database and is used in the later stages of migration as follows:
  - In Stage 1 migration, if maps in a map group span projects, the migration set name concatenated with a suffix is used to build the name of a new EGL project that will contain the map group and all its maps. The migration set name is also used to remove information from the migration database if you change renaming rules.
  - In Stage 2 migration, the migration set name specifies which group of projects in the migration database that you want to convert to EGL.
  - In Stage 3, the migration set name specifies which group of projects in the migration database you want to use to create EGL projects, packages, and files in your workspace or in a temporary directory. The migration set name and the migration set version are also used to create the high-level directory name if you choose to save the outputs of Stage 3 to a temporary directory.

  The migration set name is only used during migration as a way of identifying a group of projects. Other than the situation in which maps span multiple projects in VisualAge Generator, the migration set name is not used after migration.
- projectName1, projectName2, ..., projectNameN are the projects you want to migrate as a group. You must only list a projectName once within a migration set. The migration tool loads all project versions listed under the same migration set into the workspace and processes them as a group.
- projectName1Version1, projectName2Version1, ..., projectNameNVersion1 are the respective versions of each of these projects. You can only specify one version for each project within a migration set.
- **The project names and version names you specify must exactly match the project names and version names in your repository. The names are case**

sensitive. The information is used to add project versions to the workspace so that the parts can be analyzed to build the Stage 1 migration report and to load the database.

You can build a migration plan file that contains just one migration set. Alternatively, you can build a migration plan file that contains several migration sets by repeating the information between the <migrationSet> and </migrationSet> tags for each migration set.

You should test each migration set in your migration plan to ensure the migration set is valid as follows:

- Delete all your VAGen projects from your workspace.
- Manually add the project versions specified in the migration set to your workspace. Be sure to add the version of each project that you specified in the migration set. Note that the Stage 1 migration tool stops if a specified project version or package version is not available in the respository.
- From the VAGen Parts Browser, select **Tools** > **Show Duplicate Parts**. There should not be any parts on the list. If there are, you need to change your migration set definition so that there are no duplicates. Note that the Stage 1 migration tool stops if there are any duplicate parts in the migration set.
- The Stage 1 migration tool requires that the projects be versioned. Run a Management Query to determine whether there are any open or scratch editions of projects or packages. To run a Management Query, do the following:
  1. From the Workbench window, select **Workspace** > **Management Query**.
  2. From the Management Query window, do the following:
     a. In the **Program element** section, select **Projects** and **Packages**. Be sure that **Types** is deselected.
     b. In the **Status** section, select **Scratched**.
     c. In the **Scope** section, select **Workspace**.
     d. In the **Owners** section, select **Any User**.
     e. Select the **Run Query** button (the last button on the tool bar). There should not be any scratch editions. If there are scratch editions, create open editions of the projects and packages. If you are the owner, you can create the open editions from the Status pane.
     f. Change the **Program element** section to select **Projects**, **Packages**, and **Types**.
     g. Change the **Status** section to select **Open Edition**.
     h. Select the **Run Query** button.
     i. There should not be any open editions other than for the *IBM VisualAge Generator EGL Migration* project. If there are open editions, version the projects, packages, or types. If you are the owner, you can version them from the Status pane.
- Run validation for your programs and tables to ensure that they are valid in VisualAge Generator and that you are not missing any parts.

When you are ready to run the Stage 1 migration tool, do the following:

- When you set your Stage 1 preferences, on the **Build plans** tab, set the **Plan directory name** to the drive and directory where you stored your migration plan files. Specify the **Plan file name** if you want the Stage 1 migration tool to run only **one** migration plan that you have created. Leave the **Plan file name** blank if you want the Stage 1 migration tool to run using **all** the migration plan files in the specified **Plan directory**.

- When you instruct the Stage 1 tool which preferences file to use, be sure to omit the *-o* option. Omitting the *-o* option instructs the Stage 1 tool to use the existing migration plan files. That is, the tool is not to create any new migration plan files.

Part 3. Migrating from VisualAge Generator 4.5 on Smalltalk to EGL

Chapter 5. Stage 1 — Extracting from Smalltalk

Before you can extract your information from VisualAge Generator, you must install the Stage 1 migration tool that runs on VisualAge Smalltalk. You must also create the DB2 migration database that is used to store the data you are migrating from VisualAge Generator 4.5 (VAGen 4.5) to EGL.

Installing the Stage 1 migration tool on VisualAge Smalltalk

The VisualAge Generator to EGL Stage 1 migration tool is shipped as a self-extracting file called VAGenMigST.exe To install this file, do the following:

1. Upgrade to VisualAge Generator 4.5 with FixPack 4 and FixPack 5. Also review Appendix F, "Situations where incorrect External Source Format causes problems in creation of EGL," on page 411 for additional VisualAge Generator APARs that might be necessary for your specific situation.

   Note: An early version of Fix Pack 5 for VAGen on Smalltalk was **not** cumulative. Check the readme file to ensure that the version of Fix Pack 5 you are using is cumulative. If necessary, download the Fix Pack again or contact IBM Support.
2. On your system, determine where VisualAge Smalltalk is installed.
3. Shut down VisualAge Smalltalk.
4. Run the self-extracting VAGenMigST.exe file. The file is in the following subdirectory under your Rational Developer installation directory:

   `\egl\eclipse\plugins\com.ibm.etools.egl.vagenmigration_`*`version`*`\database`

   where *version* is the highest numbered version for the vagenmigration plugin. For example, if you installed maintenance for RAD 6.0.1 ifix3, the version number is 6.0.1.003.

   Note: If you installed and kept a previous version of the developer product before installing the product that you are using now, the installation directory of interest may be the directory that was used in the earlier install.
5. When the GUI prompt appears, navigate to the drive and directory where VisualAge Smalltalk is installed. Then click **Extract**.

When the self-extracting executable runs, it extracts the following files into your VisualAge Smalltalk installation directory:

- import\vgMigSt.dat
- feature\vgMigSt.ctl
- image\Messages.properties
- image\MigPreferences.xml
- image\VGMigReserved.txt
- checkStage1.sql
- createdatabase.sql
- createindex.sql
- createtables.sql
- checkStage1.bat

- runStats.bat
- SetupDatabase.bat
- SetupIndex.bat
- SetupTables.bat
- deletemigsets.bat

Loading the migration feature

To be able to use the Stage 1 migration tool, you must load the VAGen EGL Migration feature. To do this, perform the following steps:

1. Start VisualAge Generator on Smalltalk.
2. Load the VAGen EGL Migration feature by doing the following:
   a. From the System Transcript, select **Tools -> Load/Unload Features**.
   b. On the Selection Required window, do the following:
      1) Ensure the **Show other features** checkbox is selected.
      2) In the **Available features** pane, select **Other: VAGen EGL Migration - *versionName*.**
      3) Select the **>>** button to move **Other: VAGen EGL Migration - *versionName*** to the **Loaded features** pane.
      4) Click **OK**. The VAGen EGL Migration feature will be imported and loaded into your image.
3. In the System Transcript, you should see messages that the VAGen EGL Migration feature was loaded successfully. You should also see **EGL Migration Tools** on the tool bar. In the VisualAge Organizer, you should see HptEglMigrationGuiApp in the **Applications** pane.
4. After the VAGen EGL Migration feature is loaded, you will be prompted to save your image. Click **Yes** so you do not have to load the feature again.

Note: If you have a problem loading the feature, check your abt.ini file (contained in the *VisualAge-Smalltalk-installation-directory*\image directory). Make sure the abt.ini file has the following fields filled in under the [EmLibraryInterface] heading:

- ServerAddress=*myserver.somecompay.somewhere.com*. This value should point to the server at your company that runs EMSRV. If you use a local library, set ServerAddress=127.0.0.1.
- DefaultName=*path-to-mgr50.dat**mgr50.dat*. This value must be the name of your Smalltalk library.

Creating the migration database

See “Creating the DB2 migration database” on page 413 for information on creating the migration database. You need to use the SetupDatabase.bat and the SetupTables.bat files that were placed in the VisualAge Smalltalk installation directory when you ran the self-extracting VAGenMigST.exe file.

Setting Stage 1 preferences

When you installed the Stage 1 migration tool on VisualAge Smalltalk, the installation process created a sample preferences file called MigPreferences.xml in the directory *VisualAge-Smalltalk-installation-directory*\image. You should make a copy of the MigPreferences.xml file for backup purposes before you modify any preferences. You might also want to copy the MigPreferences.xml to a directory

outside the VisualAge for Smalltalk installation directory and make your modifications in the copy. This avoids accidentally overwriting your modifications if you install a new version of the migration tool.

The VisualAge Generator to EGL migration tool on Smalltalk provides a GUI editor to assist you in specifying your Stage 1 migration preferences. You can start the Stage 1 preferences editor in either of two ways:

- From the System Transcript, select **EGL Migration Tools -> Preferences Editor**. The EGL Migration Preferences Editor appears. The preferences editor defaults to the last preferences file that you modified (or to the MigPreferences.xml file that is shipped with the Stage 1 tool if you have never modified preferences before). If you need to point to a different preferences file, click the **Open...** button.
- From the System Transcript, select **EGL Migration Tools -> Migration Driver**. In the **Migration File Preference** section, specify a file name for your preferences file and then click **Edit**. The EGL Migration Preferences Editor appears. The advantage of this technique is that after you finish modifying the preferences file, you are positioned to run the Stage 1 migration tool.

Regardless of which technique you use, the EGL Migration Preferences Editor enables you to set preferences that control the Stage 1 migration tool. When you are finished editing the preferences, click the **Save** or **Save As...** button, and then close the editor.

Note:

- If you do not use currently use configuration maps, see "Migration plans and high-level configuration maps" on page 149.
- For preferences that require a drive and directory, you can specify the information in either of two ways:
  - an absolute path. For example: d:\tempMig\MySystem\
  - a relative path. In this case the path is relative to the working directory. For example:
    - .\tempMig\MySystem results in an absolute path of *VisualAge-Smalltalk-installation-directory*\image\tempMig\MySystem
    - ..\tempMig\MySystem results in an absolute path of *VisualAge-Smalltalk-installation-directory*\tempMig\MySystem

The preferences you can modify are described in the following sections, based on the page within the GUI in which the preference appears:

- Build Plans
- Mapping
- Renaming
- Execution

Build Plans page

The Build Plans page enables you to specify information about where the migration plan is to be placed. The Build Plans page also enables you to indicate which configuration maps and versions in the library you want to consider for migration. The Build Plans page is organized in the following sections:

- *Migration Plan Specification* information identifies where the Stage 1 migration tool is to read or write the migration plan file (or files).

– *Plan Directory*. This is the target directory where you want your migration plan file (or files) to be placed.
– *Plan File Name*. An optional file name of the migration plan file you are creating and using to load the migration database. You can click the **Plan File Name** button to view existing plan files in your plan directory. If you need to see details within a plan file, click the **View Plans** button and expand the plan file to see the migration sets.
  - If you do not specify a Plan file name, the migration tool deletes **all** the .pln files in the specified Plan directory before creating new plan files. The migration tool creates one plan file for each migration set. In this case, the migration Plan file names are of the form *migrationSetName_version*.pln.
  - If you specify a Plan file name, the migration tool deletes **only** the specified .pln file from the specified Plan directory before creating a new .pln file with your specified Plan file name. In this case, the single Plan file lists all the migration sets.

• *Repository Filters* information enables you to control which configuration maps and versions in your Smalltalk library are considered by the Stage 1 migration tool. Limiting the configuration maps and versions can greatly enhance the performance of the Stage 1 migration tool. You can specify multiple filters. The Stage 1 migration tool uses the Configuration Maps filter and the Version Name or Version Depth filters as follows:
  – The migration tool matches each configuration map name in the library against the Configuration Maps filter.
    - If the configuration map name does not match at least one of the Configuration Maps filters, the configuration map is not considered for further processing.
    - If the configuration map name matches at least one of the Configuration Map filters, the versions of the configuration map are processed as follows:
      • If you specified any Version Name filters, then each version name for the configuration map is matched against the list of Version Name filters. If the version name matches any of the Version Name filters, then the version is considered for further processing.
      • If you specified the Version Depth filter and did not specify any Version Name filters, then the most recent versions of the configuration map, up to the number specified by the Version Depth filter, are considered for further processing. The default Version Depth filter is 1.

        Note: Version Depth and Version Name are mutually exclusive. By default, the Version Depth filter is included in the MigPreferences.xml file.
  – If the configuration map name and version name result in the configuration map version being considered for further processing, the Stage 1 migration tool does the following:
    - If the configuration map version is a high-level configuration map, then the migration tool uses the configuration map version as the basis for creating a migration set. Each version of the high-level configuration map results in a different migration set, assuming the version name matched the version filter.
    - If the configuration map version is not a high-level configuration map, the configuration map version is not considered for further processing. The configuration map version might still be included in other migration sets; there just will not be a migration set specifically for this configuration map version.

Specify the Repository Filter information as follows:

- *Configuration Maps* filter. The migration tool matches the configuration map names in your library to the Configuration Maps filter that you specify. You can specify multiple Configuration Maps filters. To add, change, or remove filters, right-click on a filter and use the options on the context menu. The filters are not case sensitive. You can use wildcards in the filters as follows:
  - A configuration map filter of **xyz** matches any configuration map name in the library that has the string ″xyz″ anywhere in its name.
  - A configuration map filter of *xyz** matches any configuration map name in the library that begins with ″xyz″.
  - A configuration map filter of **xyz* matches any configuration map name in the library that ends with ″xyz″.
- *Version Name* filter. If a configuration map name matches the Configuration Maps filter, the migration tool uses the Version Name filter to determine which, if any, of the configuration map versions should be considered for migration. You can specify multiple Version Name filters. To add, change or remove filters, right-click on a filter and use the options on the context menu. The filters are not case sensitive. You can use wildcards in the filters as follows:
  - A version name filter of **xyz** matches any configuration map version name that has the string ″xyz″ anywhere in the version name.
  - A version name filter of *xyz** matches any configuration map version name that begins with ″xyz″.
  - A version name filter of **xyz* matches configuration map version name that ends with ″xyz″.
  - If you leave the Version Name filters field empty, the migration tool uses the Version Depth filter.
- *Version Depth* filter. You can specify the number of previous versions you want to migrate. The default is 1, in which case the migration tool only processes the most recent version of the configuration map. If any Version Name filters are specified, the Version Depth filter is ignored.

Mapping page

The Mapping page enables you to specify the following:

- EGL file names for common parts and for unused parts.
- Suffixes that are used in building EGL project and package names.
- Options that control how your application names are converted to EGL package names.
- Information about which VAGen configuration maps and applications contain common parts.

The following describes the preferences on the Mapping page in more detail:

- *File Names*. The File Names section enables you to control the names of two EGL files that are created during migration.
  - *Common Parts* enables you to specify the name of an EGL file to contain parts that are common to multiple unique generatable parts within the scope of the migration set. Specify the file name without an extension or path. The migration tool creates a common parts file in each EGL package that contains parts that are used by (associated with) multiple generatable parts in the migration set or which are in VAGen configuration maps or applications that are identified as common configuration maps or applications. See “Placing

parts in EGL files" on page 38 for details about whether a part is placed with in a file with a program or in the Common Parts file.

  - *Unused Parts* enables you to specify the name of an EGL file to contain parts that are not used within the scope of the migration set. Specify the file name without an extension or path. The migration tool creates an unused parts file in each EGL package that contains parts that are not used by (associated with) any generatable part in the migration set, provided the corresponding VAGen configuration map and application are not identified as common configuration maps or applications.

- *Spanning Maps*. The Spanning Maps section enables you to specify suffixes that are used in the event that one of your map groups includes maps from multiple configuration maps or applications.
  - *Project Suffix* enables you to specify a suffix that the Stage 1 migration tool concatenates to the migration set name to create a new EGL project name. The migration tool only creates this new EGL project if a map group and its maps are spread across multiple VAGen configuration maps within the migration set. The migration tool concatenates the suffix to the migration set name **after** any Renaming rules are applied.
  - *Package Suffix* enables you to specify a suffix that the Stage 1 migration tool concatenates to a project name to create a new EGL package name within the EGL project. The migration tool only creates this new EGL package if a map group and its maps are spread across multiple VAGen applications within a configuration map. The migration tool concatenates the suffix **after** any Renaming rules are applied to create the EGL project name.
- *EGL Package Naming Options*. The EGL Package Naming Options section enables you to specify general rules about converting Smalltalk application names to Java package names.
  - *Use package naming dot notation*. If you select this option, the migration tool converts VAGen application names to EGL package names by placing a dot before each uppercase letter in the application name after the first. For example, if you select this option, the migration tool changes MyOrderEntryApp to My.Order.Entry.App.
  - *Collapse subapplications*. If you select this option, the migration tool converts each VAGen subapplication to an EGL package. If you deselect this option, the migration tool converts the subapplication using dot notation. Consider the situation in which there is an application named MainApp that contains a subapplication named SubApp. If you select Collapse subapplications, the migration tool creates two packages--one named MainApp and one named SubApp so that both packages are at the same level in the EGL folder structure. If you deselect Collapse subapplications, the migration tool also creates two packages, but they are named MainApp and MainApp.SubApp so that the two packages appear in a hierarchy in the EGL folder structure. The default is selected.
  - *Convert package names to lowercase*. If you select this option, the migration tool converts VAGen application names to EGL package names by changing uppercase letters to lowercase. For example, if you select this option, the migration tool changes MyOrderEntryApp to myorderentryapp.

  In general, you should select both options. If both are selected, the migration tool changes MyOrderEntryApp to my.order.entry.app. The EGL Package Naming Options are applied **after** any Renaming rules.
- *Common Identifiers*. This section enables you to specify a list of strings with wildcards that the migration tool can use in determining which configuration maps and applications contain common (shared) parts. To add or delete a

common identifier, right click on the field and use the options on the context menu. When you add an identifier, the editor prompts you to enter the following information:

– *context* indicates whether the string is to be matched to the configuration map name, application name, or both.
  - *ConfigMap* enables you to specify a string that identifies configuration maps that contain common parts. The migration tool matches this string to each configuration map name in the migration set to determine if the configuration map contains common parts. If the configuration map name matches any of the strings, all parts within the configuration map are considered to be ″used″. Each non-generatable part will either be placed in a program file or in the file specified by your Common Parts File Name preference; the part will not be placed in the unused parts file even if the part is not used by any generatable part in the migration set. You can enter multiple *ConfigMap* strings.
  - *Application* enables you to specify a string that identifies applications that contain common parts. The migration tool matches this string to each application name in the migration set to determine if the application contains common parts. If the string matches an application name, all parts within the application are considered to be ″used″. Each non-generatable part will either be placed in a program file or in the file specified by your Common Parts File Name preference; the part will not be placed in the unused parts file even if the part is not used by any generatable part in the migration set. You can enter multiple *Application* strings.
  - *Both* enables you to specify a string that the migration tool matches to both configuration map names and application names within the migration set. *Both* is equivalent to specifying the same string with a context of *ConfigMap* and a context of *Application*.
– *Pattern to identify the common code* enables you to specify the string the migration tool should match based on the context you specified. You can use the * as a wildcard at either the beginning or end of the string. The filters are not case sensitive.

Renaming page

The Renaming page enables you to control the names of the EGL projects, packages, and versions that are derived from your VAGen configuration map, application, and version names. The number in the Order column indicates the order in which the migration tool is to apply the renaming rules, with the lowest numbered rule applied first. To add or delete a renaming rule, click on a rule and use the options on the context menu. Add Rule always puts the new rule at the end of the list. When you add a rule, the editor prompts you to enter the following information:

- *from string* specifies the characters in the VAGen name that you want to change.
- *to string* specifies the characters you want to use in the resulting EGL name.
- *string context* specifies the location in the VAGen name where the migration tool should look for the from string during renaming. The values are as follows:
  – *front* means the rule applies if the from string appears at the beginning of a configuration map, application, or version name.
  – *back* means that the rule applies if the from string appears at the end of a configuration map, application, or version name.
  – *any* means that the rule applies if the from string appears anywhere within a configuration map, application, or version name.

  - *token* means that the rule applies only if the from string is an exact match for the configuration map, application, or version name.
- *mapping context* indicates whether the migration tool is to apply the renaming rule to a configuration map, application, or version name. The values for *mapping context* are as follows:
  - *configMap* means that the renaming rule only applies to VAGen configuration map names.
  - *application* means that the renaming rule only applies to VAGen application names.
  - *both* means that the renaming rule applies to both VAGen configuration map names and VAGen application names.
  - *version* means that the renaming rule applies to the version names for all configuration maps. Use a version renaming rule if your version names include special characters such as a semicolon (:) that are not permitted in directory or file names. The default MigPreferences.xml file includes several version renaming rules to help ensure that your version names do not result in invalid directory or file names. The migration tools use the renamed versions to create the migration plan file names in Stage 1 and to create directory names in Stage 3 of migration.

Execution page

The Execution page enables you to specify information about the location of the migration database, as well as the logging, debug, and report information you want to capture during Stage 1. The following describes the preferences you can specify on the Execution page in more detail:

- *Database* information. This section enables you to specify details about the migration database:
  - *DB* is the name of the migration database into which the migration tool is to write the migration set information. If you changed the database name from VGMIG when you created the migration database, you must change the database name specified by this preference to match the name you used.
  - *Schema* is the name used as the qualifier for the database tables. If you do not specify the schema, the migration tool uses MIGSCHEMA as the default. If you changed the schema name from MIGSCHEMA when you created the migration database, you must change the schema name specified by this preference to match the name you used.
  - *Userid* is the user ID needed to connect to the migration database. If you not specify the Userid, the migration tool attempts to connect using the user ID specified in your VAGen SQL Preferences as the default. If the connection fails, the migration tool attempts to use your logon user ID. If both attempts fail, the migration tool displays a dialog window asking for the information.
  - *Password* is the password needed to connect to the migration database. If you not specify the password, the migration tool attempts to connect using the password specified in your VAGen SQL Preferences as the default. If the connection fails, the migration tool attempts to use your logon password. If both attempts fail, the migration tool displays a dialog window asking for the information.

    Note: The password is not encrypted in the preferences file. If this is a concern, do not enter the password in the preferences file. Wait for the prompt.

- *Service* information. This section enables you to specify details about the logging and debug information you want to capture during Stage 1. You can specify the following:
  - *Trace Level* enables you to specify the level of information that you want to write to the log and debug files. You can specify one of the following values:
    - *FATAL* (Level 1) -- Error messages are logged.
    - *WARN* (Level 2) -- Warning messages and error messages are logged.
    - *INFO* (Level 3) -- Informational, warning, and error messages are logged.
    - *DEBUG* (Level 4) -- Debug information, as well as informational, warning, and error messages are logged. DEBUG is the only trace level that causes the migration tool to write information to the debug file.
  - *Log File Name* enables you to specify the drive, directory, and file name for a log file. You can create the log file with any file extension, but it is best viewed as an .xml file. If you omit the log file name, a file named *migLog.xml* is written to the drive and directory that you specified in the Log File Name field. If you do not specify a drive and directory, the migration tool writes the log file to the migration plan directory.
  - *Debug File Name* enables you to specify the drive, directory, and file name for a debug file that might be needed by IBM support. You can create the debug file with any file extension, but it is best viewed as an .xml file. Information is only written to this file if the Trace Level preference is set to DEBUG. If you omit the debug file name and you specify a Trace Level of DEBUG, a file named *migDebug.xml* is written to the drive and directory that you specified in the Debug File Name field. If you do not specify a drive and directory, the migration tool writes the debug file to the migration plan directory.
- *Verification* information. This section enables you to specify information about the report file that can be output from the Stage 1 migration tool. You can specify the following:
  - *Report File Name* enables you to specify the drive, directory, and file name to be used for the report file. This report contains information about how your VAGen files are going to be migrated. You should always specify the .htm extension. If you omit the report file name, a file named *report\MigrationReport.htm* is written to the drive and directory that you specified in the Report File Name field. If you do not specify a drive and directory, the migration tool writes the report file to the migration plan directory.

Sample MigPreferences.xml file

The following is a sample MigPreferences.xml file:

```
<preferences>
    <database>
        <uri>VGMIG</uri>
        <schema>MIGSCHEMA</schema>
        <userid></userid>
        <password></password>
    </database>
    <migrationSpec>
        <directory>d:\TempMig\Stage1</directory>
        <filename></filename>
    </migrationSpec>
    <service>
        <traceLevel>4</traceLevel>
        <logfile>d:\TempMig\stage1\migLog.xml</logfile>
        <debugfile>d:\TempMig\stage1\migDebug.xml</debugfile>
    </service>
    <repositoryFilters>
        <projectName>MyConfigMap*</projectName>
```

```
    <versionNumber>1</versionNumber>
</repositoryFilters>
<verification>
    <reportName>d:\TempMig\report\MigrationReport.htm</reportName>
</verification>
<eglMapping>
    <commonPartsFileName>CommonParts</commonPartsFileName>
    <unusedPartsFileName>UnusedParts</unusedPartsFileName>
    <spanningMapsProjectSuffix>MapsProject</spanningMapsProjectSuffix>
    <spanningMapsPackageSuffix>mapspackage</spanningMapsPackageSuffix>
    <packageDotNotation>true</packageDotNotation>
    <collapseSubapplications>true</collapseSubapplications>
    <packageLowercase>true</packageLowercase>
    <commonParts>
         <commonConfigMap>*Common*</commonConfigMap>
         <commonApplication>*Common*</commonApplication>
    </commonParts>
    <renameRule order="1">
         <fromString> </fromString>
         <toString></toString>
         <stringContext>any</stringContext>
         <mappingContext>both</mappingContext>
    </renameRule>
    <renameRule order="101">
         <fromString>CM</fromString>
         <toString></toString>
         <stringContext>back</stringContext>
         <mappingContext>configMap</mappingContext>
    </renameRule>
    <renameRule order="301">
         <fromString>App</fromString>
         <toString></toString>
         <stringContext>back</stringContext>
         <mappingContext>application</mappingContext>
    </renameRule>
    <renameRule order="501">
         <fromString>:</fromString>
         <toString>_</toString>
         <stringContext>any</stringContext>
         <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order="502">
         <fromString>/</fromString>
         <toString>_</toString>
         <stringContext>any</stringContext>
         <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order="503">
         <fromString>\</fromString>
         <toString>_</toString>
         <stringContext>any</stringContext>
         <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order="504">
         <fromString>|</fromString>
         <toString>_</toString>
         <stringContext>any</stringContext>
         <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order="505">
         <fromString>?</fromString>
         <toString>_</toString>
         <stringContext>any</stringContext>
         <mappingContext>version</mappingContext>
    </renameRule>
    <renameRule order="506">
         <fromString>*</fromString>
```

```
            <toString>_</toString>
            <stringContext>any</stringContext>
            <mappingContext>version</mappingContext>
        </renameRule>
        <renameRule order="507">
            <fromString>&lt;</fromString>
            <toString>_</toString>
            <stringContext>any</stringContext>
            <mappingContext>version</mappingContext>
        </renameRule>
        <renameRule order="508">
            <fromString>&gt;</fromString>
            <toString>_</toString>
            <stringContext>any</stringContext>
            <mappingContext>version</mappingContext>
        </renameRule>
        <renameRule order="509">
            <fromString>&quot;</fromString>
            <toString>_</toString>
            <stringContext>any</stringContext>
            <mappingContext>version</mappingContext>
        </renameRule>
        <renameRule order="510">
            <fromString> </fromString>
            <toString>_</toString>
            <stringContext>any</stringContext>
            <mappingContext>version</mappingContext>
        </renameRule>
    </eglMapping>
</preferences>
```

Deriving file names from your preferences

The Stage 1 migration tool derives the file names for the log, debug, and report file names in the same way. The following table shows a name you as you might specify it in the preferences and the resulting drive, directory and path name that the migration tool uses. In this example, the Migration Plan Directory is d:\myVAGenMig.

Table 60. File name derived from preferences

Log File Name Preference	File Name used by Stage 1 Migration Tool
Preference is left blank.	d:\myVAGenMig\migLog.xml **Note:** • The default file name for the debug file is migDebug.xml. • The default file name for the report file is \report\MigrationReport.xml
mine.xml	d:\myVAGenMig\mine.xml
logs\mine.xml	d:\myVAGenMig\logs\mine.xml
.mine.xml	*VisualAge-Generator-installation-directory*\image\mine.xml

Before you run the Stage 1 tool — hints and tips

Before you run the Stage 1 migration tool, there are some things you might want to do to improve performance. You might also want to save your existing image for use after migration is completed.

Improving performance

To minimize the memory usage, it is best to clean up (or ″scrub″) the image before running the Stage 1 migration tool. To clean up (or ″scrub″) the image, do the following:

1. From the System Transcript, select **Tools —> Open VAGen Tools Workspace**.
2. Under the ″Image Management″ section, swipe through:

   ```
   System abtScrubImage
   ```

3. Then right-click and select **Execute** to run System abtScrubImage.
4. If you scrub the image, you might need to reload the VAGen EGL Migration feature. See “Loading the migration feature” on page 136 for information on how to load the feature. Alternatively, to add the EGL Migration Tools option back onto the System Transcript tool bar, do the following:
   a. Type the following into the System Transcript window:

      ```
      HptEglMigrationGuiApp loaded
      ```

   b. Swipe through the line you typed, then right-click and select **Execute**.

To reduce the time the Stage 1 migration tool spends analyzing which configuration maps and versions to migrate, consider creating a library that only contains the configuration map versions that you want to migrate. If you have ongoing maintenance in VisualAge Generator while you are migrating, a separate migration library also has the following advantages:

- There is a stable set of configuration map versions to migrate. This is particularly important if you use the Version Depth preference to control what is to be migrated.
- You can compare the versions in the new migration library against your maintenance library to determine what additional configuration map versions still need to be migrated.

If you do create a special library, consider using it as a local library to improve Stage 1 migration performance.

Saving your image

The Stage 1 migration tool unloads all applications that contain VAGen parts from your image at the beginning of Stage 1 processing. Only the last migration set to be processed is left in your image when the Stage 1 tool finishes. Unloading all applications ensures that only parts in the migration set are considered for the associate parts list during Stage 1. If you have an image that you wish to save, you should do the following before running the Stage 1 tool:

1. Shut down VisualAge Generator.
2. Save backup copies of the following files in your *VisualAgeForSmalltalk-installation-directory*\image:
   - abt.icx
   - abt.ini — not necessary to save if you do not change any preferences while running Stage 1
   - hpt.ini — not necessary to save if you do not change any preferences while running Stage 1
3. Start VisualAge Generator.

When you are finished running the Stage 1 tool, do the following to restore your workspace:

1. Shut down VisualAge Generator.

2. Restore the files you backed up before running the Stage 1 tool.
3. Start VisualAge Generator.

Running the Stage 1 migration tool

After you have finished editing your preferences, you are ready to run the Stage 1 migration tool to extract your source code from the Smalltalk library. To do this, perform the following steps:

1. Start the EGL Migration Driver View using one of the following techniques:
   a. If you modified the preferences by starting the Preferences Editor, start the EGL Migration Driver View from the System Transcript by selecting **EGL Migration Tools -> Migration Driver**.
   b. If you modified the preferences by starting the EGL Migration Driver, then when you saved the preferences file, you are positioned back at the EGL Migration Driver View.
2. Ensure the File Name for the Migration Preference File points to the file in which you stored your preferences. Use the **Browse...** button to point to a different preferences file. Use the **Edit...** button to review or make final modifications to your preferences.
3. When you are satisfied with your preferences, select the Execution Options that you want to use. The Execution Options control the output of the Stage 1 migration tool as follows:
   - *Overwrite PLN* controls the migration plan file or files as follows:
     – If you select *Overwrite PLN*, the Stage 1 migration tool does the following to files in the Plan Directory that you specified in your preferences:
       - If your preferences file does not specify a file name for your .pln file, the migration tool deletes all the .pln files in the specified Plan Directory and creates new files.
       - If your preferences file specifies a file name for your .pln file, the migration tool only deletes a file with the same name from the specified Plan Directory before creating a new .pln file.

       Select the *Overwrite PLN* option if you want the Stage 1 migration tool to create the migration plan files for you based on your repository filters and high-level configuration maps. If you need assistance creating a configuration map to use for migration, see “Creating a high-level configuration map” on page 150.
     – If you do not select *Overwrite PLN*, the Stage 1 migration tool does not create any new migration plan files. Instead, the Stage 1 migration tool runs based on the Plan Directory and Plan File Name you specified in your preferences:
       - If your preferences file does not specify a file name for your .pln file, the migration tool runs using all of the plans in the specified Plan Directory.
       - If your preferences file does specify a file name for your .pln file, the migration tool runs using only that .pln file.

       Deselect the *Overwrite PLN* option if you have previously created the migration plan files and now want to run the Stage 1 migration tool to load the migration database using these files. For details about creating your own migration plan files, see “Creating a migration plan file manually” on page 151.
   - *Generate Report* controls whether the migration tool creates the report specified in the Verification section of the preferences file. If you do not select

this option, the report is not created. If you select this option, the migration tool creates the report using the Report File Name that you specified in your preferences. The report shows how your configuration maps, applications, and VAGen parts will be assigned to EGL projects, packages, and files during migration. You might deselect this option initially so that you can review the .pln files to ensure that the migration tool is planning to process the configuration map versions that you want. If you are not satisfied with the configuration map versions that are being selected, you can refine your preferences and run Overwrite PLN again. When you are satisfied with the configuration map versions that will be processed, run Stage 1 again with the Generate Report option selected.

Note:

- Generating the report can take some time, therefore it is best to review the .pln files to be sure that the migration tool will process the configuration map versions that you intend.
- If you select the Generate Report option, the Stage 1 migration tool automatically deletes any existing report files from the report directory. If you want to save previous report files, you must move the report files to a different directory or point to a new directory for your new report. Because the report files link to other files, renaming the report files will cause links to be lost and the files to become unviewable.

- *Update Database* controls whether the migration tool updates the migration database with the migration plan information. If you do not select this option, the migration database will not be updated. If you select this option, the migration database you specified in your preferences will be updated with information from the migration plan, including the External Source Format for every VAGen part in the migration plan. You might deselect this option initially so that you can review the report to see how your configuration maps, applications and VAGen parts will be placed into EGL projects, packages, and files. If you are not satisfied with the placement, you can refine your preferences and run the report again. When you are satisfied with the placement, you can run Stage 1 a final time with Update Database selected so that the migration tool will put the results into the migration database.

  Note:

  - If you select the Update Database option and a migration set already exists in the database, the Stage 1 migration tool automatically deletes the old information about migration set from the database and then adds the new information for the migration set. There is no need for you to clean up a migration set from the database.
  - The migration tool does not automatically clean up an entire migration plan.

4. After you have selected your Execution Options, click **OK** to run Stage 1 of the migration tool. The migration tool writes messages to the log file you specified in your migration preferences. The tool also puts the same messages in the System Transcript.

When the Stage 1 tool finishes, if you selected the Update Database option, your migration plan information, including your VAGen code in External Source Format, is stored in the migration database. After reviewing your report and the

Stage 1 messages, you might decide to make changes to your code in VisualAge Generator and run Stage 1 again. After you are satisfied with the results of Stage 1 and have your final External Source Format code stored in the migration database, you are ready to perform Stage 2 of the migration. To run the Stage 2 migration tool, you use the EGL development environment. See Chapter 6, "Stage 2—Conversion to EGL syntax," on page 155 for information about continuing your migration process.

Migration plans and high-level configuration maps

A migration plan file is simply an XML file that specifies the names of one or more migration sets and, for each migration set, **one** high-level configuration map and version that specifies the applications and their versions for the migration set. The high-level configuration map can also specify other configuration maps and their versions as required maps. However, only one high-level configuration map version can be specified for a migration set. The Stage 1 migration tool is designed to automatically create a migration plan file for you based on your Repository Filters preferences for configuration map and version names. The Stage 1 tool uses these filters to select the configuration map versions that should be reviewed to determine which ones are high-level configuration map versions. The Stage 1 tool uses each high-level configuration map version as the basis for a migration set.

If you use high-level configuration maps when generating your VAGen source code, then these high-level configuration maps are the same ones you should use for migration. This is because each high-level configuration map provides a grouping of parts that are used together during generation and therefore has all the associated parts for a set of programs.

If you do not currently use configuration maps at all, you must create a configuration map to use for migration. In this situation, the easiest technique is to create one configuration map version that includes all the application versions, including common application versions, that you want to migrate as a group. See "Creating a high-level configuration map" on page 150 for details. After you have created the configuration map, you can use the Stage 1 migration tool to automatically create the migration plan for you.

If you currently use configuration maps, you might not have high-level configuration maps. For example, you might have a configuration map for common applications and another configuration map for a subsystem. At generation time you determine which version of each configuration map to load into your image. In this situation, you can do one of the following to specify what you want to migrate as a group:

- Create a high-level configuration map to use during migration. This high-level configuration map can specify a list of application versions, a list of required configuration map versions, or a combination of application versions and required configuration map versions. For example, the high-level configuration map can list the common configuration map and the subsystem configuration map so that both configuration maps will be considered as a group when migrating. See "Creating a high-level configuration map" on page 150 for details. After you have created the high-level configuration map, you can use the Stage 1 migration tool to automatically create the migration plan for you.
- If you prefer not to create a high-level configuration map, you can create the migration plan file yourself using one of the following techniques:

- If you have information in a database or other system that specifies what is needed for generation in terms of Smalltalk configuration map versions, then you can write a tool to create the migration plan file or files automatically from your database.
- Create the migration plan file or files manually.

Creating a high-level configuration map

To create a high-level configuration map for use in migration do the following in VisualAge Generator:

1. From the VisualAge Organizer, select **Options** and be sure that **Full Menus** is selected.
2. From the VisualAge Organizer, select **Tools -> Configuration Maps**.
3. From the Configuration Maps Browser, select **Names -> Create**.
4. In the Information Required window, enter the name of the configuration map and then click on **OK**. A new edition of the configuration map is automatically created and selected.
5. Select **Applications -> Add**. Then select each application that you want to migrate and the version of that application. You can only specify one version for each application. Click **OK** when you have selected the version for each application that you need to include. The application versions that you specify will be migrated as a group. This group determines the set of parts that the migration tools use to resolve ambiguous situations.
6. Version the configuration map by selecting **Editions -> Version**.
7. Select the configuration map version and load it into your image by selecting **Editions -> Load**.
8. After you have loaded your new high-level configuration map, you might also want to validate your programs and tables to ensure that they are valid in VAGen and that you are not missing any parts. When you validate your programs, include /GENMAPS, /GENHELPMAPS, and /NOGENTABLES. These 2 map options enable you to ensure that the maps are valid for the programs in which they are used. /NOGENTABLES enables you to validate a table just one time rather than revalidating the table with every program in which the table is used.

Chaining configuration maps

You can chain configuration maps. For example, you can create a configuration map that lists the version for each of your common applications. Then, for each subsystem, create a high-level configuration map for that subsystem that includes the version you need of each subsystem-specific application. You can include the configuration map for the common applications in the subsystem configuration map as follows:

1. From the Configuration Maps Browser, select an open edition of the subsystem configuration map.
2. Select **Expressions -> Add**.
3. In the Information Required window, click **OK** to accept *true* as the expression.
4. Select *true* in the Config. Expressions pane. Then select **Required Maps -> Add -> As First**. Then select the configuration map version that contains the common applications.
5. Version the configuration map by selecting **Editions -> Version**.
6. Select the configuration map version and load it into your image by selecting **Editions -> Load With Required Maps**.

Using required maps provides a simple way of specifying the common application versions without having to explicitly list the common application versions in every subsystem's high-level configuration map.

Using configuration maps with the Stage 1 tool

When you are ready to run the Stage 1 migration tool, do the following:

- When you set your Stage 1 preferences, on the Build Plans page, in the Repository Filters section, set the Configuration Maps list so that a filter in the list matches the high-level configuration map you created.
- When you instruct the Stage 1 tool which preferences file to use, also select the *Overwrite PLN* option. This option instructs the Stage 1 migration tool to create the migration plan files for you based on your high-level configuration maps and to overwrite any existing migration plan files.

Creating a migration plan file manually

If you already have external controls that determine what configuration map versions to load into your image when you generate in VisualAge Generator, you might decide to create the migration plan file by hand or to develop a tool to create the migration plan file automatically from your external information. The migration plan file must have a *.pln* file extension and the following format:

```
<migrationDefinition>
    <migrationSet
       name="migrationSet1"
       version="migrationSet1Version1"
       vgName="migrationSet1"
       vgVersion="migrationSet1Version1">
       <configMap
          name="configurationMap1"
          version="configurationMap1Version1">
       </configMap>
       <configMap
          name="configurationMap2"
          version="configurationMap2Version1">
       </configMap>
            .
            .
            .
       <configMap
          name="configurationMapN"
          version="configurationMapNVersion1">
       </configMap>
     </migrationSet>
</migrationDefinition>
```

In the previous example, the following apply:

- migrationSet1 is a name that you can use to refer to a group of configuration maps that must be migrated together. The migration set name is stored in the migration database and is used in the later stages of migration as follows:
  - In Stage 1 migration, if maps in a map group span configuration maps, the migration set name concatenated with a suffix is used to build the name of a new EGL project that will contain the map group and all its maps. The migration set name is also used to remove information from the migration database if you change renaming rules.
  - In Stage 2 migration, the migration set name specifies which group of configuration maps in the migration database that you want to convert to EGL.
  - In Stage 3, the migration set name specifies which group of configuration maps in the migration database you want to use to create EGL projects,

packages, and files in your workspace or in a temporary directory. The migration set name and the migration set version are also used to create the high-level directory name if you choose to save the outputs of Stage 3 to a temporary directory.

The migration set name is only used during migration as a way of identifying a group of configuration maps. Other than the situation in which maps span multiple configuration maps in VisualAge Generator, the migration set name is not used after migration.

- configurationMap1, configurationMap2, ... configurationMapN are the configuration maps you want to migrate as a group. You must only list a configurationMap once within a migration set.
- configurationMap1Version1, configurationMap2Version1, ... configurationMapNVersion1 are the respective versions of each of these configuration maps. You can only specify one version for each configuration map within a migration set.
- **The configuration map names and version names you specify must exactly match the configuration map names and version names in your library. The names are case sensitive.** The information is used to add configuration map versions to the image so that the parts can be analyzed to build the Stage 1 migration report and to load the migration database.

When you are ready to run the Stage 1 migration tool, do the following:

- When you set your Stage 1 preferences, on the **Build plans** tab, set the **Plan directory name** to the drive and directory where you stored your migration plan files. Specify the **Plan file name** if you want the Stage 1 migration tool to run only **one** migration plan that you have created. Leave the **Plan file name** blank if you want the Stage 1 migration tool to run using **all** the migration plan files in the specified **Plan directory**.
- When you instruct the Stage 1 tool which outputs to produce, be sure to deselect *Overwrite PLN*. This causes the migration tool to run using the previously created .pln file based on your **Plan file name** preference.

Part 4. Stages 2 and 3 — common migration steps

The remaining steps of the migration are the same whether you are migrating from VisualAge Generator on Java or VisualAge Generator on Smalltalk.

Chapter 6. Stage 2—Conversion to EGL syntax

Stage 2 of migration is the same whether you are migrating from Java or Smalltalk.

You must run another migration tool to convert your source from External Source Format syntax to EGL syntax. This migration tool is a plug-in that is available after you install EGL. You can run the tool in batch mode or interactive mode. You can optionally specify that Stage 3 is to run automatically after Stage 2 completes.

Setting DB2 performance information

After you run Stage 1 and before you run Stage 2, you should use the DB2 runStats command to evaluate and set performance information for the DB2 tables. To set the performance information, do the following:

1. From a DB2 Command Window, navigate to the directory where **runStats.bat** is located.
   - For Java, this is *VisualAge-for-Java-install-directory*\ide\vgmigration
   - For Smalltalk, this is *VisualAge-Smalltalk-install-directory*
2. If you changed the default migration database name (VGMIG) or the default schema name (MIGSCHEMA), change the **runStats.bat** file to use your database name and schema name.
3. Run **runStats.bat**.

Setting your workbench preferences

Before you start to migrate you should set your workbench preferences. This includes the following:

- Start up parameters
- Required EGL preferences
- Recommended preferences
- VAGen Migration Preferences
- Other recommended settings

Start up parameters

To improve the performance of the EGL development environment, you should set several start up parameters in the initialization file. The parameters are the same regardless of the product that you use. The initialization file is always in the product installation directory, but the name of the file varies with the product that you are using. For example, if you are using Rational Application Developer, the initialization file is named rationalsdp.ini. To set the start up parameters, do the following:

1. Using a text editor, edit the initialization file.
2. Look for the following line:

   ```
   VMArgs=-Xj9
   ```

3. Change the line to the following three lines:

   ```
   VMArgs=-Xj9
   VMArgs=-Xmx700m
   VMArgs=-Xms256m
   ```

Setting -Xmx increases the available memory. Generally, set this to a value that is less than your real memory. For example, if your real memory is 1000K, then set -Xmx to 700. This helps avoid the use of virtual memory.

Setting -Xms increases the amount of memory that is used when starting the product. Set this to a value that is less than or equal to your setting for -Xmx.

4. Save the initialization file.
5. Start the EGL development environment. For example, if you are using Rational Application Developer, start that product.

Required EGL preferences

Before you can you use the migration tool, you must enable both the EGL and the migration tool capabilities. To enable these capabilities, do the following:

- From the Workbench window, select **Window** -> **Preferences**.
- Expand the **Workbench** preference by selecting the + beside it and then select **Capabilities**.
- Expand EGL Developer. Then select both **EGL Development** and **VisualAge Generator to EGL Migration**. You do not need to select the other migration tools.
- Select **OK**.

You must also set the VisualAge Generator compatibility mode before you migrate. Setting the VisualAge Generator compatibility mode avoids numerous messages in the Problems view. To set this preference, do the following:

- From the Workbench window, select **Window** -> **Preferences**.
- Select **EGL**.
- Select the *VisualAge Generator Compatibility* preference.
- Select **OK**.
- When you are prompted for a full-rebuild of the workspace, select **OK**.

If you plan to migrate VAGen Web transaction programs, you should set the type of EGL Web project. To set this preference, do the following:

- From the Workbench window, select **Window** -> **Preferences**.
- Select **EGL**.
- In the Default EGL Web Project Feature Choices, do the following:
  - Deselect *EGL support with JSF*.
  - Select *EGL support with Legacy Web Transaction*.
- Select **OK**.

Recommended preferences

The following preferences are recommended to assist you in resolving any EGL validation messages in the Problems view. From the Workbench window, select **Window -> Preferences** and then the preference page indicated below as follows:

- **EGL -> Editor**. Select **Show line numbers**.
- **Workbench -> Editors -> Text Editor**. Select **Show line numbers**.
- Workbench page. Decide whether to select or deselect **Build automatically**. If you select this option, whenever you save a file, EGL rebuilds everything in the workspace and runs validation. The advantage of selecting the option is that you get immediate feedback on the changes you have made. The disadvantage is that rebuilding can take some time depending on the number of parts in your workspace. If you do not select this option, EGL does not rebuild anything when

you save a file. The advantage of deselecting the option is that you avoid multiple rebuilds when you are modifying a number of files. However, you must remember to rebuild the projects (**Project -> Build Project** or **Project -> Build All**) to see the results of any changes on the messages in the Problems view. You might want to deselect **Build automatically** while you are working through the list of messages in the migration log. This enables you to control when the rebuild occurs. When you are doing normal code development, then you might want to select this option. The Stage 3 Migration Tool always turns off **Build automatically**.

- **Workbench -> Local History**. The .egl files that are produced by the migration tool can be quite large. Therefore, you should change the **Maximum file size (MB)** to a larger value (for example, 5). In addition, you might want to change the **Days to keep files** and the **Entries per file** based on your backup requirements.
- **Workbench -> Perspectives**. You might want to set either the EGL perspective or the Web perspective as your default perspective. Use the EGL perspective if you will not be developing web applications. Use the Web perspective if you plan to migrate Web transactions or develop Web applications. To set the default perspective, select the perspective you want to use and then select **Make Default**.
- **Workbench -> Capabilities -> Tester**. Select the **Profiling and Logging** capability and then select **OK**. Reopen the Preferences window. In the Logging section, select the **General** tab and then change the **Default logging level** to **SEVERE**. Optionally, change the **Default logging level** to **INFO** or **WARNING**, but do not leave it set to **NONE**.

VAGen Migration Preferences

The preferences listed below control the overall migration process. Unless otherwise noted, these preferences are used both for Stage 2 during Stage 1 - 3 migration and for single file migration. To set these preferences, from the Workbench window, select **Windows -> Preferences -> VAGen Migration.**

Single File Mode Preferences:

- *Separate parts into EGL files*. This preference is only used during single file migration. If you select this preference, each program, map group, and table is placed in its own file; other parts are placed in the file you specify on the Import VAGen External Source Format File wizard. This adheres to the EGL requirement of one generatable part per file. If you do not select this preference, all the parts are placed in the EGL file you specify on the Import VAGen External Source Format File wizard. See “Overview of Single File Migration” on page 24 for specifics of the parts placement algorithm for single file mode.

Rename User Exit Information:

- *Rename user exit*. The VAGen migration tool provides simple renaming for data items, records, functions, and maps based on adding a prefix to the part name or part reference. Optionally, you can write a user exit routine to provide more complex renaming. For example, you might want to change a hyphen (-) to an underscore (_) during migration. Select the Rename user exit preference if you are providing a user exit routine to rename parts. If you select this option, you must provide additional information about your Rename user exit routine. See the white paper ″Using the Rename User Exit in the VisualAge Generator to EGL Migration Tool″ for details of how to create a Rename user exit, as well as sample code.

- *JAR file location*. Specify the location on your system of the .jar file that contains your Rename user exit routine.
- *Package name*. Specify the name of the package within the .jar file that contains your Rename user exit routine.
- *Class name*. Specify the name of the class within the package that contains your renaming logic. This class must contain the method *renameUserExit(String s, Connection c)*.
- *Use a database*. Select this option if your Rename user exit uses a database to provide the relationship between the old part name and the new part name.

Minimize VisualAge Generator Compatibility Mode: This group of preferences enables you to minimize the automatic use of migration techniques that require VisualAge Generator Compatibility Mode. Use caution when selecting these preferences because they can result in more error messages on the EGL Problems list or changes in runtime behavior.

- *Do not initialize old EZESYS values*. If you select this preference, the migration tool does not include a declaration and initialization statement in each program for an extra variable to contain the old VAGen values for EZESYS. The migration tool still uses the extra variable when it converts statements involving EZESYS other than IF, WHILE, or TEST. If you select this preference and you have statements involving EZESYS other than IF, WHILE, or TEST, there will be an error on the Problems list. Consider selecting this preference if you plan to convert all statements to use the new EGL sysVar.systemType values or if you know that you did not use EZESYS. See "EZESYS" on page 108 for additional details.
- *Do not include deleteAfterUse for tables*. If you select this preference, the migration tool always omits the deleteAfterUse property for the table use declaration statements in each program. The migration tool issues a warning message for those situations in which the deleteAfterUse property is omitted. Consider setting this preference if you are migrating directly from VisualAge Generator Version 4.5 FixPak 4 and all your production programs are generated with that version and FixPak. If you are migrating from Cross System Product or earlier releases of VisualAge Generator and you select this preference, be sure to thoroughly test any program for which the deleteAfterUse property is omitted from the use declaration for a table.
- *Do not honor evensql=y for items or variables*. If you select this preference, the migration tool always uses odd precision (or 18 if the item is the maximum length) when migrating a PACK data item part or nonshared item in a record. The migration tool issues a warning message for those situations in which the VAGen item specified even precision (evensql=y). Consider setting this preference if you are certain that your SQL tables do not use even precision for columns that you might reference in an SQL where clause or in an EGL prepare statement. Alternatively, you can select this preference, migrate, and then review all the item definitions for which the migration tool issued a warning message. Using a precision other than what is specified in the SQL table definition can result in poor performance for database access.
- *Do not set compatibility mode*. If you select this preference, the migration tool always omits the vagCompatibility="YES" build descriptor option whenever the tool converts a generation options part. You should only select this preference if you do all of the following:
  - Select all of the other 3 preferences in the Minimize VisualAge Generator Compatibility Mode section.

– Ensure that all of your migrated part names adhere to the EGL part naming conventions when VisualAge Generator Compatibility mode is disabled. You can specify a Rename User Exit and code the exit to rename the VAGen parts during migration to achieve this.
– Disable the EGL preference for VisualAge Generator Compatibility after you finish migration. **Note:** Regardless of how you set the preferences, the migration tool always turns on VisualAge Generator Compatibility mode when refreshing the workspace.

VAGen Migration Database I/O Preferences

The preferences listed below control the migration of the VAGen syntax to EGL syntax for SQL and DL/I database I/O. Unless otherwise noted, these preferences are used both for Stage 2 during a Stage 1 - 3 migration and for single file migration. To set these preferences, from the Workbench window, select **Window -> Preferences -> VAGen Migration -> VAGen Migration Database I/O Preferences**.

SQL Preferences:

- *Result Set suffix*. In VisualAge Generator, when an SQL REPLACE function needs to reference the corresponding UPDATE or SETUPD function, the REPLACE function must specify the function name. In EGL, multiple I/Os are supported within a single function. A result set ID is used to uniquely identify a get or open statement. The migration tool creates the result set ID from the function name by concatenating the Result Set suffix. For example, if a function is named MY-SETUPD and you use the default Result Set suffix of _RSI01, then the result set ID that is included in the open statement for the function will be MY-SETUPD_RSI01. You can set the Result Set suffix to any value that you want other than blank. However, be sure to select something that will not cause conflicts with any of your part names.
- *Prepare suffix*. In VisualAge Generator, if you need to have an SQL I/O statement prepared at runtime, you select Execution Time Statement Build. The corresponding EGL statement is the *prepare* statement. The prepare statement includes a prepare statement ID so that other I/O statements such as close, get, execute, and open can specify which prepare statement they are associated with. The migration tool creates the prepare statement ID from the function name by concatenating the Prepare suffix. For example, if there is a function named MY-EXEC-TIME-BUILD and you use the default Prepare suffix of _PREP01, then the prepare statement ID that is included in the prepare statement is MY-EXEC-TIME-BUILD_PREP01. You can set the Prepare suffix to any value that you want other than blank. However, be sure to select something that will not cause conflicts with any of your part names.
- *Omit column name*. In VisualAge Generator, the SQL column name is always specified for a field in an SQL record. In EGL, you can omit the SQL column name if it is the same as the field name. If you select Omit column name, the migration tool omits the EGL **column** property whenever the SQL column name is the same as the field name. Omitting the column name can make your EGL source code less cluttered.
- *Omit isNullable property*. In VisualAge Generator, the null indicator variable is always included for every field in the SQL record. To preserve the VisualAge Generator behavior, the migration tool always includes the **isNullable** property for every field in an SQL record. However, in EGL, you can omit the null indicator variable if the column is defined in SQL as not null. If you select the Omit isNullable property, the migration tool omits the **isNullable** property from every field in SQL records. Omitting the **isNullable** property can improve runtime performance and reduce the risk of exceeding the DB2 precompiler

limits.. However, you should only select the Omit isNullable property if you are certain that all of your SQL columns are defined as not null. If any of your SQL columns can be null, you should not select Omit isNullable property during migration. After migration, you can remove the **isNullable** property for selected fields in your SQL records if you want to improve performance.

- *Omit isReadOnly property*. In VisualAge Generator, the Read Only property must be explicitly set for each field in an SQL record. Read Only must always be yes if there are multiple tables specified for the SQL record. By default, the migration tool includes the isReadOnly property for every field in an SQL record that references multiple SQL tables. However, the EGL isReadOnly property defaults to no if there is only one SQL table and to yes if there are multiple SQL tables specified for the SQL record. If you select the Omit isReadOnly property, the migration tool only includes isReadOnly if there is a single table specified for the SQL record and the VisualAge Generator Read Only property is set to yes. Omitting the isReadOnly property can make your EGL source code less cluttered.

DL/I Preferences:

- *Database PCB suffix*. In VisualAge Generator, the same database name can be used multiple times in a PSB. In EGL, the PSB is a record. The database name becomes a field name and must be unique. The migration tool creates the field name in the PSB from the database name, a number (if necessary for uniqueness), and the Database PCB suffix. This avoids conflicts between the database name and any other names in the program. Consider the situation in which the database name COURSE is used for two different PCBs and COURSE is also the name of a DL/I segment record. If you use the default Database PCB suffix of _dbPCB, then the field name created for the first COURSE PCB is COURSE_dbPCB. The field name created for the second COURSE PCB is COURSE_*n*_dbPCB, where *n* is the number of the PCB in the VAGen PSB. The name of the DL/I segment is still COURSE. You can set the Database PCB suffix to any value that you want other than blank. However, be sure to select something that will not cause conflicts with any of your part names.
- *GSAM PCB suffix*. The GSAM PCB suffix is used for the GSAM PCBs similar to the way the Database PCB suffix is used for database PCBs. You can set the GSAM PCB suffix to any value that you want other than blank. However, be sure to select something that will not cause conflicts with any of your part names.

VAGen Migration Syntax Preferences

The preferences listed below control the migration of the VAGen syntax to the EGL syntax. Unless otherwise noted, these preferences are used both for Stage 2 during a Stage 1 – 3 migration and for single file migration. To set these preferences, from the Workbench window, select **Window -> Preferences -> VAGen Migration -> VAGen Migration Syntax Preferences.**

Renaming preferences:

- *Renaming prefix*. The migration tool uses this prefix whenever a VAGen data item, record, function or map name is an EGL or SQL reserved word or starts with the # or @ symbol. The tool adds the Renaming prefix to the VAGen part name to create a valid EGL part name. For example, *date* is an EGL reserved word. If you have a function named DATE and use the default Renaming prefix of VAGen_, then the migration tool changes the function DATE to VAGen_DATE. The tool also changes all references to the function from DATE to VAGen_DATE. You can set the Renaming prefix to any value that you want

other than blank or EZE. In addition, the Renaming prefix cannot start with the # or @ symbol. Be sure to select something that will not cause conflicts with any of your part names.

- *Level77 suffix*. The migration tool uses this suffix whenever a VAGen working storage record contains level 77 items. EGL does not support level 77 items. The migration tool splits the VAGen working storage record into two EGL records. The first record is named the same as the original VAGen working storage record and contains all the non-level 77 items. The second record contains all the level 77 items. The migration tool names this second record based on the original working storage record name concatenated with the Level77 suffix. For example, if the original working storage record is named MYRECORD and you use the default Level77 suffix of _Level77Items, the EGL record that contains the level 77 items will be named MYRECORD_Level77Items. You can set the Level77 suffix to any value that you want other than blank. However, be sure to select something that will not cause conflicts with any of your part names.
- *Help Map suffix*. The migration tool uses this suffix whenever the main map group and the help map group for a program have maps with the same name. EGL requires that all forms in both formGroups for a program have unique names. The migration tool renames maps in the help group that conflict with map names in the main map group. Consider the following example. The main map group for a program is MAPGP1 and contains MAP1. The help map group for the same program is MAPGP2 and contains MAP1. Using the default Help Map suffix of _helpmap, the migration tool renames the MAP1 in MAPGP2 to be MAP1_helpmap. You can set the Help Map suffix to any value that you want other than blank. However, be sure to select something that will not cause conflicts with any of your part names.

Other conversion options:

- *Convert shared data items to primitive item definitions.* If you select this preference, then whenever shared data items are used in records, tables, function local storage, function parameter lists, or program parameter lists, the migration tool converts the shared items to primitive definitions. If you have current organization standards that discourage the use of shared data items in new applications, this option enables you to remove the use of shared data items from existing applications as you migrate. **Warning:** Only the primitive definition is included in the record. Therefore, do not select this preference if you use shared items in a UI record because the UI edit customizations for the shared item are not copied to the EGL VGUI record.
- *Change decimal comma to decimal point.* The migration tool automatically converts numeric literals to use the point if your workstation specifies a locale that typically uses a comma to indicate decimal positions. For example, the migration tool automatically converts the comma to a point for French and German locales. However, some customers specify English as their locale and override the normal decimal point setting to be a comma. If you use this technique, you must select the Change decimal comma to decimal point preference. This ensures that the migration tool will convert the comma to a point in numeric literals. EGL only supports the point as the decimal position indicator.

Other recommended settings

The following additional settings are recommended:

- Optionally, close the Welcome view.
- If you are not already using the EGL perspective, switch to it by selecting **Window** -> **Open Perspective** -> **Other** -> **EGL** -> **OK**. Alternatively, if you plan to migrate VAGen Web transaction programs or develop new EGL

PageHandlers, you should switch to the Web perspective. You can close other perspectives by right-clicking the icon for the perspective on the tab in the upper-right corner of the window and then selecting **Close**.

- If the Navigator view is not already included with the perspective that you are using, you might want to add this view. To add the Navigator view, select **Window -> Show view -> Other**. From the Show View window, expand **Basic** and then select **Navigator**.

  Note: Some activities such as deleting an EGL package are not fully supported in the Navigator view. Always use the Project Explorer view if you are restructuring your projects or packages.
- The Problems view shows any validation errors. Therefore, you might want to set the Problems view to be in the foreground. In the lower right section of the Workbench window, select the Problems tab to place the Problems view in the foreground.
- In the Problems view, select the **Filters...** icon in the upper right corner. In the **Filters** window, do as follows:
  - Select the **On selected resource only** radio button. This limits the error messages in the Problems view to the messages for the currently selected file. When there are errors, this can help you focus your attention on a single file at a time. The title bar of the Problems view provides a count of the messages that matched the filter and the total number of messages for all projects in your workspace.
  - Deselect **Limit visible items to**. This enables you to see all the messages.
- When you have multiple files open for editing, you can configure the Navigator view to automatically bring an open file to the foreground (make its editor session the active editor) every time you select that open file in the Navigator view. To do this, select the **Link with Editor** icon on the tool bar of the Navigator view. You might also want to select the **Link with Editor** icon on the tool bar of the Project Explorer view.

Setting up the Stage 2 VAGen migration file

The tool that performs Stage 2 of the migration can be invoked through a wizard. To prepare for Stage 2, create a project where you can optionally save Stage 2 preferences for later use. To create the Stage 2 migration preferences, do the following:

1. Start the EGL development environment. Be sure to set your workbench preferences as explained in section "Setting your workbench preferences" on page 155.
2. The Stage 2 wizard asks you for your database driver location. You can set a classpath variable to hold this value so that the wizard will pick it up automatically. The easiest way to do this is as follows:
   a. Under **Window->Preferences**, select **Java->Build Path->Classpath Variables**.
   b. Click the **New** button.
   c. For **Name**, enter the following: **DB2_DRIVER_PATH**
   d. For **Path**, click the **File** button and navigate to your db2java.zip file. (This is the same db2java.zip file that you used in Stage 1. By default the file is in \SQLLIB\java\db2java.zip.)
   e. Click **OK** in the New Variable Entry window, then click **OK** in the Preferences window.

3. Create a simple project that can contain your Stage 2 preferences file if you choose to save it. This is useful if you want to run Stage 2 in batch mode. Start the wizard for this by selecting **File->New->Project**. Expand **Simple**, select **Project**, and then select **Next**.
4. Give the project a name. For example, VAGENMIG. Then click **Finish**.
5. In the Project Explorer view, a simple project is listed under the Other Projects folder. In the Navigator view, a simple project is listed alphabetically with all the other projects.
6. Right click on your project and then select **New->Other** from the context menu.
7. Expand **VAGen Migration to EGL** and then select **VAGen Migration File**. Click **Next**.
8. Enter the appropriate Stage 2 preferences:
   a. On the first page of the wizard, edit the preferences as described in the following table. The migration tool does not validate any of the Database Information fields until you tab out of the field. This prevents multiple attempts to connect to the database while you are entering information.

Table 61. Preferences to enter on first page of wizard

Preference	Meaning	Value
Load Existing File	This allows you to select a previously saved Stage 2 preferences file. Click the **Choose File** button to select an existing .vgmig file. Click the **Load File** button to retrieve the preferences from that file and display them in the wizard.	Optionally, choose and load an existing .vgmig file.
Database driver location	This is the location of your DB2 driver.	*path_to_db2java.zip*\db2java.zip
Database driver	This is the name of your DB2 driver.	This value must always be COM.ibm.db2.jdbc.**app**.DB2Driver. This value works for both a local database or a remote database that is cataloged locally.
Database name	This is the name of the DB2 database you used in Stage 1 of migration.	This value should be in the following format: • jdbc:DB2:*databaseName* *databaseName* is the name of the DB2 database you used in Stage 1 of migration. VGMIG is the default value for Stage 1.
Database schema	This is the name of the DB2 database schema you used in Stage 1 of migration.	This value is the name of the DB2 schema you used in Stage 1 of migration. MIGSCHEMA is the default value for Stage 1.
Database user ID	This is the database user ID you used in Stage 1 of migration.	Use the same database user ID that you used for Stage 1. (The default value is your logon ID.)
Database password	This is the database password you used in Stage 1 of migration.	Use the same database password that you used for Stage 1. (The default value is your logon password.)
Log file location	This is the location where a log file will be written.	Enter a valid location (drive and directory) in the file system.
Log file name	This is the name of the log file where you want the Stage 2 messages to be written.	Enter a valid file name.

   b. On the second page of the wizard, edit the preferences as described in the following table:

Table 62. Preferences to enter on second page of wizard

Preference	Meaning	Value
Java or COBOL radio button	This choice determines whether the migration tool creates projects that include Java Source folders.	If you are using Rational Web Developer or Rational Application Developer, you should always select the Java radio button. For other products, you can select COBOL if you only plan to generate COBOL.
Migrate remaining VAGen parts	This determines whether or not parts that are not referenced by any generatable part in the migration set will be converted to EGL. **Note:** For the purposes of the *Migrate remaining VAGen parts* preference, UI records are treated like other records. This preference does not consider UI records to be generatable parts.	Select the box to convert unreferenced parts to EGL. Generally, you should select Migrate remaining parts. If you do not select Migrate remaining parts, control parts and any other parts that are unused within the migration set will not be migrated to EGL source.
Import into workspace	This determines whether or not Stage 3 (importing EGL into files in the current workspace) will be automatically started after Stage 2 is complete. **Note:** If you select this box, you must select one of the radio buttons under this checkbox to specify the version to import (latest or oldest – see description below), because only one version of a project can be in the workspace at a time.	Select this box to import EGL files directly after the conversion of parts to EGL. Leave this box unselected to import files later, during Stage 3. **Note:** • If you select this option, there is no need to run Stage 3 separately. The migration tool automatically starts Stage 3 (import) directly after Stage 2 (conversion) and completes the migration process.
Latest version	This specifies that the latest version of the desired migration sets should be imported.	This option can only be selected if the *Import into workspace* checkbox is selected.
Oldest version	This specifies that the oldest version of the desired migration sets should be imported.	This option can only be selected if the *Import into workspace* checkbox is selected.
Override existing files	Stage 3 (the import process) uses EGL produced by Stage 2 to create and import the EGL files specified in the Stage 1 report. If EGL files with the same names as the EGL files that Stage 3 is about to import already exist in the workspace, this option determines whether or not those files will be overwritten.	This option can only be selected if the *Import into workspace* checkbox is selected. *Override existing files* enables you to specify how you want the Stage 3 migration tool to handle the situation in which the migration set you are currently migrating contains parts that should be placed in a file that is already in your workspace. If you select *Override existing files*, the Stage 3 migration tool replaces the existing file and includes **only** those parts that are in the **current** migration set. If you do not select *Override existing files*, the Stage 3 migration tool merges any new parts into the existing file. The new parts are placed alphabetically by part type. See "Overwriting and merging files" on page 44 for a more complete discussion of the effects of this option.

Table 62. Preferences to enter on second page of wizard (continued)

Preference	Meaning	Value
Save migrated files to temporary directory	This provides the option to save EGL files to a location in the file system. This allows you to access EGL files for multiple versions of a project at the same time (whereas you can only see one version at a time in the workspace). You can move EGL files directly from here to your repository.	If you plan to migrate multiple versions of a migration set, then do the following: • Select this box so that each version can be written to a different subdirectory. • Specify the *Folder* under which the subdirectories for the versions will be placed. • Do not select *Migrate now*. Migration to a temporary directory should only be done in batch mode because of the resource requirements. If you do select *Migrate now*, the migration tool asks you to confirm that you really want to run in online mode. • Select *Save current configuration to file*. You must also specify the project and file name where the current configuration is to be saved as a .vgmig file. The .vgmig file is required if you select *Save migrated files to temporary directory* regardless of whether you migrate in online or batch mode. If you run Stage 2 in batch mode, point to the saved .vgmig file to specify your migration preferences.
Folder	This is the directory in which you want to save EGL files. Each migration set version becomes a subdirectory under the directory you specify for Folder.	Specify an existing directory in your file system.
Migrate now	This specifies that you want Stage 2 to run at this time, rather than just setting up the preferences file to migrate at a later time.	You must select either *Migrate now* to run Stage 2 in online mode or *Save current configuration to file* to save your preferences so that you can run Stage 2 in batch mode at a later time. You can select both options if you want to retain a copy of your preferences for later reference. Do not select *Migrate now* if you have already selected *Save migrated files to temporary directory*. Saving to a temporary directory can only be done in batch mode. Selecting *Migrate now* indicates that you want to migrate in online mode.
Save current configuration to file	This enables you to save the preferences you are specifying to a file. You can later run Stage 2 in one of the following ways: • In online mode, right click the saved .vgmig file and select **Start Migration** from the context menu. • In batch mode, use the -importFile option to specify the saved .vgmig file. For details, see "Running Stage 2 in batch mode" on page 167.	You must select either *Migrate now* to run Stage 2 in online mode or *Save current configuration to file* to save your preferences so that you can run Stage 2 at a later time. You can select both options if you want to retain a copy of your preferences for later reference. If you select this option you must also specify the Path and File Name where the current configuration is to be saved as a .vgmig file. When you run Stage 2 later, point to the saved .vgmig file to specify your migration preferences.
Path	This specifies the project into which the file should be saved.	*projectName*, where projectName is the name of the project that you want to contain your saved file.
File Name	This specifies the name of the file to which preferences will be saved.	*fileName*, where fileName is the desired name for your file WITHOUT a file extension. The extension *.vgmig* is automatically appended.

c. On the third page of the wizard, the wizard lists the migration sets in the database you specified. Select the migration sets you want to migrate. If you do not select any migration sets, then the migration tool migrates all the migration sets in the database. Click **Finish**.

The combinations of the check boxes that you select determine the actions that are performed by the wizard:

- If you select *Save current configuration to file*, all the options are saved in the file you specified after you click the Finish button.
- If you select *Migrate now*, Stage 2 migration runs after you click the Finish button.
- If you also select either *Import into workspace* and/or *Save migrated files to temporary directory*, Stage 3 will start automatically after Stage 2 completes.

Here is an example of a Stage 2 preferences file, stage2.vgmig:

```
databaseDriverLocation=d:\SQLLIB\java\java\db2java.zip
databaseDriver=COM.ibm.db2.jdbc.app.DB2Driver
databaseName=jdbc:DB2:VGMIG
databaseSchema=MIGSCHEMA
databaseUserid=myuserID
databasePassword=encoded:AAEDAwQFBwYKCwo+Pw==
configurationPlan=MyMigrationSetA,1.1
migrateRemainingParts=yes
workspaceImport=latest
overrideExistingFiles=yes
tempDirectory=
logFileLocation=D:\tempmig\MyMigrationSetA\stage2\MyMigrationSetA.log
migrateNow=yes
projectType=COBOL
```

Running Stage 2

The Stage 2 migration tool can be run in batch mode or from the user interface in the EGL development environment.

Running Stage 2 from the user interface

The wizard described in "Setting up the Stage 2 VAGen migration file" on page 162 provides the option to save your preferences in a .vgmig file. If you select the *Migrate now* box in the wizard, then Stage 2 migration starts when you click the Finish button in the wizard. If you did not select the *Migrate now* box in the wizard, when you are ready to run Stage 2 migration using your saved .vgmig file, do the following:

1. From the Navigator view, expand the project containing the Stage 2 preferences file by right-clicking on the **+** symbol next to the project name.
2. Right click on the .vgmig preferences file to get the context menu.
3. Click on **Start Migration**.

Stage 2 migration starts and converts the External Source Format for your specified migration sets to EGL source and stores the EGL source in the migration database. If you selected either *Import into workspace* or *Save migrated files to temporary directory*, Stage 3 automatically starts after Stage 2 completes. After Stage 3, the migration tool automatically starts a refresh of the workspace. The refresh step can take some time, particularly if there is a large number of parts. When the refresh step is complete, a pop-up window appears telling you that migration is complete. Be sure to wait for the pop-up window.

When migration and the refresh step are complete, the following outputs are available:

- The Stage 2 migration log file. The log file is in the directory you specified as the Log file location. The log file contains information about what parts were migrated and any informational, warning, or error messages that occurred during Stage 2 migration.
- The ″to do″ list log file for the migration set. This ″to do″ list file is created at the beginning of Stage 3 and contains a consolidated list of the messages produced by Stage 2 that might require you to perform additional tasks to complete the migration. The ″to do″ list is somewhat similar to the VisualAge Generator generation messages in that the messages for each generatable part and its associates are listed as a group. If a part has messages and is an associate of several programs, the messages are listed once for each program. The ″to do″ list differs from the VisualAge Generator generation messages in that messages for unused, nongeneratable parts are listed by project, package, and file name at the end of the ″to do″ list. The ″to do″ list is placed in the same directory as the Stage 2 migration log file.
- If you selected *Import into workspace*, then Stage 3 automatically starts and creates the EGL projects, source folders, packages, and EGL files that are needed for your migration set. The Stage 3 tool also imports the projects into your workspace and rebuilds the projects so that EGL validation is run.
- If you selected *Save migrated files to temporary directory*, Stage 3 automatically starts and creates the EGL projects, source folders, packages, and EGL files that are needed for your migration set. The Stage 3 tool places these projects in the temporary directory you specified. The Stage 3 migration tool appends the VAGen version name to the project name when creating the projects in the temporary directory. This enables you to migrate multiple versions of a project at one time for later import into your workspace.

Running Stage 2 in batch mode

The Stage 2 wizard enables you to select one or more migration sets for immediate migration. It also enables you to save the information in a file for later migration in batch mode. To create a file for later migration, do the following:

1. Follow the steps described in “Setting up the Stage 2 VAGen migration file” on page 162, except do the following:
   - Select *Save current configuration to file* and specify the path and file name. The file that is created automatically has the suffix *.vgmig* and is the file that you need to specify as the *-importFile* when you run Stage 2 or Stage 3 in batch mode.
   - Be sure to deselect *Migrate now*. Deselecting this option indicates that you want to save the information for migration at a later time.
   - You can define multiple .vgmig files for later migration as a single batch.
2. Create a file with a .bat file extension.

   For Windows environments, the contents of the .bat file should be the following:

```
set path=InstallDirectory\eclipse\jre\bin;%path%
set classpath=InstallDirectory\eclipse\startup.jar;
  InstallDirectory\egl\eclipse\plugins\
  com.ibm.etools.egl.vagenmigration_version\runtime\eglMigration.jar;
cd InstallDirectory
java com.ibm.etools.egl.internal.vagenmigration.batch.VGMIG
     -importFile Path\vgmigFileName.vgmig
     -data Path\workspace
     >Path\LogName.log
```

Note:

- The following statements must be written so that the statement is all on one line:
  - For Windows environments, the **set classpath** statement.
  - The **java** statement.
- Repeat the **java** statement once for each .vgmig file that you want to migrate in batch mode. However, if you selected *Import into workspace* when you created any of your .vgmig files, then be sure that none of the .vgmig files result in the same EGL project names. **If you attempt to migrate multiple .vgmig files for the same EGL project in the same .bat file, the EGL project will only reflect the last of the .vgmig files to be migrated.**
- *InstallDirectory* is the drive and directory in which you installed the Rational Developer product. You must include the *InstallDirectory* for the path statement, the classpath statement, and the cd (change directory) statement.

  Note: If you installed and kept a previous version of the developer product before installing the product that you are using now, the installation directory of interest may be the directory that was used in the earlier install.
- *version* is the plugin version number (for example, 6.0.1 or 6.0.1.103). In general, you should use the highest version number you see for the com.ibm.etools.egl.vagenmigration_*version* plugin.
- *Path**vgmigFileName.vgmig* refers to the drive, directory, and file name of the .vgmig file that specifies the migration sets you want to migrate from the migration database. The directory must include the workspace name. This is the .vgmig file you saved in step 1. (For example, d:\myworkspace\mySimpleProject\ myMigrationInformation.vgmig.)
- *Path**workspace* is the drive, directory, and workspace name where you want to place the EGL files. (For example, the workspace could be d:\myworkspace.) Any EGL projects and packages that are used by the migration sets are created automatically by the migration tool. The *-data* parameter is optional; -data is only required if you need to specify VAGen Migration Preferences other than the default values. If you want to set any VAGen Migration Preferences, you must specify them in the workspace specified by the -data parameter before you run the .bat file. See "VAGen Migration Preferences" on page 157 for information about how to set your preferences.
- *Path**LogName.log* points to the drive, directory, and file name of the log file you want to create for the java command. This log file lists any problems with the java command itself. Any log messages produced by Stage 2 or Stage 3 are placed in the log file that you specified on the first page of the wizard and then saved into the .vgmig file. If you include multiple java commands in the same .bat file, be sure to specify a different log file name for each java command.

For Windows environments, an example of the java command might look something like this (though it should be all on one line) :

```
java com.ibm.etools.egl.internal.vagenmigration.batch.VGMIG
  -importFile d:\myworkspace\mySimpleProject\myMigrationInformation.vgmig
  -data d:\myworkspace\
  >d:\migrationLogs\myMigrationInformationPiped.log
```

3. Shut down the EGL development environment.

4. Open a Command Prompt window, navigate to the directory containing your .bat file, and run your .bat file.

   Note: You can safely ignore the following message: *PolicyClassLoader could not find policy com.ibm.jxesupport.JxeClassLoaderPolicy*.

5. When the process completes, your EGL project, source folders, packages, and files will be stored in the directories you specified for them respectively. The log file corresponding to each java command contains a list of the migrated parts and any error messages. The messages are the same messages that are written to the log file if you run Stage 2 using the user interface. Similarly, the ″to do″ list file contains the same messages that are written to this file if you run Stage 2 using the user interface.
6. Start the EGL development environment.
7. You should see the EGL projects, source folders, packages, and files in your workspace.

Chapter 7. Stage 3 — Import

Stage 3 of the migration is also run with a plug-in supplied with EGL. In this stage, you run another migration tool that builds EGL files from the EGL syntax that was stored in the migration database during Stage 2.

Running the Stage 3 tool

From the EGL development environment, in the Workbench window, do the following:

1. From the File menu, select **Import**.
2. Select **VAGen Migration from Database** and click **Next**.
3. Specify your preferences for this stage of migration:
   a. On the first page of the wizard, edit the preferences as described in the following table. The migration tool does not validate any of the Database Information fields until you tab out of the field. This prevents multiple attempts to connect to the database while you are entering information.

Table 63. Preferences to enter on first page of wizard

Preference	Meaning	Value
Load Existing File	This allows you to select a previously saved Stage 3 preferences file. Click the **Choose File** button to select an existing .vgmig file. Click the **Load File** button to retrieve the preferences from that file and display them in the wizard.	Optionally, choose and load an existing .vgmig file.
Database driver location	This is the location of your DB2 driver.	*path_to_db2java.zip*\db2java.zip
Database driver	This is the name of your DB2 driver.	This value must always be COM.ibm.db2.jdbc.**app**.DB2Driver. This value works for both a local database or a remote database that is cataloged locally.
Database name	This is the name of the DB2 database you used in Stage 1 of migration.	This value should be in the following format: • jdbc:DB2:*databaseName* *databaseName* is the name of the DB2 database you used in Stage 1. VGMIG is the default value for Stage 1.
Database schema	This is the name of the DB2 database schema you used in Stage 1 of migration.	This value is the name of the DB2 schema you used in Stage 1. MIGSCHEMA is the default value for Stage 1.
Database user ID	This is the database user ID you used in Stage 1 of migration.	Use the same database user ID that you used for Stage 1. (The default value is your logon ID.)
Database password	This is the database password you used in Stage 1 of migration.	Use the same database password that you used for Stage 1. (The default value is your logon password.)
Log file location	This is the location where a log file will be written.	Enter a valid location (drive and directory) in the file system.

Table 63. Preferences to enter on first page of wizard (continued)

Preference	Meaning	Value
Log file name	This is the name of the log file where you want the Stage 3 messages to be written.	Enter a valid file name.

b. On the second page of the wizard, edit the preferences as described in the following table:

Table 64. Preferences to enter on second page of wizard

Preference	Meaning	Value
Java or COBOL radio button	This choice determines whether the migration tool creates projects that include Java Source folders.	If you are using Rational Web Developer or Rational Application Developer, you should always select the Java radio button. For other products, you can select COBOL if you only plan to generate COBOL.
Latest version	This specifies that the latest version of the desired migration sets should be imported.	Select one of the radio buttons.
Oldest version	This specifies that the oldest version of the desired migration sets should be imported.	Select one of the radio buttons.
Override existing files	Stage 3 (the import process) uses EGL produced by Stage 2 to create and import the EGL files specified in the Stage 1 report. If EGL files with the same names as the EGL files that Stage 3 is about to import already exist in the workspace, this option determines whether or not those files will be overwritten.	*Override existing files* enables you to specify how you want the Stage 3 migration tool to handle the situation in which the migration set you are currently migrating contains parts that should be placed in a file that is already in your workspace. If you select *Override existing files*, the Stage 3 migration tool replaces the existing file and includes **only** those parts that are in the **current** migration set. If you do not select *Override existing files*, the Stage 3 migration tool merges any new parts into the existing file. The new parts are placed alphabetically by part type. See "Overwriting and merging files" on page 44 for a more complete discussion of the effects of this option.

Table 64. Preferences to enter on second page of wizard (continued)

Preference	Meaning	Value
Save migrated files to temporary directory	This provides the option to save EGL files to a location in the file system. This allows you to access EGL files for multiple versions of a project at the same time. (You can only see one version at a time in the workspace). You can move EGL files directly from here to your repository.	If you plan to migrate multiple versions of a migration set, then do the following: • Select this box so that each version can be written to a different subdirectory. • Specify the *Folder* under which the subdirectories for the versions will be placed. • Do not select *Migrate now*. Migration to a temporary directory should only be done in batch mode because of the resource requirements. If you do select *Migrate now*, the migration tool asks you to confirm that you really want to run in online mode. • Select *Save current configuration to file*. You must also specify the project and file name where the current configuration is to be saved as a .vgmig file. The .vgmig file is required if you select *Save migrated files to temporary directory* regardless of whether you migrate in online or batch mode. If you run Stage 3 in batch mode, point to the saved .vgmig file to specify your migration preferences.
Folder	This is the directory in which you want to save the EGL files. Each migration set version becomes a subdirectory under the directory you specify for Folder.	Specify an existing directory in your file system.
Migrate now	This specifies that you want Stage 3 to run at this time, rather than just setting up the preferences file to migrate at a later time.	You must select either *Migrate now* to run Stage 3 in online mode or *Save current configuration to file* to save your preferences so that you can run Stage 3 in batch mode at a later time. You can select both options if you want to retain a copy of your preferences for later reference. Do not select *Migrate now* if you have already selected *Save migrated files to temporary directory*. Saving to a temporary directory can only be done in batch mode. Selecting *Migrate now* indicates that you want to migrate in online mode.
Save current configuration to file	This enables you to save the preferences you are specifying to a file. You can later run Stage 3 in one of the following ways: • In online mode, right click the saved .vgmig file and select **Start Migration** from the context menu. • In batch mode, use the -importFile option to specify the saved .vgmig file. For details, see "Running Stage 2 in batch mode" on page 167.	You must select either *Migrate now* to run Stage 3 in online mode or *Save current configuration to file* to save your preferences so that you can run Stage 3 at a later time. You can select both options if you want to retain a copy of your preferences for later reference. If you select this option, you must also specify the Path and File Name where the current configuration is to be saved as a .vgmig file. When you run Stage 3 later, point to the saved .vgmig file to specify your migration preferences.
Path	Specifies the project into which the file should be saved.	*projectName*, where *projectName* is the name of the project that you want to contain your saved file.
File Name	This specifies the name of the file to which preferences will be saved.	*fileName*, where *fileName* is the desired name for your file WITHOUT a file extension. The extension *.vgmig* is automatically appended.

c. On the third page of the wizard, select the migration sets to import.

   Note: The VAGen Migration Import from Database wizard only lists migration sets that have been migrated to EGL. This ensures that you run Stage 2 to convert the migration set to EGL source and store the EGL into the migration database before you run Stage 3.

4. Click **Finish**.
5. The migration tool creates the EGL projects, EGL source folder, and EGL packages based on the migration set you selected. The tool extracts the EGL source from the migration database and creates the EGL files based on the migration set. The migration tool also includes import statements and updates the project's EGL build path so that the part references can be resolved.

Running Stage 3 in batch mode

The only difference between running Stage 2 and Stage 3 in batch mode is the wizard that you use to create the .vgmig file. See "Running the Stage 3 tool" on page 171 for details on setting up the .vgmig file to run just Stage 3. See "Running Stage 2 in batch mode" on page 167 for details of the commands to include in your .bat file and descriptions of the options you can specify for batch mode.

Using the migration sets written to temporary directories

If you direct the output of stage 3 to a temporary directory, the migration tool creates one subdirectory for each migration set version. The subdirectory name is of the form *migrationSetName_versionName*.

There are two techniques you can use to bring the projects into a workspace:

- **Technique 1** is convenient if you only have a few projects in the subdirectory; however, it does not support EGL Web projects (VAGen Web Transactions or UI records). In this technique, you can point an existing workspace to each of the projects. This technique does not copy the projects into your workspace; it merely makes the projects available to your workspace. When you modify or delete files in the projects, the change is made on the file system in the directory to which the workspace points.
  1. From an existing workspace, select **Window -> Preferences -> Workbench** and deselect **Build automatically**. This avoids multiple rebuilds while you are bringing in each of the projects.
  2. From the context menu of the Navigator or Project Explorer view, select **Import -> Existing Project Into Workspace**.
  3. Select the Browse button for the **Project contents** and point to the first project. Select **Finish**.
  4. Repeat steps 2 and 3 for each of the projects within the subdirectory for the migration set.
  5. Select **Project -> Build All** to rebuild the workspace with the new projects.
- **Technique 2** is convenient if there are a number of projects in the subdirectory; it is required if you use EGL Web projects. In this technique, you bring up a workspace for the subdirectory as follows:
  1. Start the EGL development environment.
  2. When you are prompted for the workspace name, point to the subdirectory containing a migration set version and then select **OK**.
  3. Modify your workbench preferences to do the following:

- Turn on the Workbench Capabilities for EGL Development and VisualAge Generation to EGL Migration.
- Ensure that the EGL preference is set for VisualAge Generator Compatibility mode.
- Set any other preferences that you normally set for a new workspace.

4. If you have errors in the Problems view indicating that projects could not be built, use the Navigator view to locate any closed projects. Closed projects do not have the plus (+) symbol to the left of the project name. Select the closed projects by selecting **Open Project** from the context menu. The projects should now be visible on the Project Navigator view.

Chapter 8. Running migration in single file mode

An alternative to running migration using Stages 1 – 3 is running migration in Single File Mode. This process allows you to migrate one External Source Format file directly to an EGL file. To run migration in this mode, you must first export VisualAge Generator parts to an External Source Format file, and then import that External Source Format file into EGL. During the import process, the External Source Format file is migrated into one or more EGL files, depending on your preferences.

To export parts from VisualAge Generator, do the following:

1. Start VisualAge Generator on Java (or VisualAge Generator on Smalltalk) and open the VAGen Parts Browser.
2. Select the parts you want to export and right-click the selection.
3. From the context menu, select **Import/Export —> VAGen Export** (or **VAGen Export with Associates**).
4. Type a name for the External Source Format file in the box and click the **Save** button. (If you type the name of an existing file, you will be asked if you would like to add parts to the file or overwrite it. Choose whichever is appropriate for you.)

To prepare for single file mode, do the following:

1. Start the EGL development environment and point to your workspace. (For example, d:\workspaces\myworkspace)
2. Set your migration preferences. See "VAGen Migration Preferences" on page 157 for information on how to do this.
3. From the Workbench window, select **Window -> Preferences -> VAGen Migration**. In general, you should always ensure that the **Separate parts into EGL files** preference is selected. When you select this preference, each program, map group, table, and UI record is placed in its own file. This adheres to the EGL requirement of one generatable part per file. If you do not select **Separate parts into EGL files**, all the parts except UI records are placed in the same EGL file. See "Overview of Single File Migration" on page 24 for specifics of the parts placement algorithm for single file mode.
4. Create a new EGL project. (For example, MyProject.) Alternatively, you should create an EGL Web project if you are planning to migrate VAGen Web transactions or develop new EGL PageHandlers.
5. Under the EGLSource directory for the EGL project, create a new EGL package. (For example, my.pkg)
6. See the section "Running single file migration using the user interface" on page 177 for details on running in online mode or "Running single file migration using batch mode" on page 179 for details about creating a batch command file to process multiple External Source Format files with a single command file.

Running single file migration using the user interface

To import the External Source Format file into EGL, do the following:

1. From the Project Explorer or Navigator view, select the EGL package in which to put the resulting EGL file.
2. Right-click the package. From the context menu, select **Import**.

3. Select **VAGen External Source Format File** and select **Next**.
4. In the **Input file name** field, enter the name of the External Source Format file you want to import.
5. In the **Source folder** field, enter the name of the project and source folder in which to put the EGL file. (For example, MyProject\EGLSource)
6. In the **Package name** field, enter the name of the package in which to put the EGL file. The migration tool also uses the package name you specify for the package statement within the EGL file. (For example, my.pkg)
7. In the **EGL file name** field, enter the name of the EGL file that will be created from your External Source Format file. By default, the EGL file name will be the same as the External Source Format file, but with the .egl file extension. See "Overview of Single File Migration" on page 24 for information about how the migration tool uses the *Separate parts into EGL files* preference and the type of parts in the External Source Format file to determine what files to create during migration in single file mode.
8. In the **Log file location** field, enter the drive and directory where the migration log file is to be placed. In the **Log file name** field, enter the name for the migration log file. The Log file name defaults to match the name of the External Source Format file that you specified. The migration log file contains any messages written during migration.
9. Click **Finish**. If the file name you specified in the EGL file name field already exists in the container you specified in the Container field, you are prompted to append or overwrite to the file. Based on your response to the overwrite prompt, the migration tool does the following:
   - If you specify that you do not want to overwrite the existing targetFile, then any data items, functions, PSBs, and non-VGUI records in the second import are added to the targetFile. All the common parts in the second import result in duplicate parts within the targetFile.
   - If you specify that you want to overwrite the existing targetFile, then any data items, functions, PSBs, and non-VGUI records in the second import completely replace the targetFile. This results in the loss of any parts included in the first import, but not included in the second import.
   - If you selected the Migration Preference to *Separate parts into EGL files*, the migration tool overwrites the files created for programs, formGroups, and dataTables. If you did not select the preference, then these parts are placed in the targetFile and added or overwritten based on your response to the overwrite prompt.
   - The migration tool always overwrites the files for VGUI records and .eglbld files.
10. When the migration completes, you should notice the following:
    - One or more EGL files should be listed in the project, source folder, and package that you specified. See "Overview of Single File Migration" on page 24 for information about how migration tool uses the *Separate parts into EGL files* preference and the type of parts in the External Source Format file to determine what files to create during migration in single file mode.
    - Any error messages appear in a pop-up window. If you did not specify a Log file location, you can use the **Save to File** button to save the messages in a file. Be sure to close the pop-up window.
11. Select the project and then select **Project —> Build Project**. This causes validation to run so that the Problems view reflects the most current messages for all files in the project.

Running single file migration using batch mode

The user interface enables you to migrate one External Source Format file at a time. With batch mode, you can migrate multiple External Source Format files in a single command file. To use batch mode do the following:

1. Create a file with a .bat file extension. For Windows environments, the contents of the .bat file should be:

```
set path=InstallDirectory\eclipse\jre\bin;%path%
set classpath=InstallDirectory\eclipse\startup.jar;
        InstallDirectory\egl\eclipse\plugins\
        com.ibm.etools.egl.vagenmigration_version\runtime\eglMigration.jar;
cd InstallDirectory
java com.ibm.etools.egl.internal.vagenmigration.batch.VGMIG
    -importFile Path\ExternalSourceFormatFile.esf
    -eglFile Path\EGLFile.egl
    -data Path\workspace
    -package packageName
    -overwrite
    >Path\LogName.log
```

   Note:

   - The following statements must be written so that the statement is all on one line:
     - For Windows environments, the **set classpath** statement.
     - The **java** statement.
   - Repeat the **java** statement once for each External Source Format file you want to migrate.
   - *InstallDirectory* is the drive and directory in which you installed the Rational Developer product. You must include the *InstallDirectory* for the path statement, the classpath statement, and the cd (change directory) statement.

     Note: If you installed and kept a previous version of the developer product before installing the product that you are using now, the installation directory of interest may be the directory that was used in the earlier install.
   - *version* is the plugin version number (for example, 6.0.1 or 6.0.1.103). In general, you should use the highest version number you see for the com.ibm.etools.egl.vagenmigration_*version* plugin.
   - *Path\ExternalSourceFormatFile.esf* refers to the drive, directory, and file name of the External Source Format file you want to migrate. (For example, d:\temp\VAGenFiles\PROG1.esf.)
   - *Path\EGLFile.egl* refers to the drive, directory, and file name of the EGL file you want to create. The directory must include the workspace, EGL source folder, and package where you want to place the EGL source file. (For example, d:\myworkspace\MyProject\EGLSource\my\pkg\prog1.egl.) *EGLFile.egl* is used in the same way as the EGL file name field you specify when you use the Import VAGen External Source Format File wizard. See “Overview of Single File Migration” on page 24 for information about how migration tool uses the *Separate parts into EGL files* preference and the type of parts in the External Source Format file to determine what files to create during migration in single file mode.
   - *Path\workspace* is the drive and directory for your workspace. (For example, d:\workspaces\myworkspace) If you do not specify the *-data*

option, anything you specified in the VAGen Migration Preferences is ignored and the migration tool uses the default VAGen Migration Preferences. If you want to specify VAGen Migration Preferences, you must specify the *-data* option and point to the workspace in which you set the preferences.

- *packageName* is the name of the package with which you want to associate the EGL file. (For example, my.pkg.) The package name is also used in the package statement of the .egl files that the migration tool creates.
- The *-overwrite* parameter is optional. This parameter tells the migration tool whether or not to overwrite an existing EGL file in the specified directory with the specified name.
- *Path\LogName* refers to the location and file name of the log file you want to create for the migration of the corresponding External Source Format file. Sending your migration messages to a log file is also optional, but it is highly recommended. If you include multiple Java commands in the same .bat file, be sure to specify a different log file name for each Java command.

For Windows environments, an example of the java command might look something like this (though it should be all on **one** line):

```
java com.ibm.etools.egl.internal.vagenmigration.batch.VGMIG
   -importFile d:\temp\VAGenFiles\prog1.esf
   -eglFile d:\workspaces\myworkspace\MyEGLProject\EGLSource\my\pkg\prog1.egl
   -data d:\workspaces\myworkspace
   -package my.pkg -overwrite >d:\temp\EGLLogs\prog1.log
```

2. Shut down the EGL development environment.
3. Open a command prompt window, navigate to the directory containing your .bat file, and run your .bat file.

   Note: You can safely ignore the following message: *PolicyClassLoader could not find policy com.ibm.jxesupport.JxeClassLoaderPolicy*.
4. When the process completes, your EGL files and log files will be stored in the directories you specified for them, respectively. The log file contains a list of the migrated parts and any error messages. The messages are the same messages that are listed in the pop-up window when you use the Import Wizard in online mode.
5. Start the EGL development environment.
6. Select the project into which you imported External Source Format files, then right-click and select **Refresh**. This refreshes the project from the file system so that the EGL files that were created, appended, or overwritten during migration in batch mode are recognized by EGL. This in turn causes validation to run so that the Problems view reflects the most current messages for all files in the project. Then you can expand the package you created to see your EGL files.

Part 5. Completing the migration

Chapter 9. Completing your migration

After you have migrated your source code using Stages 1 – 3 migration or single file migration, there are some additional tasks you should do. This includes the following:

- Set the Build Order preference
- Export your preferences.
- Save a baseline for the EGL projects and packages in your source code repository.
- Preliminary steps for completing single file migration.
- Review your EGL source code.
- Review your EGL build descriptor parts.
- Review your EGL linkage option parts.
- Review your EGL resource associations parts.
- Establish a bind control part to use as a template
- Establish program-specific a bind control parts
- Review your linkedit commands
- Review your VGWebTransactions
- Prepare for debugging.
- Generate and test with COBOL generation.
- Generate and test with Java generation.
- Review your standards
- Consider whether to eliminate the use of VisualAge Generator Compatibility mode

Setting the Build Order preference

When EGL builds the workspace, it builds the projects based on the **Build Order** preference. The default for this preference might not provide the best performance. In general you want the projects that are referenced the most frequently (such as common projects) to be built first. This ensures that when files in other projects import packages, the location of the common parts is already known. To change the **Build Order** preference, do the following:

1. Select **Window** > **Preferences**.
2. Select **Build Order**.
3. Deselect *Use default build order*.
4. Select projects in the **Project build order** list and use the **Up** and **Down** buttons to modify the build order.
5. After making all the changes, select **Apply** and then select **OK**.

Exporting your preferences

After you have worked with EGL during your pilot project, you might have set additional preferences beyond those that are required or recommended in "Required EGL preferences" on page 156, "Recommended preferences" on page 156, "VAGen Migration Preferences" on page 157, and "Setting the Build Order preference." For example, you might have set other preferences related to your

source code repository and the library management process you have chosen. You can export your preferences to a file so that other developers can import the preferences to have as a starting base for their own preferences. The export technique is also an easy way to move preferences from one workspace to another. To export your preferences, do the following:

- Select **Window -> Preferences**.
- Select **Export** in the lower left corner of the Preferences window.
- Point to a file where you want to save your preferences.

Other developers can import your preferences into a workspace by doing the following:

- Select **Window -> Preferences**.
- Select the EGL capability as described in "Required EGL preferences" on page 156.
- Select **Window -> Preferences**.
- Select **Import** in the lower left corner of the Preferences window.
- Point to the file where you saved your preferences.

Note: This technique does not have any effect on the settings for perspectives and views. It only changes the preferences.

Saving a baseline for EGL projects and packages

Before you attempt to resolve any messages in the Problems view or modify any migrated EGL code, you might want to create a version of the EGL projects and packages in your source code repository. Storing and versioning the EGL projects and packages immediately after migration provides a baseline so that you know exactly what source code was produced by the migration tool. This baseline also provides a way of tracking any code changes you have to make by hand. This is especially useful during a pilot project as a way of capturing all the changes so that you can document the types of changes that were necessary. This documentation can serve as an aid in migrating additional subsystems.

Preliminary steps for completing single file migration

Single file migration does not do everything that Stage 1 – 3 migration does. You must do the following steps manually:

- Nest any forms within their corresponding formGroup. This is required if you migrate two formGroups to the same package and the two formGroups contain the same form name. (For example, MAP1).
- Resolve any duplicate parts within the same EGL package. This can occur if you migrate two programs with their associates to the same EGL package and the two programs share some common parts. You can split the common part definitions into a centralized common file or you can remove the duplicate parts from one of the files. If all the files are in the same package, you do not need to modify the EGL build path property or add import statements.
- Update the EGL build path property for the current project to list all the projects that the current project needs to reference to resolve any part names. To update the EGL build path, in the Project Navigator view, select the current project, right-click the selection, and then select **Properties**. On the EGL Build Path page, on the Projects tab, select the additional projects that the current project needs to reference. Be sure to include in the EGL build path any projects that contain packages that files in the current project need to import. For example, if FileA is

in ProjectB and FileA needs to import packageC, be sure to include the project where packageC is located in the EGL build path for ProjectB.

- Add any import statements to your EGL file to point to the common packages that your file needs to reference. The packages that you specify for the import statement must exist in projects that are specified for the EGL build path of the project in which the current EGL file is located. For example, if FileA is in ProjectB, then the import statements in FileA can only reference packages that are located in projects specified for the EGL build path of ProjectB.

Common steps for both Stage 1 — 3 and single file migration

Reviewing your EGL source code

You need to perform the following steps regardless of whether you used Stage 1 – 3 migration or single file migration:

- Review and resolve the errors in the migration log or the ″TODO″ list log. These errors reflect ambiguous situations that the migration tool was not able to resolve. Modify your EGL source code to resolve these errors. For example, if you used the VAGen RETR statement and did not explicitly specify a search column, then if the table was not available during migration, the EGL syntax includes EZE_UNKNOWN_SEARCH_COLUMN. You must update your EGL source code with the correct search column name based on the dataTable definition. See Appendix C, “Messages from the migration tools,” on page 357 for help in resolving messages in the migration log or the ″TODO″ list log. See Appendix D, “Messages in the Problems view,” on page 385 for help with resolving specific strings that the migration tool uses when it creates intentionally invalid EGL syntax.
- If you have program, dataTable, or formGroup names that are reserved words, you must change the part name. If you generate COBOL, you might want to set the *alias* property for the part to specify the original part name. That will help you avoid having to change any external references to the program, dataTable, or formGroup.
- Review and resolve any additional errors in the Problems view. See Appendix E, “IWN.xxx messages in the Problems view,” on page 391 for help in resolving common messages in the Problems view that are a result of the migration process.
- Determine if you need to set the *containerContextDependent* property for any records or functions. For more details, see “containerContextDependent Property” on page 36.

Reviewing your EGL build descriptor parts

The migration tool converts VAGen generation options parts to EGL build descriptor parts. However, some VAGen options have no EGL equivalent. In addition, EGL has several new build descriptor options that you might need to set. You might see errors in the Problems view due to either of these changes. See Appendix E, “IWN.xxx messages in the Problems view,” on page 391 for help in resolving common messages in the Problems view that are a result of the migration process. You might need a text editor to resolve some of the problems. You need to perform the following steps regardless of whether you used Stage 1 – 3 migration or single file migration:

- Review general build descriptor options.
- Review COBOL generation build descriptor options.
- Review Java generation build descriptor options.

- Establish a debug build descriptor part.

Reviewing general build descriptor options

You need to review the following build descriptor options regardless of whether you plan to generate COBOL or Java:

- If you generate COBOL for a national language in which the decimal point is the comma symbol, you must include the *decimalSymbol* build descriptor option. If you generate Java, you might want to include the decimalSymbol build descriptor option to improve runtime performance.
- If you use the VAGen EZESYS special function word to determine your runtime environment, you might want to set the EGL build descriptor option *eliminateSystemDependentCode*. Refer to the online helps for more information about this option.
- Refer to the online helps for information about master build descriptors. This technique is a replacement for the VAGen preference for the Default generation options part. The migration tool automatically splits any generation options part that contains the NOOVERRIDE attribute into two build descriptor parts. One of the build descriptor parts is named *xxxxx*, and the other is named *xxxxx_NOOVERRIDE*, where *xxxxx* is the original VAGen generation options part name. The part named xxxxx contains the EGL replacement for all the VAGen generation options that did not specify the NOOVERRIDE attribute. The part named xxxxx_NOOVERRIDE contains the EGL replacement for all the VAGen generation options that specified the NOOVERRIDE attribute. This split into two parts is required if you decide to use master build descriptors.
- If you used the VAGen /OPTIONS generation option to chain generation options parts, review how your EGL build descriptor parts chain using the *nextBuildDescriptor* option. You might need to modify this chaining to obtain the same set of build descriptor options that you had in VisualAge Generator.
- If you generate Web transaction parts for the COBOL environments, refer to the online helps for information about the secondaryTargetBuildDescriptor that is used for generating the Java parts associated with VGUI records. The migration tool automatically splits any generation options part into two build descriptor parts if the generation option part contains any of the following options: /javadestdir, /javadesthost, /javadestpassword, /javadestuserid, or /javasystem. One of the build descriptor parts is named *xxxxx*, and the other is named *xxxxx*_TARGET2, where *xxxxx* is the original VAGen generation options part name. The part named *xxxxx* contains the EGL replacement for all the VAGen generation options that are used when generating the EGL VGWebTransaction program for the primary (COBOL) runtime environment. The part named *xxxxx*_TARGET2 contains the EGL replacement for all the VAGen generation options that are used when generating the EGL VGUI record for the secondary (Java) runtime environment. The migration tool places the EGL equivalent for the following generation options in the secondary build descriptor part: /javadestdir, /javadesthost, /javadestpassword, /javadestuserid, and /javasystem. The migration tool places the EGL equivalent for the following options in both the primary and secondary build descriptor parts: /genout, /genresourcebundle, /msgtableprefix, /resourcebundlelocale, and /targnls. The migration tool includes the secondaryTargetBuildDescriptor option in the primary build descriptor part and sets the value for the option to the name of the secondary build descriptor part.
- If you generate Web transaction parts and use message tables, you might need to change the msgTablePrefix build descriptor option. The message table is specified by the program that uses a VGUI record. If the message table and the

VGUI record are in different packages, you must modify the secondary build descriptor part and include the package name (for example, msgTablePrefix = ″packageName.prefixID″).

- The migration tool does not create a default build descriptor for you when it creates the EGL non-Web projects. This enables you to specify one of your migrated build descriptor parts as the default build descriptor. You can establish a default build descriptor for a file, package, EGL source folder, project, or workbench levels. The default build descriptor that is closest to the generatable part is the one that is used. For example, you can specify a default build descriptor for just one file and specify a different default build descriptor for the workbench. In this situation, if you generate the program contained in the file, the default build descriptor for the file is used. When you generate any other program, then the workbench default build descriptor is used.
  - To set a preference for a particular file, package, EGL source folder, or project, select the resource (file, package, folder, or project), then right-click and select **Properties** from the context menu. Select *EGL Default Build Descriptor* in the left pane. Select the build descriptor that you want to use as the default for all generatable parts in this resource. Assuming there is no closer EGL default build descriptor, the *Target system build descriptor* is the default that will be used whenever you generate anything in this resource. The *Debug build descriptor* is the default that will be used when you use the debugging tool.
  - To set a workbench preference for a build descriptor part, select **Window -> Preferences -> EGL -> Default Build Descriptor**. This preference applies to all projects, packages, source folders, and files if you do not specifically override it. You can set both a *Target system build descriptor* to use for generation and a *Debug build descriptor* to use with the debugging tool.
- The migration tool creates a default build descriptor for you when it creates the first EGL Web project in a migration set. This ensures that the VGUI records can be generated into JSPs when the workspace is refreshed at the end of Stage 3. You can change the default build descriptor for the project, the EGL source folder, or any packages or files the project contains.
- If your control parts (build descriptor, linkage options, resource association, bind control, and linkedit parts) are not all in the same file, you must modify the current file to include import statements for the files that contain other build parts that you want to reference from the current file. For example, if buildDescriptorPartA references a linkageTableB that is in a different file, the file containing buildDescriptorPartA must include an import statement for the file that contains linkageTableB. Use the EGL Build Parts Editor to add the import statement.

Reviewing COBOL generation build descriptor options

If you plan to generate COBOL, you need to review or set the following build descriptor options:

- For VisualAge Generator, the outputs of COBOL generation are transferred to the host to run the preparation steps. EGL uses a build server to handle the preparation steps. For the EGL z/OS and iSeries build servers, there is a port number that must be specified for the destPort build descriptor option to transfer the outputs of generation. Contact the person who installed and configured the build server to determine the port number on which the remote build server is listening for build requests.
- If you do not use web transactions and do not plan to create EGL page handlers, you might want to set the EGL build descriptor option **genResourceBundle** to NO in your build descriptor parts that generate for COBOL runtime environments. This prevents the Java generation of your DataTables.

- If you generate COBOL for the z/OS environment, you must also do the following:
  - Establish a bind control part to use as a template. (See "Establishing a bind control part to use as a template" on page 190.)
  - Establish a program-specific bind control part. (See "Establishing a program-specific bind control part" on page 192.)
  - Review linkedit commands. (See "Reviewing linkedit commands" on page 193.)
- If you generate COBOL for the VSE environment, you must also do the following:
  - Review linkedit commands (see "Reviewing linkedit commands" on page 193).
  - Review the *VisualAge Generator EGL Plug-in for VSE Reference Manual*.

Reviewing Java generation build descriptor options

If you plan to generate Java, you need to review or set the following build descriptor options:

- Add the *genProject* build descriptor option to specify where the outputs of Java generation are to be placed. There is no VAGen generation option that migrates to the EGL *genProject* build descriptor option. The genProject option is required in the following cases:
  - If you generate for HP-UX or SOLARIS
  - If you generate VGWebTransactions or VGUI records or their associated parts such as dataTables. In this case, be sure that the genProject option specifies an EGL Web project.
- There are some EGL build descriptor options that have somewhat different behavior from their corresponding VAGen generation option. Refer to the online helps for information about the following build descriptor options to determine whether you need to set or modify them for your environment:
  - genProperties, which is set by the migration tool based on the VAGen /genproperties option.
  - enableJavaWrapperGen, which is set by the migration tool based on the VAGen /system=JAVAWRAPPER option.
- There are some new EGL build descriptor options that have no corresponding VAGen generation option. Refer to the online helps for information about the following build descriptor options to determine whether you need to set them for your environment:
  - dateMask
  - sessionBeanID
  - sqlJDBCDriverClass
  - sqlValidationConnectionURL
  - tempDirectory (for VGUI records only)

Establishing a debug build descriptor part

Create a build descriptor part that contains the build descriptor options that you want to use during debug. See the online helps for guidance on creating a debug build descriptor part.

Reviewing your EGL linkage option parts

The migration tool converts VAGen linkage table parts to EGL linkage options parts. However, some VAGen options have no EGL equivalent. In addition, EGL

has several new linkage options that you might need to set. You might see errors in the Problems view due to either of these changes. See Appendix E, "IWN.xxx messages in the Problems view," on page 391 for help in resolving common messages in the Problems view that are a result of the migration process. Also refer to the online helps for details about the linkage options that are supported for your environment. You need to perform the following steps regardless of whether you used Stage 1 – 3 migration or single file migration:

- Review and resolve the messages in the migration log and in the Problems view. You might need a text editor to resolve some of the problems.
- For callLink, consider the following:
  - Not all of the linktypes from VisualAge Generator are supported in EGL. For example, CSOCALL is no longer supported. The migration tool converts CSOCALL to a remoteCall. However, the attributes you must specify for an EGL remoteCall differ from those for CSOCALL.
  - Not all of the remoteComType values from VisualAge Generator are supported in EGL. For example, DCE, DCESECURE, and APPCIMS are no longer supported. The migration tool converts these unsupported values exactly as they are, which results in an invalid EGL linkage options part. This ensures that there is an error in the Problems view as a reminder that you must modify the linkage options part to specify the option you want to use with EGL.
  - If you change to use remoteComType=CICSECI, you must add the *ctgPort* and *ctgLocation* attributes. This does require the configuration and setup of a CICS Transaction Gateway Server for the invocation of remote CICS transactions.
  - If you change to use remoteComType=CICSSSL, you must add the *ctgKeyStore* and *ctgKeyStorePassword* attributes. In addition, if you have not already included the *ctgPort* and *ctgLocation* attributes in your VAGen linkage table, you must include them for the EGL remoteComType=CICSSSL.
  - If you decide to use CICSJ2C, you must add the pgmName, conversionTable, remotePgmType, luwControl, remoteBind, location, and parmForm attributes.
  - If you change to use remoteComType=IMSTCP as a replacement for APPCIMS, refer to the online helps for assistance in setting the additional attributes that are necessary. Also review the online help for existing attributes because the values that must be specified have different meanings for IMSTCP.
  - conversionTable=BINARY is not supported in EGL. The migration tool converts this value exactly as it is so that there is a place holder in the EGL linkage part. However, you must modify the value.
  - You might need to add calllink entries. EGL requires calllink entries for the following situations:
    - If a generated Java program calls a native C++ or a VAGen generated program, it is always a remote call even if the programs are running on the same workstation. A calllink entry is required.
    - If you used the VAGen generation option /system=JAVAWRAPPER for a called program, you must create an EGL calllink entry with the attribute javaWrapper="YES". If you do not have the entry, EGL does not generate the Java wrapper.
    - If you generate Java and a called program name conflicts with an EGL reserved word, you must create an EGL calllink entry and set the alias attribute to the actual name of the called program.

- For fileLink, conversionTable=BINARY is not supported in EGL. The migration tool converts this value exactly as it is so that there is a place holder in the EGL linkage part. However, you must modify the value.
- For asynchLink (VAGen crtxlink), conversionTable=BINARY is not supported in EGL. The migration tool converts this value exactly as it is so that there is a place holder in the EGL linkage part. However, you must modify the value.
- The EGL Transfer To Program linkage information is the equivalent of the VAGen dxfrlink entry. If you generate for Java and use the VAGen XFER statement, you might need to add EGL Transfer to Transaction entries. Refer to the online helps for information about this new linkage entry.

Reviewing your EGL resource association parts

The migration tool converts VAGen resource association parts to EGL resource associations parts. However, some VAGen options have no EGL equivalent. In addition, EGL has several new resource association options that you might need to set. You might see errors in the Problems view due to either of these changes. See Appendix E, "IWN.xxx messages in the Problems view," on page 391 for help in resolving common messages in the Problems view that are a result of the migration process. Also refer to the online helps for details about the resource association options that are supported for your environment. You need to perform the following steps regardless of whether you used Stage 1 – 3 migration or single file migration:

- Review and resolve the messages in the migration log and in the Problems view. You might need a text editor to resolve some of the problems.
- Not all of the file types from VisualAge Generator are supported in EGL. For example, BTRIEVE and MFCOBOL are no longer supported. The migration tool converts these unsupported options exactly as they are so that there is a place holder in the resource association part. This ensures that there is an error in the Problems view as a reminder that you must modify the resource associations part to specify the option you want to use with EGL. Depending on the EGL file type option you select, there might be additional attributes you must set for the resource association entry.
- Review the online helps for the *FormFeedOnClose* and *text* attributes to determine if you need to set these values for your environment. In VisualAge Generator, the equivalent options, /noff and /text respectively, can only be specified in a runtime resource association file for the workstation environment. Therefore, these options are not set by the migration tool because the tool only processes resource association parts.

Establishing a bind control part to use as a template

VisualAge Generator uses a bind control template to create default bind control commands. The default VAGen template binds a DB2 plan, but you might have modified the template so that it binds a package or made other changes to conform to the standards of your organization. The VAGen templates are stored outside the workspace in files named EFK2MBD*x*.tpl where *x* is a letter. Bind control parts are only required if you need to do a special bind for a particular program. Table 65 shows the VAGen bind control templates based on the runtime environment and database access.

Table 65. VAGen bind command templates

Environment and Database Access	VisualAge Generator BIND Template
MVS CICS - with DB2	EFK2MBDA
MVS Batch - with DL/I and DB2	EFK2MBDA

Table 65. VAGen bind command templates (continued)

Environment and Database Access	VisualAge Generator BIND Template
MVS Batch - with DB2 only	EFK2MBDD
IMS/VS- with DL/I with DB2 work database	EFK2MBDC
IMS/VS- with DL/I and DB2 with DB2 work database	EFK2MBDB
IMS/VS- with DL/I and DB2 without DB2 work database	EFK2MBDA
IMS BMP - with DL/I and DB2	EFK2MBDA

EGL does not use bind control templates. Instead EGL requires a bind control part. If you bind packages, you can achieve an effect similar to VisualAge Generator templates by creating an EGL bind control part that contains a template to use for all the binds and store this part in your workspace.

Note: The technique described in this section does not work if you bind plans. See "Establishing a program-specific bind control part" on page 192 if you bind plans.

If you modified the VAGen bind control template so that you bind a package for each program, you can adapt that template for use as an EGL bind control part. It is recommended that you put this bind control part in the same file with other control parts. For example, you might have a VAGen bind control template that looks like the following:

```
DSN SYSTEM(%MYDB2SUBSYSTEM%)
BIND PACKAGE(%MYCOLLECTIONNAME%) -
     MEMBER(%EZEMBR%) -
     .
     .
     .
```

In the previous example, MYDB2SUBSYSTEM and MYCOLLECTIONNAME are symbolic parameters you set in your VAGen generation options and EZEMBR is set automatically with the name of the program currently being generated.

For binding packages, the EGL bind control part that you need to create is very similar to the VAGen template, but requires 3 additional lines and a change to the EZEMBR symbolic parameter. The corresponding EGL bind control part looks like the following:

```
TSOLIB ACTIVATE DA('%DSNLOAD%')
ALLOC FI(DBRMLIB) SHR DA('%EZEPID%.%SYSTEM%.DBRMLIB' +
'%ELA%.SELADBRM')
DSN SYSTEM(%MYDB2SUBSYSTEM%)
BIND PACKAGE(%MYCOLLECTIONNAME%) -
     MEMBER(%EZEALIAS%) -
     .
     .
     .
```

DSNLOAD, EZEPID, and ELA all have the same meaning as they did in VisualAge Generator. EZEALIAS is the EGL replacement for EZEMBR when you need the name of the program being generated in a bind control part. SYSTEM is the EGL replacement for EZEENV. You might need to modify the first 3 lines of the bind control part if you use different data set naming conventions on your EGL build

server. Contact the person who installed and configured the EGL build server to determine what the additional 3 lines need to be based on the naming conventions for your organization. You might also need to modify your EGL build descriptor options to set the projectID build descriptor option and the DSNLOAD and ELA symbolic parameters if you did not set these values in VisualAge Generator. See "Symbolic parameters" on page 346 for changes to the names of the symbolic parameters. Also see the online helps for more information about using a template for the EGL bind control part and setting the values of EGL symbolic parameters.

In addition to creating the EGL bind control part to serve as a template, you must also modify your build descriptor parts to include the *bind* build descriptor option to point to your bind control part. It is recommended that you add the *bind* build descriptor option to one of your existing, common build descriptor parts to minimize the number of build descriptor parts you need to modify.

Note: Be sure to compare the VAGen bind control templates for any of your target environments. If the templates are different, you might be able to add additional symbolic parameters to support the differences. Alternatively, you might need to set different build descriptor options on a program basis to point to different EGL bind control parts that are needed as templates for different target environments.

Establishing a program-specific bind control part

If you bind plans in VisualAge Generator, then generally each program requires a different bind command. In this case, you need a program-specific bind command to bind a plan for the program with all the other programs that are in the same run unit. The typical way to do this is to create a bind control part called *xxxxx.BND*, where *xxxxx* is the name of the program. You then set the VAGen generation option /BIND=BND to specify the suffix that you want VisualAge Generator to use when searching for a program-specific bind command. The .BND suffix can also be used if you bind packages for the rare situations in which one program requires something different from what the template provides.

The EGL *bind* build descriptor option does not permit you to specify a suffix. Instead, the *bind* build descriptor option must specify the name of a specific bind control part. In EGL, if you do not specify the *bind* build descriptor option, then EGL looks for a bind control part with the same name as the program. In general, the easiest technique is to bind packages and follow the process described in "Establishing a bind control part to use as a template" on page 190. However, if you want to bind plans or if you have the situation in which one program requires something other than what is provided by the bind control part template, you can create program-specific bind control parts.

If you have VAGen program-specific bind control parts that used the default .BND suffix, then the migration tool automatically removes the .BND suffix for you and adds the additional statements required for an EGL bind control part. Assuming that your naming convention was programName.BND and you always have program-specific bind command parts, then you do not need to specify the EGL *bind* build descriptor option for this program. However, if you are using the EGL *bind* build descriptor to specify a bind control part for most programs to use as a template and you need to provide a program-specific bind control part for a program, then you must create a build descriptor part for this specific program and set the *bind* build descriptor option to point to the program-specific bind control part. Otherwise, EGL will pick up the bind control part that is the template because that is what your normal *bind* build descriptor option specifies.

Reviewing linkedit commands

VisualAge Generator provides default linkedit commands based on the target environment and database access. However, in some cases, you might have a program that requires specific linkedit commands. (For example, to link in a PL/I program for the MVS Batch environment.) The typical way to do this is to create a linkedit part called *xxxxx.LKG*, where *xxxxx* is the name of the program. You then set the VAGen generation option /LINKEDIT=LKG to specify the suffix that you want VisualAge Generator to use when searching for the program-specific linkedit command.

The EGL *linkEdit* build descriptor option does not permit you to specify a suffix. Instead, the *linkEdit* build descriptor option must specify the name of a specific linkedit part. In EGL, if you do not specify the *linkEdit* build descriptor option, then EGL looks for a linkedit part with the same name as the program. If EGL does not find a linkedit part with the same name as the program, then EGL creates default linkedit commands based on the target environment and database access similar to what VisualAge Generator does. Therefore, the only time you need to specify the *linkEdit* build descriptor option is if you create a linkedit part with a different name from the program. You might need to do this if you generate the same program for several COBOL environments.

If you have VAGen program-specific linkedit parts that used the default .LKG suffix, then the migration tool automatically removes the .LKG suffix for you. Assuming that your naming convention was programName.LKG, then you do not need to specify the EGL *linkedit* build descriptor option for this program. EGL will find the program-specific part first, before it attempts to create a default linkedit command.

Converting VAGen preparation templates and procedures to EGL build scripts

In VisualAge Generator, for COBOL generation, preparation templates are used to control the preparation process. The template that is used depends on the type of part that is generated, the runtime environment, and, for program parts, the type of database access. The /TEMPLATES generation option points to the drive and directory that contains the preparation templates. The templates vary by environment as follows:

- For the MVS and VSE runtime environments, preparation templates are used to generate the JCL necessary to do the DB2 precompile, CICS translate, COBOL compile, link edit, and bind. The preparation templates invoke JCL procedures to provide the actual steps in the preparation process.
- For the OS/400 runtime environment, preparation templates are used to generate the control language (CL) to do the compile and bind.

In EGL, the preparation process is handled as follows:

- For zSeries and iSeries, preparation is handled by an EGL build server. The EGL build scripts merge the information previously contained in the VAGen preparation templates and preparation procedures.
- For VSE, the preparation process is handled using preparation templates and procedures similar to the process in VisualAge Generator. However, the template and procedure names have changed. Refer to the *VisualAge Generator EGL Plug-in for VSE Reference* for details.

For zSeries, review your VAGen preparation templates and procedures to determine whether you customized them. If so, the best way to modify and debug an EGL build script is as follows:

- Specify prep="NO" in your build descriptor options.
- Generate a program for your runtime environment. Review the preparation file that is created to determine the name of the build script that is being used for this type of program, database access, and runtime environment.
- Manually upload the outputs of generation to the data sets you plan to use on the z/OS host.
- Create preparation JCL for the program. You can use your VAGen preparation templates and procedures as a starting point and then modify them to point to the EGL data sets. Also compare the preparation templates and procedures to the build scripts supplied by EGL to determine if there are additional steps, libraries, and so on required for EGL.
- Test the preparation JCL until you are satisfied that your modifications are correct.
- Convert the preparation JCL to pseudo-JCL so it can be used as a build script. For details, refer to the *EGL Server Guide*.
- Specify **prep**="YES" in your build descriptor options.
- Generate the program again for your runtime environment. The outputs of generation should now be uploaded and prepared automatically using the build server.
- Repeat the process for programs that access each type of database in each runtime environment. Be sure to generate FormGroups (with both text and print forms) and DataTables for all your runtime environments because these use different build scripts.

For zSeries, also see "Preparation templates and procedures" on page 348 for a list of the VAGen templates and procedures and their corresponding EGL build scripts. VisualAge Generator also uses bind control templates for the MVS runtime environments. See "Establishing a bind control part to use as a template" on page 190 for details of how to convert the MVS bind control templates.

For iSeries, refer to the *WebSphere Development Studio Client for iSeries Advanced Edition EGL Server Guide for iSeries* for information about how to customize the build script.

Converting VAGen runtime templates

In VisualAge Generator, runtime templates are used to generate the following:

- Sample runtime JCL for the MVS Batch and IMS BMP runtime environments.
- Sample runtime JCL for the VSE Batch environment.
- Sample control language for the iSeries environment.

The /TEMPLATES generation option points to the drive and directory that contains the runtime templates. The template that is used depends on the type of program, the runtime environment, and the type of file or database access. There are 3 types of runtime JCL templates for MVS Batch, IMS BMP, and VSE as follows:

- Execution JCL templates that create the main portion of the sample runtime JCL.

- File and database allocation templates that create DD statements that are included in the sample JCL for DL/I databases, serial, indexed, or relative files based on the runtime environment and the file implementation specified by the resource association information.
- File and database allocation placeholder templates that create comments that are included in the sample JCL when the application does something that might require additional DD statements, but the information is not available to generation. For example, if ProgramA calls ProgramB, when you generate ProgramA, there is no way to determine the DD statements required by ProgramB. The file and database allocation placeholder templates include a comment in the sample runtime JCL for ProgramA to indicate that it calls ProgramB.

Similarly, for OS/400, there are several runtime CL templates.

In EGL, there are also runtime templates. The **templateDir** build descriptor option points to the directory where the templates reside. The default directory is the following subdirectory within your product installation directory:

`eclipse\plugins\com.ibm.etools.egl.generators.cobol_`*`version`*`\MVStemplates`

`eclipse\plugins\com.ibm.etools.egl.generators.cobol_`*`version`*`\iSeriesTemplates`

version is the highest version level of COBOL generation that you have installed.

If you need to tailor the EGL runtime JCL templates, do the following:

- Create your own directory outside the RAD installation directory. This simplifies installing EGL maintenance because you do not have to worry about overlaying your customized templates.
- Consider putting this directory on a shared drive where it can be accessed by all developers. This makes it easier to change a template because you do not have to distribute the new template to all the developer workstations.
- For a list of the VAGen runtime templates and the corresponding EGL runtime templates, see the following:
  - For zSeries and iSeries, see "Runtime templates" on page 350.
  - For VSE, refer to the *VisualAge Generator EGL Plug-in for VSE Reference* for details on any template changes.

  Use your VAGen runtime templates as a starting point and compare each template to the corresponding EGL template to determine the tailoring you might require. Be sure to change the VAGen symbolic parameters to the corresponding EGL symbolic parameters as shown in "Symbolic parameters" on page 346.

Converting the VAGen reserved words file

In VisualAge Generator, the /RESVWORD generation option points to the drive, directory, and file name of an optional reserved words file. This file contains all the COBOL, SQL, and CICS reserved words that are not permitted as part or field names in the generated COBOL programs. The default reserved words file is shipped with VisualAge Generator. If you specified the /RESVWORD generation option, you probably added additional words to the list. If you never made modifications to the reserved words list, you can skip this section.

In EGL, the reserved words are predefined in the COBOL generator. The EGL reserved words file only contains your additions to the list.

Consider whether you still really need additions to the EGL reserved word list. If so, create a file on the workstation with a list of the additional words you require. Then modify your EGL build descriptor parts to include the **reservedWord** build descriptor option and point this option to your reserved words file. You might want to put the reserved words file on a shared drive so that everyone can access a single copy of the file rather than propagating the file to every developer's workstation. This technique simplifies making a change to the reserved words file.

Reviewing your VGWebTransactions

You should consider the following when reviewing your migrated VGWebTransaction programs:

- When you deploy or use an EGL-generated bean, you must regenerate all the VGUIRecords that will be included in the same WAR file. You must also regenerate all the corresponding VGWebTransaction programs.
- If the EGL package name differs from the VAGen package name, you must update your JSPs and properties files. The package name might have changed for any of the following reasons:
  - You used the Stage 1 migration tool renaming rules to rename packages because they conflict with EGL reserved words.
  - You used the Stage 1 migration tool renaming rules or modified the Stage 1 tool to consolidate packages in EGL.
  - You used the VAGen /packagename generation option to specify the runtime package name, which can be different from the package name of the VAGen source code. In EGL, the runtime package name is always the same as the package name of the EGL source.
- You can use your modified JSPs from VisualAge Generator. However, you might need to make some modifications in the following situations:
  - If the runtime package name has changed, you must modify the JSP to specify the new package name.
- To deploy your EGL Web transactions, refer to the online helps for assistance. Be sure to do the following:
  - Review and modify the default gw.properties file in the project's JavaSource folder. Be sure to set the *hptEntryPage* and the *hptEntryApp* values. You might be able to copy this information from the corresponding gw.properties file in your VisualAge Generator system. You might need to set additional options depending on the modifications you made to the VisualAge Generator gw.properties file. The *hptDisableRMIIDManager* option was added in a VisualAge Generator FixPak. If this option is new for you, review the EGL online helps for assistance in setting the value.
  - Review and modify the default csogw.properties file in the project's JavaSource folder. Be sure to include the information to specify which applications are to be found on which server. You might be able to copy this information from the corresponding csogw.properties file in your VisualAge Generator system. You might need to set additional options depending on the modifications you made to the VisualAge Generator csogw.properties file.
  - Review and modify the default VAGen1EntryPage.jsp in the project's WebContent folder. Be sure to update the OPTION information for *hptAppId* to include the names of your VGWebTransaction programs and the associated text that you want to display for each program in the list. You might be able to copy this information from the corresponding JSP file in your VisualAge Generator system.
  - Generate the project.

– Create an Enterprise Application Resource (EAR) project as follows:
  - From the workbench window, in the Navigator or Project Explorer view, select **New** -> **Other** -> **J2EE** -> **Enterprise Application Project**.
  - Enter the **Name** of the EAR project.
  - Select **Next**.
  - Select the projects to include in the EAR Project.
  - Select **Finish**.
– Define a Web Application Server.
– Add the EAR Project to the server.
– Run the application by selecting the EGLWebStartup.jsp in the project's WebContent folder and then selecting **Run** -> **Run on Server** from the context menu.

Preparing for debugging

You should do the following to prepare for debugging:

- From the workbench window, select **Window -> Preferences -> EGL -> Debug**. Refer to the online helps to determine which, if any, of these preferences you need to set for your environment. For example, if you used the VAGen Test preference to **Run in EBCDIC mode**, you should set the EGL Debug preference **Character Encoding** to the EBCDIC code page for your host system
- Also review the **EGL-> Default Build Descriptor** preferences. You might want to set the default Debug build descriptor for your entire workspace. Alternatively, you can set the default Debug build descriptor for a project, EGL source folder, package, or file.
- If you are calling generated EGL or non-EGL programs on a remote CICS system from the debugger, you need to configure and use a CICS Transaction Gateway Server. Direct calls to CICS using CICS Client or CICS Transaction Gateway are no longer supported.

Installing the EGL server product

For z/OS, the EGL server product that you select must be installed in a separate SMP/E zone and have different target libraries from the VisualAge Generator Server for MVS, VSE, and VM (VAGen server product).

If you placed any of the VAGen server product load modules in the LPA, you must replace them with the EGL server product load modules before migration is complete. When you make this change be sure to avoid having a combination of modules from VAGen server product and the EGL server product because this will cause unpredictable results. Therefore, if you removed the VAGen server product load modules from the VAGen SELALMD load library when you originally placed the load modules in the LPA, do the following to keep the sets of load modules consistent:

- Put the VAGen modules back into the VAGen SELALMD load library.
- Remove the VAGen load modules from the LPA.
- Add the EGL server product load modules to the LPA.
- Remove the EGL server product load modules from the EGL SELALMD load library

Even though EGL uses a build server for the preparation process, the EGL server product includes the same preparation JCL procedures as the VAGen server product. The EGL server product is also compatible with VAGen-generated

programs. Therefore, you can migrate to the EGL server product before you migrate your source code to EGL. For example, your IMS or CICS regions might evolve over time as follows:

- A production region with the VAGen server load library and an application load library with VAGen-generated programs. A test region that is identical to the production region.
- A production region with the VAGen server load library and an application load library with VAGen-generated programs. A test region with the EGL server load library and an application load library with VAGen-generated programs so that you can ensure that existing VAGen programs run the same as before. Optionally, a second test region with the EGL server load library and an application load library with EGL-generated programs so that you can test programs during your pilot migration.
- A production region with the EGL server load library and an application load library with VAGen-generated programs. A test region with the EGL server load library and an application load library with VAGen-generated programs so that you can continue developing and maintaining programs in VisualAge Generator during your pilot migration. A second test region with EGL server load library and an application load library with EGL-generated programs so that you can test EGL programs during your pilot migration.
- A production region with the EGL server load library with a mixture of VAGen-generated and EGL-generated programs. A test region with the EGL server load library with a mixture of VAGen-generated and EGL-generated programs. The test region has more EGL-generated programs than the production region. If you migrate all your source code to EGL at the same time, you can skip this configuration of regions.
- A production region with the EGL server load library with EGL-generated programs. A test region that is identical to the production region.

Generating and testing with COBOL generation

You should do the following to prepare for COBOL generation:

- You might want to create another version of the EGL projects and packages in your source code repository at this time. This provides another baseline of code that reflects the changes you made manually and before generation.
- If you are generating for VSE, follow the directions in the *VisualAge Generator EGL Plug-in for VSE Reference Manual*.
- If you are generating for z/OS, be sure that the EGL runtime server is installed with all of the latest PTFs.
- If you are generating for iSeries, be sure that the EGL runtime server for iSeries has been installed in your host environment with all the latest PTFs.
- Be sure the EGL build server is installed with all of the latest PTFs. Also, be sure it is configured in your host environment. In VisualAge Generator, customization was done to the preparation process for z/OS and iSeries by changing preparation templates on the workstation. In EGL, this customization is done on the host machine. See the online helps for more information regarding if customization is still needed and how the customization is done for each target host environment.
- Contact the person who installed and configured the EGL build server. Be sure you understand any changes to the naming conventions for the host data sets that contain the outputs of generation and preparation. For example, in VisualAge Generator when you generate for MVS Batch, the default name of the data sets is *xxxx.MVSBATCH.yyyy*, where *xxxx* is the high-level qualifier you specify in the */projectid* generation option and *yyyy* is the type of code. (For

example, EZESRC for the COBOL source.) With EGL, because the target environment names have changed, the corresponding default data set names are *xxxx.ZOSBATCH.yyyy*. This means that you might need to define a new group of data sets on the host.

- Generate your programs and dataTables. When you generate the programs, use the following build descriptor options:
  - genFormGroup="YES"
  - genHelpFormGroup="YES"
  - genDataTables="NO"

  This enables you to generate the formGroups with the programs that use them, but to only generate the dataTables one time regardless of the number of programs that use the dataTable. Resolve any validation errors that are caught during generation.
- VAGen and EGL create the names of COBOL records and items differently. The EGL names result in a more readable COBOL program, but can result in a generated COBOL program that exceeds the SQL statement precompiler limits, depending on your SQL product. The following are examples of precompiler limits:
  - Maximum number of processed lines. All SQL statements must occur in the program prior to this limit. COBOL generation places the SQL statements as early as possible in the Procedure Division. However, a program might encounter this limit if it has many SQL functions or large numbers of data items in records or on forms.
  - Maximum number of unique host variables. Each host variable that allows nulls also has an indicator variable that counts toward the maximum. By default, the VAGen to EGL Migration tool includes the isNullable=yes property for each field in the SQL records to preserve the VAGen behavior.
  - Maximum number of lines or characters for an SQL statement.

  If any of the SQL precompiler limits is exceeded, you need to make one or more of the following changes to the program:
  - If some of the columns in your SQL tables are defined as NOT NULL, remove the isNullable=yes property from the corresponding field in the EGL SQL record definitions. This reduces the number of unique host variables which in turn reduces the number of characters and lines for an SQL statement and the total number of lines for the program. This technique has the biggest impact for the least amount of work and also has the potential of improving performance.
  - Review the use of default SQL statements. If the default statements are retrieving more columns than you actually need, modify the statements to specify only the required columns.
  - Shorten the name of the SQL record.
  - Split the SQL statements into multiple statements. For example, change one **get** statement into multiple **get** statements and retrieve a subset of the columns in each statement.
  - Split the program into multiple programs.
- Test the generated code.
- You might want to create another version of the EGL projects and packages in your source code repository at this time. This provides another baseline of code that reflects the changes you made as a result of problems found during generation and testing.

Generating and testing with Java generation

You should do the following to prepare for Java generation:

- You might want to create another version of the EGL projects and packages in your source code repository at this time. This provides another baseline of code that reflects the changes you made by hand and before generation.
- Generate your programs and dataTables. When you generate the programs, use the following build descriptor options:
  - genFormGroup="YES"
  - genHelpFormGroup="YES"
  - genDataTables="NO"

  This enables you to generate the formGroups with the programs that use them, but to only generate the dataTables one time regardless of the number of programs that use the dataTable. Resolve any validation errors that are caught during generation.
- If you modified the VAGen product message text, you can make similar modifications to the EGL message text.
- Test the generated code.
- You might want to create another version of the EGL projects and packages in your source code repository at this time. This provides another baseline of code that reflects the changes you made as a result of problems found during generation and testing.

Reviewing your standards

You might want to review your current coding standards and set new standards to be used for any new code that is written. For example, if you generate COBOL, some standards that you might want to consider:

- Use underscore rather than hyphens in your part names. COBOL programs do not permit the use of underscore for names. However, COBOL generation automatically changes the underscore to a hyphen, so the generated COBOL will still be readable. The only time an alias name is assigned is if there are duplicate part names after changing the underscore to a hyphen.
- To improve the readability of generated COBOL code, avoid the use of names that cause generation to assign an alias. You can do this by using the following naming conventions:
  - Record and function names should be 18 or fewer characters. This is the same limit as in VisualAge Generator.
  - Data item names should be 27 or fewer characters. This is slightly less than the recommended limit of 30 characters and the maximum of 32 characters for VisualAge Generator.
- Program and dataTable names can now be 8 characters.

Planning for dual maintenance of your source code

You can migrate your VAGen source code to EGL. However, you cannot migrate an EGL source file back to VisualAge Generator. If you are not migrating all of your VAGen source code at the same time and have parts that are needed by both the VAGen and the EGL code, you need to make changes to the common parts in one of the following ways:

- Make the change in both the VAGen and EGL versions of the part.
- Make the change in VAGen and then export an external source format file for the part. Depending on the changes, to ensure cross-part migration can be done,

you might need to include parts used by the changed part, as well as parts that use the changed part in the external source format file. Import the external source file into a new file in EGL. Then compare the changes for the newly-migrated parts to the original EGL parts and move the changes to the correct location within the EGL workspace.

The simplest solution to the dual maintenance problem is to avoid the problem completely by doing the following:

- Freeze your VAGen development and maintenance while you are migrating to EGL.
- Generate and test all the VAGen programs that are currently work-in-progress and move them into production. This enables you to migrate just the production version of your source code.

If you cannot migrate everything at the same time, try to limit the changes to a small number of parts and then make the changes in both the VAGen and the EGL versions of the part. Making the changes in both places can be easier than changing the part in VAGen and migrating it to EGL again because you do not have to determine all the related parts that are required for cross-part migration and you do not have to move the newly-migrated parts to the correct location within the EGL workspace.

Eliminating the use of VisualAge Generator Compatibility mode

VAGen Compatibility mode supports a number of behaviors that make it easier to preserve the behavior of your VAGen programs. It is not necessary to turn off VAGen Compatibility mode. However, particularly if you use only a few of these compatibility behaviors, you might want to eliminate the use of VAGen Compatibility mode. The following list describes the EGL behavior when VAGen Compatibility mode is turned on and provides information that might be helpful in removing the need to use the behavior.

- EGL permits the use of the hyphen (-) and the national language characters @ and # in part names. If you plan to eliminate the use of VAGen Compatibility mode, you should create a Rename User Exit to use during Stage 2 migration. Create the Rename User Exit so that it eliminates the use of the hyphen, @, and #. For example, if you never use the underscore in your VAGen part names, you can create a Rename User Exit that renames parts by changing the hyphen to an underscore. See “VAGen Migration Preferences” on page 157 for details of how to specify a Rename User Exit for Stage 2 migration. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for any part name or variable name that contains a hyphen, @ or #. You can correct the problem by changing the name.
- EGL permits the use of the primitive data types *numc* and *pacf*. numc is similar to num except that numc uses the C as the positive sign indicator. pacf is similar to decimal (VAGen PACK) except that pacf uses the F as the positive sign indicator. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for any dataItem definition or variable declaration that specifies a primitive type of numc or pacf. You might be able to correct the problem by changing the primitive type to num or decimal respectively and then making any related program changes required for the new positive sign indicator.
- EGL defaults the subscript to 1 for single-dimension, structure-field arrays. Single-dimension, structure-field arrays are the EGL equivalent of a VAGen array or multiply occurring item in a record, map or table. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for any

statement that specifies a structure-field array that now requires a subscript. To correct the problem, you must modify the statement to explicitly specify a subscript of 1.

- EGL permits the *deleteAfterUse* property on a use declaration for a dataTable. The deleteAfterUse property is the replacement for the VAGen Keep After Use property. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for each program that contains a use declaration that specifies deleteAfterUse. You can correct the problem by removing the deleteAfterUse property, in which case EGL treats the table similar to a VAGen table that specifies Keep After Use = yes.

  If your production programs are already generated using VisualAge Generator Version 4.5 FixPak 4, there is no impact of eliminating the EGL *deleteAfterUse* property. If you are migrating from Cross System Product or an earlier version of VisualAge Generator, you should thoroughly test any program that you change to eliminate the *deleteAfterUse* property.

  If you specify the VAGen Migration Preference *Do not include deleteAfterUse for tables*, the migration tool automatically omits the *deleteAfterUse* property and issues a warning message for the affected program and table.
- EGL permits the *sqlDataCode* property in an SQL record. The migration tool preserves the VAGen SQL Data Code property to specify the SQL type for hex items (for example, an SQL timestamp) or if the primitive type is unknown because a shared data item is not included in the migration set. You can minimize migration to the EGL sqlDataCode property by always including the data item parts in your migration set. This avoids the migration tool including the sqlDataCode due to an unknown primitive type. However, the migration tool must still include the sqlDataCode for hex items. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for any SQL field that specifies the sqlDataCode property. You can correct the problem by changing the field to use one of the new EGL data types and then making any related program changes to use this new data type. For variable length fields, include the sqlVariableLen = yes property.
- EGL supports the call statement options of *externallyDefined* and *noRefresh*. These are the replacements for the VAGen NONCSP and NOMAPS options on the call statement. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for any call statement that specifies externallyDefined or noRefresh. You can correct the problem by removing these options from the call statement and specifying the corresponding EGL replacement options in a linkage options entry for the called program. Be sure to point to the linkage options part in your build descriptor options.
- EGL supports the transfer and show statement *externallyDefined* option. This is the replacement for the VAGen NONCSP option on the DXFR and XFER statements. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for any transfer or show statement that specifies externallyDefined. You can correct the problem by removing this option from the transfer or show statement and specifying the corresponding EGL replacement option in a linkage options entry for the transfer from and to programs. Be sure to point to the linkage options part in your build descriptor options. In the linkage options part, use a transfer link entry in the form of either transfer to program or transfer to transaction entry, corresponding to the type of transfer statement. For the show statement, the transfer link entry must be in the form of a transfer to transaction entry.
- EGL implements a *display printForm* statement in the same way as a *print printForm* statement. You can minimize the use of display printForm by including the maps in your migration set. This enables the migration tool to

correctly migrate to a display statement for text maps and a print statement for printer maps. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for each display printForm statement. You can correct the problem by modifying the statement to be a print statement.

- EGL uses the *value* property of a form field only when displaying a field on the screen that has not had a value assigned to it. The value property does not set the initial value of the form field in storage. The migration tool includes the value property when it migrates the map. If you turn off VAGen Compatibility mode, EGL uses the value property to set the initial value of the form field in storage. There might or might not be an error on the Problems list. For example, in VisualAge Generator, a numeric map variable field can have an initial value of "MM/DD/YYYY" to provide a value for the Map Editor Preview mode and to provide output to the end user if the program does not move any data to the field before the DISPLAY or CONVERSE I/O option. In this example, if you turn off VAGen Compatibility mode, there is a message on the Problems list because the value is not compatible with the num primitive type. However, if the initial value is a number such as 5, there is no message on the Problems list, but the program might not behave the same as in VisualAge Generator. If you turn off VAGen Compatibility mode, in addition to correcting the messages on the Problems list, you should also search your EGL forms for the value property and then determine the program changes necessary to prevent any change in behavior. This might include removing or changing the value property for the form fields.
- EGL permits the use of the *VGVar.handleSysLibraryErrors* system variable. This is the replacement for VAGen EZEREPLY, which controls setting of EZERT8 (EGL sysVar.errorCode) for a call or EZE function invocation statement. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for each statement that specifies VGVar.handleSysLibraryErrors. You can correct the problem by removing the use of VGVar.handleSysLibraryErrors. If VGVar.handleSysLibraryErrors is set to 1, then nest the call or function invocation in a try ... onError ... end block. If VGVar.handleSysLibraryErrors is set to 0, then do not add a try ... onError ... end block.
- If your release of EGL supports DL/I, then EGL permits the use of the *dliVar.handleHardDLIErrors* system variable. This is the replacement for VAGen EZEDLERR. In VAGen, EZEDLERR and EZEFEC (EGL sysVar.handleHardIOErrors) work together to control error handling. If both EZEDLERR and EZEFEC are 0 or an error routine is not specified, the program ends if a hard I/O error occurs. If either EZEDLERR or EZEFEC is set to 1 and an error routine is specified, the error routine gets control if a hard I/O error occurs. In general EZEDLERR and EZEFEC are set at the beginning of the program and then never changed. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for each statement that specifies dliVar.handleHardDLIErrors. You need to review your program logic to determine whether you can safely merge dliVar.handleHardDLIErrors with sysVar.handleHardIOErrors. If sysVar.handleHardIOErrors is not used in the program or if it is set only at the beginning of the program, it might be relatively simple to merge dliVar.handleHardDLIErrors with sysVar.handleHardIOErrors.
- EGL permits the use of the *VGLib.getVAGSysType* system function. The migration tool declares a variable named *customerPrefix*EZESYS and initializes it in each program to the results of VGLib.getVAGSysType. *customerPrefix* is the Renaming prefix you specify during Stage 2 migration. VGLib.getVAGSysType provides the original VAGen EZESYS system values (for example, MVSCICS or OS400) for use when migrating statements other than IF, WHILE, or TEST. If you turn off VAGen Compatibility, there will be an error on the Problems list for each

program for the statement that initializes *customerPrefix*EZESYS. You can correct the problem by changing the program to remove the *customerPrefix*EZESYS declaration and the initialization statement. When you save the program, there will be an additional error on the Problems list for each statement that uses *customerPrefix*EZESYS. To correct this error, you can change the statement to use the EGL sysVar.systemType system variable, which provides the new EGL system values. Depending on how *customerPrefix*EZESYS is being used, you might also need to change the values in databases, files, or dataTables from the old VAGen system values to the new EGL system values. See "EZESYS" on page 108, as well as "EZESYS state conditions" on page 302.

If you specify the VAGen Migration Preference *Do not initialize old EZESYS values*, the migration tool automatically omits the variable declaration and initialization statement from each program. There will be an error on the Problems view for any statement that uses *customerPrefix*EZESYS.

- EGL permits the use of the *VGLib.connectionService* system function. This is the replacement for VAGen EZECONCT system function, which provides a variety of SQL connection services depending on the arguments you specify and your runtime environment. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for each statement that uses VGLib.connectionService. You can correct the error by changing to use one of the new EGL specialized system functions (for example, sysLib.connect, sysLib.disconnect, sysLib.disconnectAll, or sysLib.queryDatabase). Which EGL system function you use depends on the arguments you specified for the VAGen EZECONCT system function and your runtime environment. You should also check for any use of VGVar.sqlIsolationLevel because this might affect your choice of the EGL system function or the arguments that you need to specify for it.
- EGL permits the use of the *ConverseVar.segmentedMode* system variable. This is the replacement for VAGen EZESEGM, which enables you to switch between segmented and nonsegmented mode in a CICS main transaction program at runtime. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for each statement that uses ConverseVar.segmentedMode. In many cases, because EZESEGM is rarely used, there might not be any errors on the Problems list. If there is an error, removing the use of ConverseVar.segmentedMode might require restructuring the program to avoid the need to switch between segmented and nonsegmented mode.
- EGL permits the use of the *VGVar.sqlIsolationLevel* system variable. This is the replacement for VAGen EZESQISL, which is used to control the SQL isolation level in older releases of Cross System Product and VisualAge Generator for the VSE runtime environments and in VisualAge Generator 4.5 for accessing ODBC databases. If you turn off VAGen Compatibility mode, there will be an error on the Problems list for each statement that uses VGVar.sqlIsolationLevel. In many cases, because EZESQISL is rarely used, there might not be any error on the Problems list. If there is an error, you might be able to remove VGVar.sqlIsolationLevel entirely if it is not being used to control your program logic. Alternatively, if VGVar.sqlIsolationLevel is used to control some of your program logic, you can replace VGVar.sqlIsolationLevel with a new variable that you declare in the program. Be sure to check for any use of VGLib.connectionService because the behavior for that system function might depend on the value in VGVar.sqlIsolationLevel.
- EGL supports even precision for decimal fields (VAGen PACK fields) by incrementing the precision by 1 except for host variable references in SQL WHERE clauses and the EGL prepare statement. If you turn off VAGen Compatibility mode, there will not be an error on the Problems list. However, the program might not run the same as in VisualAge Generator. Specifically,

decimal fields that have even precision might be too small for the data contained in the database. In general you need to carefully evaluate each data item to determine whether you can safely turn off VAGen Compatibility mode. In VisualAge Generator, you can search all data item and record parts using the References tool for the text string *evensql = Y* (one blank before and after the = sign). This search can help you determine if you have any items or records that specified even precision. In EGL, you can search for an even precision decimal field by searching for *decimal(2, decimal(4, ... decimal(18*. If you did not use even precision decimal fields, then you can safely turn off VAGen Compatibility mode. If you did use even precision decimal fields, you need to consider the performance impact on your SQL access of changing to the next higher odd precision. SQL provides better performance for decimal fields if your EGL host variables exactly match the precision of the SQL column definitions.

If you specify the VAGen Migration Preference *Do not honor evensql=y for items or variables*, the migration tool automatically uses odd precision (or 18 if the item is the maximum length) and issues a warning message for the affected data item part or nonshared record item.

If you do turn off the VAGen Compatibility mode preference, be sure to remove vagCompatibility=″YES″ from each of your build descriptor parts. If you specify the VAGen Migration Preference *Do not set compatibility mode*, the migration tool automatically omits vagCompatibility=″YES″ from each build descriptor part.

Part 6. Language and runtime differences

There are various language and runtime differences between VisualAge Generator and EGL.

Chapter 10. Language and runtime differences

Language differences

See "Determining whether you can migrate to EGL" on page 8 for information about areas in which EGL is not a complete replacement for VisualAge Generator Developer.

See Chapter 3, "Handling ambiguous situations," on page 61 for details about VAGen language elements or migration strategies that do not allow a precise migration to the EGL language.

See Appendix B, "Relationship of VisualAge Generator and EGL Language Elements," on page 227 for details about how each VAGen language element is migrated to EGL.

Runtime differences

After you have migrated your source code to EGL, you should generate and thoroughly test your code to ensure that it runs the same as in VisualAge Generator. The specific runtime differences vary depending on the target environment as follows:

- General differences.
- Differences in debug.
- Differences in generated COBOL.
- Differences in generated Java.
- Differences between host and workstation environments
- Differences between distributed CICS and native workstation environments.
- Differences between generated C++ and generated Java.

General differences

The following runtime behavioral differences can occur without any messages in the migration log or the Problems view. The problems can occur during debug or when running the generated Java or COBOL code:

- The following apply to text programs and print forms:
  - A runtime error occurs if a form field is not long enough to contain all the digits and formatting information (sign, decimal point, currency symbol, and numeric separator).
  - Non-default fill characters are always honored, even if the program does not issue a SET formItem FULL statement.
  - Arrays on forms always use the validation and formatting properties of the first element of the array. This might result in slightly different behavior from VisualAge Generator, which allowed some of these properties to vary for the elements of the array. For details, see "Map arrays and attributes" on page 80.
  - If any maps contained fields at row=0, column=0, be sure to test the programs that use the corresponding forms for any differences in appearance or behavior. For details, see "Fields at row=0, column=0" on page 82.
  - For workstation platforms, including debug, the following key mappings are used for textForms:

Table 66. Key mappings for textForms

3270 Keys	VAGen mappings	EGL mappings on Windows	EGL mappings on Linux and AIX
PF1–PF12	F1–F12	F1–F12	F1–F12
PF13–PF24	Alt+F1–Alt+F12	Shift+F1–Shift+F12	press Ctrl+S and then press F1–F12
PA1–PA3	Ctrl+F1–Ctrl+F3	Ctrl+F1–Ctrl+F3	press Ctrl+A and then press F1–F3

Note:

- \+ indicates that you must press 2 keys simultaneously.
- For Linux and AIX, the Ctrl+S and Ctrl+A work as a toggle. If you press the combination of keys by mistake, you can press them again to turn it off. Pressing Ctrl+S and then pressing a key other than F1–F12 has no effect. Similarly, pressing Ctrl+A and then pressing a key other than F1–F3 has no effect.

- If a record that is a VAGen REDEFINED record is not available when migrating a program, the migration tool does not include the EGL *redefines* property in the data declarations. This results in two separate record areas, rather than a single area with two definitions as in VisualAge Generator. Errors, including abends, can result due to uninitialized or invalid data. See "Redefined records" on page 66 for details.
- Hard I/O errors occur in more situations in EGL than in VisualAge Generator:
  - In VisualAge Generator, UNQ for non-SQL records is a soft error so the HRD I/O error state is not set. In EGL, *unique* is a hard error so *hardIOError* also tests true. See "I/O error values UNQ and DUP" on page 104 for details.
  - For iSeries, the VAGen I/O error value LOK is migrated to the EGL *deadlock* I/O error state. In VisualAge Generator, LOK is a soft error so the HRD I/O error state is not set. In EGL, *deadlock* is a hard error so *hardIOError* also tests true. See "I/O error value LOK" on page 106 for details.
- If the I/O error routine is not available when migrating a function, the migration tool assumes that the I/O error routine is not a main function and converts to a function invocation. In VisualAge Generator, if the I/O error routine is a main function and an error occurs at runtime, VisualAge Generator clears the current execution stack of functions and starts a new stack with just the main function that is specified as the I/O error routine. This also clears out any storage for the execution stack. In EGL, because the migration tool converted to a function invocation, if an error occurs at runtime, EGL adds the main function to the current execution stack rather than cleaning out the stack and starting a new stack with just the main function. This has the potential for an infinite loop or a large use of resources if functions have local storage or parameter lists. See "I/O error routine" on page 90 for details.

Differences in SQL support

The differences in SQL support can affect program behavior in the following situations:

- If you generate COBOL, the differences between DB2 on the host and JDBC used by the debugger might affect the behavior of your program when you debug in EGL.

- If you previously generated C++ and now generate Java, the differences between DB2 or ODBC and JDBC used by Java generation might affect the behavior of your program both when you debug in EGL and when you run the program in the native workstation environment.

The following are differences in SQL behavior:

- ODBC is not supported in EGL. If you use an SQL database manager other than DB2, you must obtain a JDBC driver for your database manager.
- JDBC does not support two-phase commit. Therefore, there are the following differences:
  - There are separate calls to the SQL manager and MQ series manager for commit and rollback. Therefore, if a problem occurs, it is possible for one resource to commit or rollback without the corresponding commit or rollback for the other resource.
  - EZECONCT (EGL **VGLib.connectionService**). In VisualAge Generator, the R option for the unit of work argument changes the connection to another database without ending the current connection. This permits you to update multiple databases within the same unit of work. In EGL, the R option, as well as the D1C, D2A, D2C, and D2E options for the unit of work argument are all treated as though you specified D1E. D1E is a one-phase commit, but does not automatically release the database connection. You must explicitly request the DISC, DCURRENT, or DALL option to disconnect the database. See the online helps for the **VGLib.connectionService** for details.
- JDBC always runs dynamic SQL. Generated COBOL (in both VAGen and EGL) and generated C++ (in VAGen) use static SQL except when you use the VAGen execution time statement build option (EGL **prepare** statement) or a table name host variable. Therefore, there are the following differences:
  - In dynamic mode, single row select can result in more than one row being returned without setting **sysVar.sqlCode** to -811.
- JDBC handles code page conversion differently than DB2. If your database is on the host and includes a char, dbchar, or mbchar SQL column defined as ″FOR BIT DATA″, DB2 does not do any code page conversion. However, JDBC does convert the data. If you have this situation, change the EGL SQL record definition to add the asBytes=yes property for the field that corresponds to the SQL column that is defined as ″FOR BIT DATA″.
- Other changes in the EZE words related to SQL when using JDBC:
  - EZESQISL (EGL **VGVar.sqlIsolationLevel**). In VisualAge Generator, a value of 1 means you want cursor stability. In EGL a value of 1 means you want serializable transactions.
  - EZESQRRM (EGL **VGVar.sqlerrmc**) is not supported.
  - EZESQWN6 (EGL **VGVar.sqlwarn[7]**) is not supported.
  - EZESQLCA (EGL **sysVar.sqlca**) fields are limited. They do not include values for EZESQRRM and EZESQWN6.

Differences in debug

There are some differences in debug that might affect your testing. If you generate for COBOL environments, you need to be particularly aware of these differences because debug does not provide the same support as generated COBOL in the following areas:

- Differences for maps are as follows:
  - Blink is not supported for text forms.

  - The *isDecimalDigit* property is only supported for character fields. It is implemented as a software edit, not as a hardware attribute. Numeric fields also have a software edit. See "Map fields and the numeric hardware attribute" on page 79 for details.
- For indexed records that have an alternate index record defined, the setting for the DUP I/O error value differs from VisualAge Generator. For VisualAge Generator, for a SET record SCAN followed by a SCAN or SCANBACK I/O option, the DUP I/O error value is not set for the SET record SCAN statement. The DUP I/O error value is set for each of the duplicate-keyed records other than the last record retrieved with a duplicate key. For Java generation, a *set* record *position* followed by a *get next* or *get previous* statement results in the *duplicate* I/O error state being set on the *set* record *position* rather than on the first duplicate-keyed record retrieved. The remaining duplicate-keyed records result in the *duplicate* I/O error state being set the same as in VisualAge Generator. The EGL duplicate state is set on all records other than the first and last of the duplicate-keyed records. See the online helps for more information about indexed records and alternate index records and their use with *set* record *position*, *get next* and *get previous*.
- Interactive Test Facility (in VisualAge Generator) uses DB2 or ODBC. Generated COBOL (in both VisualAge Generator and EGL) use DB2. Generated C++ (in VisualAge Generator) uses DB2 or ODBC. EGL debug and Java generation use JDBC. If you generate COBOL or previously generated C++, this results in differences in when you debug your program using the EGL debugger. See "Differences in SQL support" on page 210 for details.
- Handling of num or numc data that contains invalid data differs from VisualAge Generator. In VisualAge Generator, invalid data, including blanks, is tolerated by ITF for num and numc fields. If a num or numc field contains blanks, it is treated as though the value is 0. For example, if the field is compared to 0, the comparison tests true. If a num or numc field contains invalid data other than blanks, the comparison tests false. In effect, this simulates the use of the COBOL generation option /SPZERO, which specifies that blanks are tolerated in num and numc fields and are treated as though the field contains 0. Any other use of invalid data in the num or numc fields results in a runtime error, including an abend. If you do not use the /SPZERO generation option, any invalid data in an num or numc field, including blanks, results in a runtime error. The /SPZERO generation option has no effect on bin, pack, or pacf fields. In EGL, the **spacesZero** build descriptor option provides the same support as /SPZERO for generated COBOL programs. However, the EGL debugger does not simulate the use of **spacesZero**. Therefore, in the EGL debugger, if a num or numc field contains blanks, the EGL debugger tests false when comparing the value to 0.

Differences in generated COBOL

The following differences occur for generated COBOL code:

- EGL generated COBOL text and basic programs are fully compatible with VisualAge Generator programs. You do not have to regenerate or recompile a VAGen program for either of the following situations:
  - A VAGen program uses CALL, DXFR, or XFER as a way of transferring to an EGL program.
  - An EGL program uses *call*, *transfer to program*, *transfer to transaction*, or *show* as a way of transferring to a VAGen program.

  The restrictions on calling or transferring between EGL and VAGen programs are similar to those for calling or transferring between two VAGen programs. For example, a VAGen called program cannot use the DXFR or XFER statements

to transfer to other programs. Similarly, an EGL called program cannot use *transfer to program*, *transfer to transaction*, or *show* to transfer to other programs.

- Differences for maps are as follows:
  - The *isDecimalDigit* property is only supported for character fields. It is implemented as a software edit, not as a hardware attribute. Numeric fields also have a software edit. See "Map fields and the numeric hardware attribute" on page 79 for details.
  - The following device sizes are no longer supported: 6x40, 12x40, 16x64, and 255x60. See "Map groups, maps, and device sizes" on page 74 for details.

Differences in generated Java

The following differences occur for generated Java code:

- VAGen-generated Java programs use a vgj.properties file to control the runtime environment. EGL-generated Java programs use either *programName*.properties or rununit.properties, depending on the value of the **genProperties** build descriptor option. See "vgj.properties" on page 354 for the correspondence between the VisualAge Generator and EGL runtime properties.
- EGL generated Java programs are **not** fully compatible with VisualAge Generator programs.

  The following are supported:
  - An EGL program can call a VAGen generated Java or C++ program using a remote call. Similarly, a VAGen generated Java or C++ program can call an EGL program using a remote call.
  - An EGL VGWebTransaction program can use the *show VGUI record* statement to indirectly transfer to a VAGen Web Transaction program. Similarly, a VAGen Web Transaction program can use the XFER with a UI record statement to indirectly transfer to an EGL VGWebTransaction program.

  The following are **not** supported:
  - An EGL program cannot call a VAGen generated Java or C++ program using a local call. Similarly, a VAGen generated Java or C++ program cannot call an EGL program using a local call.
  - An EGL program cannot transfer to a VAGen program using the *transfer to program*, *transfer to transaction*, or *show textForm* statements. Similarly, a VAGen program cannot transfer to an EGL program using the DXFR or XFER statements.

Differences between host and workstation environments

If you change from generating for a host environment (such as CICS) to generating for a workstation environment (such as native AIX), you need to consider the following:

- The collating sequence for the host environments is EBCDIC. The collating sequence for Java generation is UNICODE. Therefore, you need to review the following:
  - Range match valid tables
  - Specific values coded for a high-value or low-value of a key
  - Comparison of keys for a 2-file match
- End users will need to know the following:
  - The mapping for the function keys because workstation keyboards do not typically have keys for PF13 - PF24 and PA1 - PA3.

  - It is not necessary to enter SO/SI characters when shifting out/into DBCS mode.
- The total length of all records passed on a CALL from AIX native to CICS cannot exceed 32567. This is a CICS restriction. If you previously generated for CICS and used the default parmform=COMMPTR, then the total length of all records might have exceeded this limit. If you previously used parmform=COMMDATA, then the total length of all records is within this limit.
- Also review the information in these sections:
  - "Differences between distributed CICS and native workstation environments"
  - "Differences between generated C++ and generated Java" on page 217

Differences between distributed CICS and native workstation environments

To run generated EGL code in a workstation environment, you must change to run as a native process instead of having the option to run under Transaction Series (TX Series or CICS). The following list outlines the differences or changes that are necessary to move from a CICS environment to a native environment. The list uses VAGen terminology, but you must make the changes in the corresponding EGL language elements. Refer to Appendix B, "Relationship of VisualAge Generator and EGL Language Elements," on page 227 to determine the corresponding EGL language element.

- General differences are as follows:
  - Multiple users cannot run in the same address space on a server. Users run on their own workstations.
  - Client unit of work is not supported.
  - There is a change from C++ generation to Java generation. Be sure to review the section on "Differences between generated C++ and generated Java" on page 217.
  - Be sure to test performance and scalability when migrating from CICS to native environments.
  - Communication protocols are different between CICS and native environments. You must determine which protocol you plan to use and then change your EGL linkage options parts and resource associations parts accordingly.
  - VAGen-generated programs for distributed CICS use environment variables to control the runtime environment. EGL-generated Java programs use either *programName*.properties or rununit.properties, depending on the value of the **genProperties** build descriptor option. See "Runtime environment variables" on page 352 for the correspondence between the VisualAge Generator environment variables and the EGL runtime properties.
- The following CICS-specific special function words and service routines are not supported in native environments:
  - AUDIT (EGL **sysLib.audit**) for writing a CICS journal entry. You can create your own non-EGL program named AUDIT to write similar information to a file for the native environment.
  - EZEPURGE (EGL **sysLib.purge**) for deleting a temporary storage queue. You must remove references to sysLib.purge. Alternatively, you can check sysVar.systemType and only use sysLib.purge when you are running in the CICS for z/OS environment. If you use this technique, be sure to include the EGL build descriptor option eliminateSystemDependentCode="YES"

  - EZELOC (EGL **sysVar.remoteSystemID**) for setting the location of a remote file, remote program, or the location at which a remote transaction is to be started using CREATX (EGL **sysLib.startTransaction**).
- CICS-specific resource associations are not supported in native environments. You must change your resource associations part to use options that are supported for EGL native environments. The following are CICS-specific resource associations that are not supported for generation for a native environment:
  - CICS spool file.
  - Transient data queue, including transient data queue with a trigger level of 1.
  - Temporary storage queue.
  - Local VSAM files, except for the AIX environment.
- The following CICS-supplied features are not supported in native environments:
  - Security services.
  - Database connection and retention.
  - CICS file management, including the use of recoverable files.
  - True segmentation support.
  - Program management.
- Differences when transferring between programs are as follows:
  - For main programs other than web transactions, the XFER statement in CICS transfers to the next transaction ID. For native environments, the XFER statement transfers to a program name. Therefore, all the EGL *transfer to transaction* and *show* statements must be modified to specify the program name.
  - XFER or DXFR to non-VAGen programs is supported in the CICS environment. For native environments, *transfer to program, transfer to transaction*, and *show* are not supported to non-EGL programs.
- Commit and rollback differences are as follows:
  - CICS supports a two-phase commit. Native environments support only a single-phase commit.
  - Files can be defined to CICS as recoverable files. This is not possible for native environments.
  - Message queues are committed or rolled back at the same time as other resources in a CICS environment. Native environments support only a single-phase commit so the message queues might not be committed or rolled back simultaneously with SQL resources if a problem occurs during commit or rollback.
- CALL CREATX (EGL **sysLib.startTransaction**) differences are as follows:
  - CALL CREATX starts another transaction in CICS and honors the parameters *prid* and *recip*. EGL **sysLib.startTransaction** starts another program for a native environment and ignores the parameters *prid* and *recip*. As a minimum, you must change **sysLib.startTransaction** to specify a program name if you generate for a native environment.
  - CICS supports both local and remote CALL CREATX. EGL **sysLib.startTransaction** only supports starting a local program.
- SQL connection services using EZECONCT (EGL **VGLib.connectionService**). In VisualAge Generator, for the CICS environment, EZECONCT ignores the password. In EGL, for native environments, **VGLib.connectionService** uses the password. See "Differences between generated C++ and generated Java" on page 217 for aditional differences due to changing to Java generation.

- EZE special data word differences are as follows:
  - EZEAPP (EGL **sysVar.transferName**). In VisualAge Generator, for the CICS environment, when EZEAPP is used with an XFER statement, EZEAPP contains the name of the new transaction to be started. In EGL, for native environments, when **sysVar.transferName** is used with a transfer to transaction or show statement, **sysVar.transferName** contains the name of the new program to be started.
  - EZEDEST (EGL **sysVar.resourceAssociation**). In VisualAge Generator, for the CICS environment, EZEDEST contains the system resource name associated with a record while the program is running. In EGL, for native environments, **sysVar.resourceAssociation** also contains the system resource name associated with a record. However, the format of the information varies depending on the runtime environment and the file type. Therefore, because you are changing both the runtime environment and the file type, you must review any use of **sysVar.resourceAssociation** to ensure that the information provided by your program is correct for your native environment and file type.
  - EZEDESTP (EGL **converseVar.printerAssociation**). In VisualAge Generator, for the CICS environment, EZEDESTP contains the destination associated with the print file. In EGL, for native environments, **converseVar.printerAssociation** also contains the file name associated with the print file. However, the format of the information varies depending on the runtime environment and the file type. Therefore, because you are changing both the runtime environment and the file type, you must review any use of **converseVar.printerAssociation** to ensure that the information provided by your program is correct for your native environment and file type.
  - EZELTERM (EGL **sysVar.terminalID**). In VisualAge Generator, for the CICS environment, EZELTERM contains the CICS terminal identifier and is equivalent to EZEUSR. In EGL, for native environments, **sysVar.terminalID** is initialized from the Java Virtual Machine system property user.name. If this property cannot be retrieved, **sysVar.terminalID** contains blanks.
  - EZERCODE (EGL **sysVar.returnCode**). In VisualAge Generator, for the CICS environment, the value in EZERCODE is not passed back to the system or calling program. In EGL, for native environments, the value in EZERCODE is ignored.
  - EZERT8 (EGL **sysVar.errorCode**). In VisualAge Generator, for the CICS environment, EZERT8 is in one of two forms:
    - *RSnnnnnn*, where *nnnnnn* is a VAGen return code based on file access and the problem that occurred.
    - *nnnnnnnn*, where the first two characters are the hexadecimal representation of the first byte of the EIBFN from the CICS EXEC interface block. The remaining 6 characters contain the hexadecimal representation of bytes 0-2 of the EIBRCODE from the CICS EXEC interface block.

    In EGL, for native environments, the return code information varies based on the file type. You should review your use of sysVar.errorCode to ensure that the values you are checking are correct for your environment and file type.
  - EZESEGTR (EGL **sysVar.transactionID**). In VisualAge Generator, for the CICS environment, EZESEGTR is initialized to the current transaction ID and also used to set a new transaction ID to take effect after a CONVERSE. EZESEGTR can be used to control program logic. In EGL, for native environments, EZESEGTR is ignored and cannot be used to control program logic.
  - EZEUSR (EGL **sysVar.sessionID**). In VisualAge Generator for the CICS environment, EZEUSR contains the CICS terminal identifier and is equivalent

to EZELTERM. In EGL, for native environments, **sysVar.sessionID** is initialized from the Java Virtual Machine system property user.name. If this property cannot be retrieved, **sysVar.sessionID** contains blanks.

– EZEUSRID (EGL **sysVar.userID**). In VisualAge Generator, for the CICS environment, EZEUSRID contains the CICS user ID if the user is signed on to the system; otherwise it contains blanks. In EGL, for native environments, **sysVar.userID** is initialized from the Java Virtual Machine system property *user.name*. If this property cannot be retrieved, **sysVar.userID** contains blanks.

Differences between generated C++ and generated Java

The following differences occur if you change from generated C++ to generated Java:

- VAGen-generated C++ programs use environment variables to control the runtime environment. EGL-generated Java programs use either *programName*.properties or rununit.properties, depending on the value of the **genProperties** build descriptor option. See "Runtime environment variables" on page 352 for the correspondence between the VisualAge Generator environment variables and the EGL runtime properties.
- Generated Java is not interoperable with VAGen generated C++ programs. An EGL program that is generated for Java cannot transfer to or from a VAGen program that is generated for C++. An EGL program that is generated for Java can call a VAGen called batch program that is generated for C++.
- A call from a generated Java program to a native C++ or VAGen generated C++ program is always a remote call even if the programs are running on the same workstation. Therefore, you must add a linkage table entry for this situation.
- In VAGen generated C++ programs, binary data is stored in Intel format (reversed byte order). In EGL generated Java programs, binary data is not stored in Intel format. The EGL conversion tables convert binary data that is passed on calls between generated Java and generated C++ programs. However, you must write a program to convert any binary data in files that were written by C++ programs before using the file in a generated Java program.
- For generated Java programs, the name resolution rules for the transfer or show statements are as follows:
  – If the **transfer** or **show** statement explicitly specifies both the package name and program name, this is the program that is used (for example: transfer to program mypackage.program1).
  – If the **transfer** or **show** statement explicitly specifies only the program name, then the first of the following that applies is used to resolve the program name:
    - The file containing the **transfer** or **show** statement explicitly imports the package and program (for example: import mypackage.program1 and transfer to program program1).
    - The transfer to program is in the same package as the **transfer** or **show** statement.
    - The file containing the transfer or show statement imports a package that contains the transfer to program (for example: import mypackage.* and transfer to program program1).
    - The linkage options part used at generation includes a transfer link entry for the transfer from program that specifies the transfer to program and the package that contains it. For the **show** statement, the transfer link entry must be in the form of a transfer to transaction entry.

  - If the **transfer** or **show** statement uses **sysVar.transferName** and the transfer-to program is in a different package, you must use a linkage options part to specify the package that contains the transfer-to program.
- General differences are as follows:
  - Resource association is done at runtime when using VisualAge Generator generated C++ code. In EGL, you have the option to specify resource association information at generation time and have it generated into the properties file for you. Set the resource associations build descriptor to point to your resource associations part. Also set the **genProperties** build descriptor to GLOBAL or PROGRAM. Refer to the online helps for details of these build descriptor options.
- Differences for maps are as follows:
  - Blink is not supported for text forms.
  - The *isDecimalDigit* property is only supported for character fields. It is implemented as a software edit, not as a hardware attribute. Numeric fields also have a software edit. See "Map fields and the numeric hardware attribute" on page 79 for details.
- For indexed records that have an alternate index record defined, the setting for the DUP I/O error value differs from VisualAge Generator. For VisualAge Generator, for a SET record SCAN followed by a SCAN or SCANBACK I/O option, the DUP I/O error value is not set for the SET record SCAN statement. The DUP I/O error value is set for each of the duplicate-keyed records other than the last record retrieved with a duplicate key. For Java generation, a *set* record *position* followed by a *get next* or *get previous* statement results in the *duplicate* I/O error state being set on the *set* record *position* rather than on the first duplicate-keyed record retrieved. The remaining duplicate-keyed records result in the *duplicate* I/O error state being set the same as in VisualAge Generator. The EGL duplicate state is set on all records other than the first and last of the duplicate-keyed records. See the online helps for more information about indexed records and alternate index records and their use with *set* record *position*, *get next* and *get previous*.
- Differences for SQL are as follows:
  - In VisualAge Generator, generated C++ uses either DB2 or ODBC. EGL debug and Java generation use JDBC. This results in differences in both debug and runtime. See "Differences in SQL support" on page 210 for details.
- EZE special data word differences are as follows:
  - EZECONVT (EGL **sysVar.callConversionTable**). In VisualAge Generator for C++ generation, the conversion table names are in the format ELAxxyyy, where xx indicates the system and yyy indicates the language. In EGL, for Java generation, the conversion table names provided by EGL are in the format CSOBxxxx, where CSO is a fixed prefix, B indicates the byte order of the target system, and xxxx indicates the code page of the target system. Valid values for B are X for Unix systems, I for Intel systems, and E for EBCDIC systems. EGL automatically translates the ELA table names to CSO table names for you so you do not need to change any code. However, EGL does not provide the ability for you to create your own CSO conversion table.
  - EZERCODE (EGL **sysVar.returnCode**). In VisualAge Generator, for C++ generation, EZERCODE is passed back to the system or calling program. If the program ends abnormally, a VAGen return code is passed back rather than the value in EZERCODE. In EGL, for Java generation, EZERCODE is ignored.

Part 7. Appendixes

Appendix A. Reserved words

EGL reserved words

There are a large number of reserved words in EGL. The reserved words cannot be used as part names. The migration tool renames functions, data items, records, and maps if the part name is an EGL reserved word. The migration tool does not rename tables, map groups, or programs. The EGL reserved words are as follows:

Table 67. EGL reserved words

Letter	Reserved words
A	absolute, add, all, and, any, as
B	bigInt, bin, bind, blob, boolean, by, byName, byPosition
C	call, case, char, clob, close, const, continue, converse, current
D	dataItem, dataTable, date, dbChar, decimal, decrement, delete, display, dli, dlicall
E	else, embed, end, escape, execute, exit, extends, externallyDefined
F	false, field, first, float, for, forEach, form, formGroup, forUpdate, forward, freeSql, from, function
G	get, goto, group
H	handler, hex, hold
I	if, implements, import, in, inOut, inParent, insert, int, interface, interval, into, is, isa
L	label, languageBundle, last, library, like
M	matches, mbChar, money, move
N	new, next, nil, no, noRefresh, not, nullable, num, number, numc
O	of, onEvent, onException, open, openUI, or, otherwise, out
P	pacf, package, PageHandler, passing, prepare, previous, print, private, program
R	record, ref, relative, replace, return, returning, returns
S	scroll, self, service, set, show, singleRow, smallFloat, smallInt, sql, sqlCondition, stack, static, string
T	this, time, timeStamp, to, transaction, transfer, true, try, type
U	unicode, update, url, use, using, usingKeys, usingPCB
W	when, where, while, with, wrap
Y	yes

Note: EGL part names cannot start with EZE, the # symbol, or the @ symbol.

EGL enumeration words

VAGen has a fixed list of valid values for each property. EGL provides an enumeration list that contains the valid values for the corresponding property. For example, EGL stores the valid values for the align property in an EGL enumeration called AlignKind. In addition, EGL permits the use of variables and expressions for property values. When EGL resolves a property value, EGL looks first for a variable by that name. If there is no variable by that name, then EGL looks at the enumeration that corresponds to the property to validate the property value. For example, in a form, if a variable field has the property align=center, EGL looks first for a variable named center within the form. If there is no variable named center

within the form, EGL then uses AlignKind.center. Table 68 shows the EGL enumeration names, the list of valid values in the enumeration, and the parts where the property is used in a way that can cause a collision between variable names and the values in the enumeration.

In addition, there are several properties that can be set using EGL library constants and variables. Table 69 lists the EGL properties that use EGL library constants and variables for reference purposes. However, the migration tool only uses the EGL library variables and constants that are indicated by an asterisk (*) in the table.

To avoid conflicts when you write new code, you can do one of the following:

- Avoid the use of variable names that match any of the list of valid values when you are defining variables that might have a collision with that name.
- Always qualify the enumeration value for a property (for example, always specify align = AlignKind.center).
- Qualify the enumeration value for a property whenever there is a conflict (for example, specify align = AlignKind.center whenever there is a field named center within a specific form).

The migration tool uses a combination of the 3 techniques, based on anticipated frequency of use, the properties that the migration tool actually uses, and migration performance considerations. To minimize the need to rename your parts and variables, the migration tool does the following:

- Always renames parts or variables named YES or NO because these are EGL reserved words.
- Always renames parts or variables named PFn, where *n* is between 1 and 24. In effect, the migration tool treats these values as reserved words. This improves the appearance of the helpKey and validationBypassKeys properties for programs and forms without a migration performance impact.
- Within a FormGroup, the migration tool does the following:
  - Always fully qualifies the deviceType property value. This improves performance by avoiding the need to review all the field names in all the forms within the FormGroup.
  - Never uses the helpKey or validationBypassKeys properties because there are no VAGen equivalent properties for a map group.
- Within a form, the migration tool only qualifies properties on the form if one or more fields within the form is named the same as one of the enumeration values, EGL constants, or EGL variables that can be used on a form. If there is a conflict for any field on the form, the migration tool fully qualifies all property values for all fields within the form with the corresponding enumeration or library name. However, for the purposes of determining if any field has a conflict, the migration tool ignores the IndexOrientationKind values (across and down) because the migration tool never uses this property.
- Within a VGUI record, the migration tool only qualifies properties in the record if one or more fields within the record is named the same as one of the enumeration values or EGL variables that can be used in a VGUI record. If there is a conflict for any field in the record, the migration tool fully qualifies all property values for all fields within the record with the corresponding enumeration or library name.
- Within a PSB record, the migration tool always fully qualifies the pcbType property.
- Within a program, the migration tool always fully qualifies the callInterface property.

- Never qualifies property values within other part types because there is no possibility of a conflict between a part name and the enumeration values.

Note: Table 68 on page 223 and Table 69 on page 224 are for reference purposes. Therefore, the tables include Library, ConsoleUI, PageHandler, Service, and Interface parts, which the migration tool never creates.

Table 68. EGL enumerations

EGL enumeration	Valid values list which imposes restrictions on variable names	Parts with possible collision
AlignKind	center, left, none, right	Form
CallingConventionKind	I4GL	Library
CaseFormatKind	defaultCase, lower, upper	ConsoleUI
ColorKind	black, blue, cyan, defaultColor, green, magenta, red, yellow, white **Note:** black is only valid for ConsoleUI	Form ConsoleUI
CommTypeKind	LOCAL, TCPIP	Service Interface
DataSource	databaseConnection, reportData, sqlStatement	Report
DeviceTypeKind	doubleByte, singleByte	FormGroup
DisplayUseKind	button, hyperlink, input, output, secret, table	Any record used with a PageHandler
DLICallInterfaceKind	AIBTDLI, CBLTDLI	Program
EventKind	afterDelete, afterField, afterInsert, afterOpenUI, afterRow, beforeDelete, beforeField, beforeInsert, beforeOpenUI, beforeRow, menuAction, onKey	ConsoleUI
ExportFormat	html, pdf, text	ConsoleUI
HighlightKind	blink, defaultHighlight, noHighlight, reverse, underline	Form ConsoleUI
IndexOrientationKind	across, down	Form
IntensityKind	bold, defaultHighlight, dim, invisible, normalIntensity	Form ConsoleUI
LineWrapKind	character, compressed, word	ConsoleUI
OutlineKind	bottom, left, right, top **Note:** sysLib.box is a constant that equates to [left,right,top,bottom]. sysLib.noOutline is a constant that means there is no outlining.	Form
PCBKind	TP, DB, GSAM	PSB record

Table 68. EGL enumerations (continued)

EGL enumeration	Valid values list which imposes restrictions on variable names	Parts with possible collision
PfKeyKind	pf*n*, where (1 <= *n* <=24)	Form FormGroup Program
ProtectKind	skip, no, yes	Form
SelectTypeKind	index, value	Any record used with a PageHandler
SignKind	leading, none, parens, trailing	Form VGUI record Any record used with a PageHandler
UITypeKind	hidden, input, inputOutput, none, output, programLink, submit, submitBypass, uiForm	VGUI record

Table 69. EGL Enumerations that use sysLib constants and sysVar variables

EGL property	EGL constants and variables (* = value used by migration tool)	Parts with possible collision
dateFormat	strLib.defaultDateFormat* strLib.eurDateFormat strLib.isoDateFormat strLib.jisDateFormat strLib.usaDateFormat VGVar.systemGregorianDateFormat* VGVar.systemJulianDateFormat* **Note:** The migration tool only uses defaultDateFormat in DataItem and VGUI record parts.	ConsoleUI Form, VGUI record
fillCharacter	strLib.nullFill*	Form
outline	sysLib.box* sysLib.noOutline **Note:** outlineKind is an enumeration for other outline values.	Form
timeFormat	strLib.defaultTimeFormat strLib.eurTimeFormat strLib.isoTimeFormat strLib.jisTimeFormat strLib.usaTimeFormat	Any record used with a PageHandler
timeStampFormat	strLib.db2TimeStampFormat strLib.odbcTimeStampFormat	ConsoleUI

SQL reserved words

There are a large number of SQL reserved words that cannot be used in SQL clauses. The migration tool renames functions, data items, records, and maps if the part name is an SQL reserved word. The migration tool does not rename tables, map groups, or programs. The SQL reserved words are as follows:

Letter	Reserved words
A	absolute, action, add, alias, all, allocate, alter, and, any, are, as, asc, assertion, at, authorization, avg
B	begin, between, bigint, binaryLargeObject, bit, bit_length, blob, boolean, both, by
C	call, cascade, cascaded, case, cast, catalog, char, char_length, character, character_length, characterLargeObject, characterVarying, charLargeObject, charVarying, check, clob, close, coalesce, collate, collation, column, comment, commit, connect, connection, constraint, constraints, continue, convert, copy, corresponding, count, create, cross, current, current_date, current_time, current_timestamp, current_user, cursor
D	data, database, date, dateTime, day, deallocate, dec, decimal, declare, default, deferrable, deferred, delete, desc, describe, diagnostics, disconnect, distinct, domain, double, doublePrecision, drop
E	else, end, endExec, escape, except, exception, exec, execute, exists, explain, external, extract
F	false, fetch, first, float, for, foreign, found, from, full
G	get, getCurrentConnection, global, go, goto, grant, group
H	having, hour
I	identity, image, immediate, in, index, indicator, initially, inner, input, insensitive, insert, int, integer, intersect, into, is, isolation
J	join
K	key
L	language, last, leading, left, level, like, local, long, longint, lower, ltrim
M	match, max, min, minute, module, month
N	national, nationalCharacter, nationalCharacterLargeObject, nationalCharacterVarying, nationalCharLargeObject, nationalCharVarying, natural, nchar, ncharVarying, nclob, next, no, not, null, nullIf, number, numeric
O	octet_length, of, on, only, open, option, or, order, outer, output, overlaps
P	pad, partial, position, prepare, preserve, primary, prior, privileges, procedure, public
R	raw, read, real, references, relative, restrict, revoke, right, rollback, rows, rtrim, runtimeStatistics
S	schema, scroll, second, section, select, session, session_user, set, signal, size, smallint, some, space, sql, sqlcode, sqlerror, sqlstate, substr, substring, sum, system_user
T	table, tablespace, temporary, terminate, then, time, timestamp, timezone_hour, timezone_minute, tinyint, to, trailing, transaction, translate, translation, trim, true
U	uncatalog, union, unique, unknown, update, upper, usage, user, using
V	values, varbinary, varchar, varchar2, varying, view
W	when, whenever, where, with, work, write
Y	year
Z	zone

SQL reserved words requiring special treatment

The following SQL reserved words require special treatment in EGL if they are used as SQL table names or column names:

```
call, from, group, having, insert, order, select, set, union,
update, values, where
```

To use these SQL reserved words, do the following:

- To specify the column property for an item in an sqlRecord, specify:

  ```
  column = "\"reservedWord\""
  ```

  For example:

  ```
  column = "\"FROM\""
  ```

- To specify the tableNames property for an sqlRecord, specify:

  ```
  tableNames = [["\"reservedWord2\""]]
  ```

  For example:

  ```
  tableNames = [["\"ORDER\""]]
  ```

- To use one of the reserved words as an SQL column name in the defaultSelectCondition for a record, specify:

  ```
  defaultSelectCondition = #sqlCondition{ "reservedWord" =  ... }
  ```

  For example:

  ```
  defaultSelectCondition = #sqlCondition{ "ORDER" =  ... }
  ```

- To use one of the reserved words as an SQL column name in an SQL I/O statement, specify:

  ```
  ...   #sql{ select "reservedWord"  from "reservedWord2" ....  }  ...
  ```

  For example:

  ```
  ...   #sql{ select "FROM"  from "ORDER" ....  }  ...
  ```

Java reserved words

Java has reserved words that cannot be used for the package names. If you are generating Java, you may want to avoid using these names:

Letter	Reserved word
A	abstract
B	boolean, break, byte
C	case, catch, char, class, const, continue
D	default, do, double
E	else, extends
F	false, final, finally, float, for
G	goto
I	if, implements, import, instanceof, int, interface
L	long
N	native, new, null
P	package, private, protected, public
R	return
S	short, static, super, switch, synchronized
T	this, throw, throws, transient, true
V	void, volatile
W	while

Appendix B. Relationship of VisualAge Generator and EGL Language Elements

The tables in this appendix have 3 columns:

- VisualAge Generator 4.5 -- this column shows the VAGen language element. In the sections related to part type, the organization of the tables and the terminology used correspond to the VAGen user interface. The tables for statements, EZE words, and service routines are organized based on the type of statement, EZE word, or service routine.
- EGL produced by the migration tool -- this column shows the corresponding EGL language element. This column only shows the information needed for migration and is not intended to be the complete EGL syntax. Additional properties, values, and options might be available for certain EGL language elements. For example, the EGL set statement provides additional options that are not available in VisualAge Generator. The only set statement options listed in these tables are the ones that correspond to VAGen language elements. Use this column as a guide for finding more detailed information in the EGL documentation.
- Migration tool considerations -- this column contains additional information about how the migration tool handles the conversion from VisualAge Generator to EGL. It also provides references to the sections on ambiguous situations, where necessary, to provide details about migration with and without the associated part and the potential problems that can occur when migrating the VAGen language element.

For each part type, the first row in the first table of the section provides:

- VisualAge Generator 4.5 - an overview of the information you can specify in various windows for the part type in VisualAge Generator.
- EGL — the overall EGL syntax for the corresponding EGL part type, using the syntax that the migration tool uses. Other variations of the syntax might be possible. For example, when migrating a VAGen table, the migration tool always places the dataTable contents after the dataTable structure so that is the syntax shown in the Tables section. EGL syntax also permits the dataTable contents to be placed before the dataTable structure.

The following syntax is used in the tables:

- | - choice of a few options. The order of the choices is the same in both the VisualAge Generator 4.5 and the EGL columns.
- bullet list - choice of a longer list of options or values. The order of the choices is the same in both the VisualAge Generator 4.5 and the EGL columns.
- *italics* - values that the migration tool fills in when migrating from VisualAge Generator or that you fill in when writing new EGL statements.
- **bold** - EGL key words and symbols that must be specified as shown.
- { } - encloses information that can be repeated 0 to n times.
- **{ }** - encloses an EGL property list; properties are always separated by commas.
- [ ] - encloses optional information.
- **[ ]** - encloses an EGL list of values; values are always separated by commas

General syntax conventions

There are some differences in the overall syntax of VisualAge Generator and EGL.

Table 70. General syntax conventions

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Comments are specified in the following formats: • Prologs for programs, tables, and records. • Descriptions for items and functions. • Comments within functions are indicated by: – a semicolon (;). Everything on the same line after the semicolon is treated as a comment. – /*. Everything on the same line after the /* is treated as a comment.	Comments are specified in the following formats: • // indicates a line comment. Everything on the same line after the // is treated as a comment. The comment is only for one line. • /* comment */. Everything after the /* is treated as a comment until the next */. The comment can span multiple lines.	The migration tool converts as follows: • Prologs and part descriptions are converted to EGL // line comments. • Descriptions for items used as fields in records, tables, maps, function local storage, function parameters, or function return values are converted to EGL // line comments. • Comments within functions are converted to /* comment */ • Informational comments added by the migration tool are in the form of EGL // line comments.
Decimal point can be either a period or a comma depending on your locale.	Decimal point during development is always the period. Generation and runtime use either a period or a comma depending on the runtime locale and the decimalSymbol build descriptor option.	During migration, if your locale uses the comma for the decimal point by default or if you select the Migration Syntax Preference Convert decimal comma to decimal point, the migration tool converts the comma to a period.
Properties are entered in specialized editors using check boxes, drop down lists, and so on.	Properties are entered in a text editor and must be separated by a comma.	No special considerations.
Lists of values are entered in specialized editors. For example, the table names for an SQL record are entered in the SQL Row Properties window.	Lists of values must be enclosed in square brackets [ ].	No special considerations.
Property values that reference other parts are entered in specialized editors. For example, the Edit routine for a map variable field is entered on the Edits page of the Variable Field Properties window.	Property values that refer to other parts must be enclosed in double quotes.	No special considerations.
Resolution of names within statements is context sensitive and is based on the statement type.	Resolution of names within statements always follows the same rules regardless of the statement type.	No special considerations. Any differences in name resolution result in EGL validation messages in the Problems view. If a message occurs, see “Reference information for messages - name resolution and qualification rules” on page 404.

Data item

The data item section is organized into the following tables:

- Data item - general syntax, data type, length, decimals, and description, Table 71 on page 229

- Default map properties and User Interface properties - general information, Table 72 on page 231
- Default map properties and User Interface properties - general edits, Table 73 on page 231
- Default map properties and User Interface properties - numeric edits, Table 74 on page 233
- Default map properties and User Interface properties - error messages, Table 75 on page 234
- User Interface properties - label and help, Table 76 on page 235

Note: In EGL, there is only one set of edit and message properties for a dataItem part. The migration tool merges the map and UI properties for the data item.

Table 71. Data item — general syntax, data type, length, decimals, and description

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen data item part: • itemName • Basic information: – Data type – Length – Decimals – Description • Default Map Properties • User Interface (UI) Properties	EGL syntax example: `// Description` `DataItem itemName` `dataType(lengthInformation)` `{ [{formattingProperties}]` `[{validationProperties}]` `[{pageHandlerFieldProperties}]` `}` `end`	The migration tool uses the VAGen data type, length, and decimals to determine the EGL dataType and lengthInformation. The migration tool merges the VAGen default map properties and the UI properties into the single set of EGL formatting, validation, and pageHandlerField properties.
Character item types: • Char • Hex • DBCS • Mixed • Unicode (VisualAge for Java only) Length is the number of characters. In the record editor you can also show the number of bytes.	Corresponding character item types: • char • hex • dbchar • mbchar • unicode Length is the number of characters.	The migration tool converts character data items to the corresponding type and length.
Numeric character (zoned decimal) types: • Num • Numc Length is the total number of digits, with a maximum of 18. Decimals is the number of digits to the right of the decimal point. In the record editor, you can also show the number of bytes.	Corresponding numeric types: • num • numc Precision is the total number of digits. Scale is the number of digits to the right of the decimal point. The maximum precision for num fields is 32 for debug and Java generation or 31 for COBOL generation. The maximum precision for numc fields is 18.	The migration tool converts to the corresponding type, precision, and scale. The migration tool omits the scale if decimals is 0.

Table 71. Data item — general syntax, data type, length, decimals, and description (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Packed decimal types: • Pacf • Pack Length is the total number of digits, with a maximum of 18. Decimals is the number of digits to the right of the decimal point. The length for Pacf must be odd or 18. The length for Pack can be odd or even. Except for a length of 18, even lengths are recorded within the data item definition, but are treated as the next higher odd length for test, generation, and in the Data Item and Record editors. Only the SQL Record editor shows the even lengths and only SQL records support even length for test and generation. The even length is only used in SQL *where* clauses and in SQL functions that use execution time statement build. In the record editor you can also show the number of bytes.	Corresponding numeric types: • pacf • decimal Precision is the total number of digits. Scale is the number of digits to the right of the decimal point. The maximum precision for pacf fields is 18. The maximum precision for decimal fields is 32 for debug and Java generation or 31 for COBOL generation. The length for pacf must be odd or 18. The length for decimal can be odd or even. Even lengths are supported for dataItem part definitions and all record types. At test and generation, if you use VisualAge Generator Compatibility mode, EGL does the following for decimal items with even precision: • Increases the precision by one in all records. • EGL uses a temporary variable with the even precision in SQL *where* clauses or *prepare* statements.	The migration tool converts to the corresponding type, precision, and scale. The migration tool omits the scale if decimals is 0. For a Pack item, if an even length was recorded in the dataItem part definition, by default the migration tool migrates it as the even length. If you specify the VAGen Migration Preference *Do not honor evensql=y for items or variables*, the migration tool automatically uses odd precision for a Pack item (or 18 if the item is the maximum length) and issues a warning message for the affected data item part or nonshared record item.
Binary item types: • Bin, length 4, no decimals • Bin, length 9, no decimals • Bin, length 18, no decimals • Bin, length 4, 9, or 18 with decimals	Corresponding binary types: • smallint (no precision or scale) • int (no precision or scale) • bigint (no precision or scale) • bin with precision and scale	The migration tool converts binary data items to the corresponding type based on the length and number of decimals. The bin type is only used if decimals (scale) is specified.
Description	Not applicable.	The migration tool converts the item description to a comment that precedes the dataItem definition.

Table 72. Default map properties and User Interface properties - general information

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Data items can have both default map properties and user interface (UI) properties specified. The properties include the following: • formatting edits • validation edits • error messages UI properties also include a label and help text. Explicitly setting some properties in VisualAge Generator automatically causes other properties to be set. For example, setting numeric separator also explicitly sets fill character, input required, justify, currency symbol, and sign.	DataItem parts can have the following properties: • formatting properties • validation properties • PageHandler field properties The categories for some properties are changed from VisualAge Generator. For example, error messages are grouped with the validation properties. PageHandler field properties include the UI label and help text. The EGL column in the following tables shows the category for the EGL property.	The migration tool merges the default map properties and UI properties, giving precedence to the UI properties. Validation edits and their associated error messages are migrated as a pair. The migration tool only migrates properties that were explicitly set in VisualAge Generator. The tool does not automatically insert default values for EGL properties. See information about Merging map and UI edits in "Shared edits and messages" on page 63 for details and potential problems. Also see information about map item edits for shared data items in "Map edit routine for shared data items" on page 64 for details and potential problems.

Table 73. Default map properties and User Interface properties - general edits

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Edit type (UI only) - values: • None • Boolean • Date • Time	EGL supports multiple properties: • not applicable • isBoolean = yes • dateFormat = defaultDateFormat • timeFormat = ″HH:mm:ss″ (formatting properties)	No special considerations.
Edit function (UI only)	validatorFunction (validation property)	No special considerations.
Edit table (UI only)	validatorDataTable (validation property)	No special considerations.
Run edit function on web (UI only)	runValidatorFromProgram	The EGL property is the reverse of the VAGen property. The migration tool converts *yes* to *no* and *no* to *yes*.

Table 73. Default map properties and User Interface properties - general edits (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Edit routine (map only)	validatorFunction OR validatorDataTable (validation property)	If the UI edit function and edit table are not specified, the migration tool does the following: • Sets the validatorFunction property if the map edit routine is EZEC10 or EZEC11. • Sets the validatorFunction property if the edit routine is a function. • Sets the validatorDataTable property if the edit routine is a table. If the UI edit function or edit table are specified, the migration tool does not migrate the map Edit routine. Special considerations apply if the edit routine is not available during migration. See information about map edit routines in "Map edit routine for shared data items" on page 64 for additional details and potential problems.
Justify - Left | Right | None (map only) **Note:** • For map items, the default is right for numeric fields and left for all other fields. • For UI items, justify is not supported.	align = left | right | none (formatting property) **Note:** • For form fields, the default is right for numeric fields and left for all other fields. • For PageHandler fields and VGUI record fields, align is not supported.	No special considerations.
Date edit mask (map only) Valid values are as follows: • SYSGREGRN • SYSJULIAN • dateEditPattern	dateFormat = *value* Valid values are as follows: • systemGregorianDateFormat • systemJulianDateFormat • *"dateEditPattern"* (formatting property) **Note:** In the dateEditPattern, the migration tool converts to the following EGL notation: • yy or yyyy indicates the year. • MM indicates the month. • dd indicates the day of the month. • DDD indicates the day of the year.	If the UI edit type does not specify Date, the migration tool sets the dateFormat based on the Date edit mask specified in VisualAge Generator, if any. If the UI edit type specifies Date, the migration tool does not migrate the map Date edit mask.
Minimum input	minimumInput (validation property)	No special considerations.

Table 73. Default map properties and User Interface properties - general edits (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Fill character **Note:** • The default fill character for items used in a UI record is blank for character, MIXED, and numeric fields. The default fill character is zero for hex fields. Blank is the required fill character for DBCS and Unicode fields. Null is not a valid fill character. • The default fill character for items used on a map is null for character, DBCS, or MIXED fields. The default fill character is blank for numeric fields and zero for hex fields.	fillCharacter (formatting property) **Note:** • The same default fillCharacter is used for PageHandler fields, form fields, and VGUI record fields unless overridden in the specific page, form, or VGUI record. • strLib.nullFill is the EGL constant for the null fill character. Alternatively, use "" (two consecutive double quotes). • Non-blank characters are permitted for Unicode fields in a VGUI record.	The migration tool converts N to the following: • N for a UI fill character • nullFill for a map field character Special considerations apply because there is only one default fill character in EGL. See information about ambiguous data items and fill characters in "Fill characters for shared data items" on page 66 for details and potential problems.
Fold	upperCase (formatting property)	No special considerations.
Hex edit (map only)	isHexDigit (validation property)	No special considerations.
Input required	inputRequired (validation property)	No special considerations.
Check SO/SI space	needsSOSI (validation property)	No special considerations.

Table 74. Default map properties and User Interface properties - numeric edits

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Minimum value and Maximum value **Note:** If either Minimum value or Maximum value is specified, both must be specified.	validValues = **[[***minimumValue, maximumValue***]]** (validation property) **Note:** Multiple pairs of values and single values can be listed in the validValues property.	The migration tool combines the minimum and maximum value into the EGL validValues property.
Sign - None | Leading | Trailing **Note:** • The default sign for numeric items in a UI record is Leading. • The default sign for numeric items on a map is None.	sign = none | leading | trailing (formatting property) **Note:** The default sign for a numeric field is always leading.	For a numeric field, the migration tool migrates the first of the following that applies: • If the UI sign edit is specified, the tool migrates to the corresponding sign property. • If a UI edit type of date, time, or Boolean is specified, the tool sets sign = none. • If there are any other UI edits specified, the tool sets sign = leading. • If the map sign edit is specified, the tool migrates to the corresponding sign property. • If the map sign edit is not specified, the tool sets sign = none.

Table 74. Default map properties and User Interface properties - numeric edits (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Currency (both map and UI) Currency symbol (UI only)	`currency = yes | no |` `currencySymbol = "symbol"` (formatting property) **Note:** • The currencySymbol also applies to forms. • If currency = yes, but the currencySymbol is not specified; the actual currency symbol used at runtime is set the same way it is in VisualAge Generator.	The migration tool migrates the first of the following that applies: • If the UI Currency symbol is specified, the tool migrates to currency = yes, currencySymbol = ″symbol″. • If the UI Currency edit is set to yes or no, the tool sets the currency property to yes or no, respectively. • If the map Currency edit is set to yes or no, the tool sets the currency property to yes or no, respectively.
Separator	numericSeparator (formatting property)	No special considerations.
Zero edit	zeroFormat (formatting property)	No special considerations.

Table 75. Default map properties and User Interface properties - error messages

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Edit table (UI only)	validatorDataTableMsgKey (validation property)	No special considerations.
EZE function (UI only)	validatorFunctionMsgKey (validation property)	No special considerations.
Edit routine (map only)	validatorDataTableMsgKey OR validatorFunctionMsgKey (validation properties)	Special considerations apply. See “Shared edits and messages” on page 63 for details on how the migration tool determines whether to migrate the map edit routine message. If the migration tool migrates the map edit routine message, the tool does the following: • Sets validatorFunctionMsgKey if the edit routine is EZEC10 or EZEC11. • Sets validatorDataTableMsgKey if the edit routine is a table. • Does not migrate the edit routine message if the edit routine is a function because the message is not used in this situation in VisualAge Generator. Special considerations apply. See information about ambiguous data items and map edit routines in “Map edit routine for shared data items” on page 64 for additional details and potential problems.
Minimum input	minimumInputMsgKey (validation property)	No special considerations.

Table 75. Default map properties and User Interface properties - error messages (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Input required	inputRequiredMsgKey (validation property)	No special considerations.
Data type	typeChkMsgKey (validation property)	No special considerations.
Numeric range	validValuesMsgKey (validation property)	No special considerations.

Table 76. User Interface properties - label and help

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
UI label	displayName (PageHandler field property)	No special considerations.
Help text	help (PageHandler field property)	No special considerations.

Record

The record section is organized into the following tables:

Note: The migration tool always converts VAGen records to EGL fixed record parts.

Table 77. Record - general syntax, record type, properties, and prolog

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen record part: • recordName • Basic information – Record type – Record structure (item list) • Properties (vary based on record type) • Prolog **Note:** The record structure can be given by specifying an alternate specification record or by including the item list.	EGL record example: `//*** Record=recordName***` `// prolog` `//******************` `Record recordName type recordType` `{ [ recordProperties ] }` `recordStructure` `end // end recordName` **Note:** The record structure can be given by specifying an embed statement or by including the item list.	No special considerations.

Table 77. Record - general syntax, record type, properties, and prolog (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Record types: • Working Storage • Redefined • Serial • Indexed • Relative • Message Queue • SQL Row • User Interface • DL/I Segment	EGL Record types: • basicRecord • basicRecord • serialRecord • indexedRecord • relativeRecord • mqRecord • sqlRecord • VGUIRecord • DLISegment	The migration tool migrates a redefined record to a basicRecord. The tool includes a comment with the record definition to provide the name of the record that was redefined. Special considerations apply for redefined records. See the information in "Redefined records" on page 66 for details and potential problems.
Working storage record properties: • Alternate specification	basicRecord properties: • embed statement	The migration tool migrates an alternate specification to the embed statement.
Redefined record properties: • Redefinition **Note:** The Redefinition property specifies the name of another record that provides the physical storage. The current record provides a different data item layout of the same physical storage.	basicRecord properties: • Not applicable. Redefinition information is only specified in programs that use the record. The same record can be used as a redefinition of another record or as a normal record.	The migration tool includes a comment with the record definition to provide the name of the record that was redefined. The migration tool also includes the redefines property on the declaration statement for the record in programs that use the record. Special considerations apply depending on how the record is used in the program and on whether the record is available during migration. See the information in "Redefined records" on page 66 for details and potential problems.
Serial record properties: • File name • Alternate specification • Variable length item • Occurrences item	serialRecord properties: • fileName • embed statement • lengthItem • numElementsItem	The migration tool migrates an alternate specification to the embed statement.
Indexed record properties: • File name • Record ID • Alternate specification • Variable length item • Occurrences item	indexedRecord properties: • fileName • keyItem • embed statement • lengthItem • numElementsItem	The migration tool migrates an alternate specification to the embed statement.
Relative record properties: • File name • Record ID • Alternate specification	relativeRecord properties: • fileName • keyItem • embed statement	The migration tool migrates an alternate specification to the embed statement.

Table 77. Record - general syntax, record type, properties, and prolog (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Message Queue record properties: • File name • Alternate specification • Include message in transaction • Open queue for exclusive use on input • Record length item • Occurrences item • Queue descriptor record • Open options record • Message descriptor record • Get options record • Put options record	mqRecord properties: • queueName • embed statement • includeMsgInTransaction • openQueueExclusive • lengthItem • numElementsItem • queueDescriptorRecord • openOptionsRecord • msgDescriptorRecord • getOptionsRecord • putOptionsRecord	The migration tool migrates an alternate specification to the embed statement.
SQL row record properties: • See Table 79 on page 239.	SQL row record properties: • See Table 79 on page 239.	No special considerations.
DL/I segment record properties: • See Table 80 on page 243.	DL/I segment record properties: • See Table 80 on page 243.	No special considerations.
UI record properties: • See Table 81 on page 245.	UI record properties: • See Table 81 on page 245.	No special considerations.
Prolog	Not applicable.	The migration tool converts the prolog to a comment that precedes the record definition.

Table 78. Record - record structure for most record types

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Record structure - variation 1: Alternate specification. If RecordA specifies an alternate specification of RecordB, RecordB provides all the items for RecordA. There is no item structure in RecordA. If RecordB contains level 77 items, RecordA only contains the non-level 77 items from RecordB.	Record structure - variation 1: The EGL embed statement specifies the record that provides the field structure for the current record. RecordA embeds RecordB. For example: `embed RecordB;`	The migration tool migrates an alternate specification to the embed statement Special considerations apply for level 77 items in working storage records. See information in "Level 77 items in records" on page 67 for details and potential problems.

Table 78. Record - record structure for most record types (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Record structure - variation 2 with Shared Items: • itemName • Occurs • Shared • levelNumber is hidden, but it is based on the data item hierarchy within the record. **Note:** Type, Length, Decimals and Description are visible in the record editor, but are not stored in the record.	Record structure - variation 2 with EGL type definitions example: `levelNumber itemName` `  itemName [occurs];` **Note:** Type, Length, Decimals and Description are **not** visible in the editor.	If you select the Migration Syntax Preference *Convert shared data items to primitive item definitions* and the data item part is available, the migration tool converts the shared item to an EGL variable that is defined using a primitive type definition based on the type, length, and decimals specified for the data item part. Migration of type, length, and decimals information is the same as described in Table 71 on page 229. If you do not select the Migration Syntax Preference *Convert shared data items to primitive item definitions* or the data item part is not available, the migration tool converts the shared item to an EGL variable that is defined using a type definition. For migration, the type definition is always the same as the item name. The migration tool omits the occurs information if occurs is 1. Special considerations apply for level 77 items in working storage records. See information in "Level 77 items in records" on page 67 for details and potential problems.
Record structure - variation 2 with Nonshared Items: • itemName • Occurs • Type • Length • Decimals • Nonshared • Description • levelNumber is hidden, but is based on the data item hierarchy within the record. **Note:** Type, Length, Decimals and Description are stored with the item in the record.	Record structure - variation 2 with EGL primitive types example: `levelNumber itemName` `  dataType(lengthInformation)` `  [occurs];` `  // Description` **Note:** Type, Length, Decimals and Description are visible in the editor.	The migration tool converts a nonshared item to an EGL variable that is defined using a primitive type. Migration of type, length, and decimals information is the same as described in Table 71 on page 229, Data items - general syntax, data type, length, decimals, and description. The migration tool omits the occurs information if occurs is 1. Special considerations apply for level 77 items in working storage records. See information in "Level 77 items in records" on page 67 for details and potential problems.

Table 79. Record - SQL properties and SQL record structure

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
SQL record properties: • Default key item • Alternate specification • SQL tables: – Label – Name **Note:** • If a record does not specify an alternate specification, the key items are the items in the record structure that specify key=yes. The Default key item is ignored. • If a record specifies an alternate specification, the key items are the Default key item in the current record merged with the items in the alternate specification record that specify key=yes. The keys are merged in the order in which the items appear in the record structure. If the Default key item in the current record is also specified as key=yes in the alternate specification record, the item is only included once in the merged list of keys. • SQL table names can be an actual table name (normal situation) or a table name host variable that will be substituted at run time. Table name host variables start with a semicolon (:).	sqlRecord properties: • keyItems • embed statement • tableNames and / or tableNameVariables **Note:** • keyItems is a list of all keys for the record. key=yes is not specified for items in the record structure. • The tableNames property is a list of the table names and table labels when the table name is not a host variable. The tableNameVariables property is a list of the table names and table labels when the table name is a host variable that will be substituted at run time. The table names in the tableNameVariables property do not start with a semicolon. tableNames and tableNameVariables can both be used in the same record definition.	The migration tool builds the keyItems property as follows: • If the VAGen alternate specification is not specified, the tool uses any items from the record structure that specify key=yes, but does not include the VAGen default key item. • If the VAGen alternate specification is specified, the tool merges any items from the alternate specification record that specify key=yes and the default key item from the current record. The keys are listed in the same order as the items appear in the record structure. If the default key item from the current record is the same as one of the key items from the alternate specification record, the item is only included once in the keyItems list. The migration tool builds the lists for tableNames and tableNameVariables as follows: • tableNames is built from the table names and table labels when the table name is not a host variable. • tableNameVariables is built from the table names and table labels when the table name is a host variable. Special considerations apply. See information about SQL alternate specification in “Alternate specification records” on page 68 for details and potential problems.

Table 79. Record - SQL properties and SQL record structure (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
SQL Default Conditions: • whereClauseText **Note:** • The SQL default conditions enable you to specify a where clause, most typically for join conditions when multiple tables are used in the SQL row record. The syntax is SQL syntax. • !itemColumnName variables are permitted. These variables specify the name of an item in the SQL row record. At test or generation time, VisualAge Generator substitutes the corresponding SQL column name.	Example of default selection conditions: `defaultSelectCondition =` `  #sqlCondition{` `  whereClauseText` `  }` **Note:** • The defaultSelectCondition is used for the same purpose as in VisualAge Generator. • !itemColumnName variables are not supported. Actual SQL column names must be used.	The migration tool converts any !itemColumnName variables to their corresponding SQL column name. Special considerations apply. See information about SQL alternate specification in "Alternate specification records" on page 68 for details and potential problems.
Record structure - variation 1: Alternate specification. If RecordA specifies an alternate specification of RecordB, RecordB provides all the items for RecordA. There is no item structure in RecordA.	Record structure - variation 1: The EGL embed statement specifies the record that provides the field structure for the current record. RecordA embeds RecordB. For example: `embed RecordB;`	The migration tool migrates an alternate specification to the embed statement.

Table 79. Record - SQL properties and SQL record structure (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Record structure - variation 2 with Shared Items: • itemName • Read Only • Key • SQL Column Name • SQL Code • Shared **Note:** • Type, Length, Decimals and Description are visible in the record editor, but are not stored in the record. • Level numbers are never used in SQL records. • The SQL Code is not included in the External Source Format for pack and binary fields. If the SQL Code is not included in the External Source Format for char, dbchar, or unicode fields, the field is treated as a fixed length field. This only occurs for records that were migrated from earlier releases of VisualAge Generator and never modified using VisualAge Generator 4.5.	Record structure - variation 2 with EGL type definitions example: *levelNumber itemName itemName* **{** [**sqlDataCode=***sqlCodeNumber*] [**column="***SQLColumnName***"**] [**isReadOnly=yes**] [**isNullable = yes**] [**sqlVariableLen = yes**] **};** **Note:** • Type, Length, Decimals and Description are **not** visible in the editor. • Level numbers are optional in SQL records. If level numbers are included, the SQL record is a fixed record. If level numbers are not included, the SQL record is not a fixed record. Non-fixed records permit the use of the new EGL data types of BLOB, CLOB, and string. However, other behavior of non-fixed records is not compatible with VAGen behavior.	If you select the Migration Syntax Preference *Convert shared data items to primitive item definitions* and the data item part is available, the migration tool does the following: • Converts the shared item to an EGL variable that is defined using a primitive definition based on the type, length, and decimals specified for the data item part. • Includes the sqlDataCode property for hex items. • Sets the sqlVariableLen=yes property for char, dbchar, or unicode fields if the VAGen SQL data code indicates the item is variable length. The migration tool omits the sqlVariableLen property if the VAGen SQL data code indicates the item is fixed length. If you do not select the Migration Syntax Preference to *Convert shared data items to primitive item definitions* or the data item part is not available, the migration tool does the following: • Converts the shared item to an EGL variable that is defined using a type definition. For migration, the type definition is always the same as the item name. • Includes the sqlDataCode property if it is included in the External Source Format and is not one of the values for VAGen binary or packed fields. • Sets the sqlVariableLen=yes property if the VAGen SQL data code indicates the item is variable length. The migration tool omits the sqlVariableLen property if the VAGen SQL data code indicates the item is fixed length. The migration tool does the following: • Includes any key=yes items in the EGL keyItems property for the sqlRecord. • Always adds a level number to items in the sqlRecord so that the record is a fixed record. This preserves VAGen behavior.

Table 79. Record - SQL properties and SQL record structure (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Record structure - variation 2 with Nonshared Items: • itemName • Type • Length • Decimals • Read Only • Key • SQL Column Name • SQL Code • Nonshared • Description **Note:** • Type, Length, Decimals and Description are stored with the item in the record. • Level numbers are never used in SQL records. • The SQL Code is not included in the External Source Format for pack and binary fields. If the SQL Code is not included in the External Source Format for char, dbchar, or unicode fields, the field is treated as a fixed length field. This only occurs for records that were migrated from earlier releases of VisualAge Generator and never modified using VisualAge Generator 4.5.	Record structure - variation 2 with EGL primitive types example: *levelNumber itemName* *dataType(lengthInformation)* *// Description* **{** [**sqlDataCode=***sqlCodeNumber*] [**column="***SQLColumnName***"**] [**isReadOnly=yes**] [**isNullable = yes**] [**sqlVariableLen = yes**] **};** **Note:** • Type, Length, Decimals and Description are visible in the editor. • Level numbers are optional in SQL records. If level numbers are included, the SQL record is a fixed record. If level numbers are not included, the SQL record is not a fixed record. Non-fixed records permit the use of the new EGL data types of BLOB, CLOB, and string. However, other behavior of non-fixed records is not compatible with VAGen behavior.	The migration tool converts the nonshared item to an EGL variable that is defined using a primitive type. Migration of type, length, and decimals information is the similar to what is described in Table 71 on page 229. The migration tool includes the sqlDataCode property only for hex items. The migration tool sets sqlVariableLen=yes for char, dbchar, and unicode data items if the VAGen SQL data code indicates the item is variable length. The migration tool omits the sqlVariableLen property if the VAGen SQL data code indicates that the item is fixed length. The migration tool does the following: • Includes any key=yes items in the EGL keyItems property for the sqlRecord. • Always adds a level number to items in the sqlRecord so that the record is a fixed record. This preserves VAGen behavior.
VAGen data type - Char • data code - 453 • data code - 449 or 457	EGL data type: • char; omit sqlVariableLen • varchar, sqlVariableLen = yes	No special considerations.
VAGen data type - DBCS • data code - 469 • data code - 465 or 473	EGL data type: • dbchar; omit sqlVariableLen • vardbchar, sqlVariableLen = yes	No special considerations.
VAGen data type - Unicode • data code - 469 • data code - 465 or 473	EGL data type: • unicode; omit sqlVariableLen • varunicode, sqlVariableLen = yes	No special considerations.

Table 79. Record - SQL properties and SQL record structure (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
SQL Column Name **Note:** The SQL Column Name is required.	column = *"SQLColumnName"* **Note:** The column property is optional. If the column property is omitted, it defaults to the field name.	The migration tool migrates based on the *Omit column name* preference. • If you select the preference, the tool does the following: – Omits the column property if the SQL Column Name is the same as the field name. – Includes the column property if the SQL Column Name is different from the field name. • If you do not select the preference, the tool always includes the column property.
No corresponding property. **Note:** VisualAge Generator always includes the null indicator variable for SQL items.	isNullable = yes | no **Note:** The default for isNullable is no.	The migration tool migrates based on the *Omit isNullable property* preference. • If you select the preference, the tool does not include the isNullable property, which will default to no. • If you do not select the preference, the tool always includes isNullable=yes. This preserves VAGen behavior.
Read Only **Note:** Read Only is always explicitly set. Read Only must always be yes if there are multiple tables specified for the SQL record.	isReadOnly = yes | no **Note:** ReadOnly defaults to yes if there are multiple tables specified for the SQL record. ReadOnly defaults to no if there is only one table specified for the SQL record.	The migration tool migrates based on the *Omit isReadOnly property* preference. • If you select the preference, the tool only includes the isReadOnly property if there is a single table specified for the record and the VAGen Read Only property is set to yes. • If you do not select the preference, the tool includes the isReadOnly property whenever the VAGen Read Only property is set to yes.

Table 80. Records - DL/I properties and DL/I record structure

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
DL/I record properties: • Key item • Alternate specification • Record length item **Note:** The record name must be the same as the segment name in the DL/I PSB.	DLISegment properties: • keyItem • embed statement • lengthItem **Note:** EGL permits the record name to differ from the segment name in the DL/I PSB. In this situation, the EGL *segmentName* property provides the name used in the DL/I PSB.	If the migration tool renames the record due to a conflict with an EGL reserved word or because the record name starts with the # or @ symbol, the tool includes the *segmentName* property to provide the original record name.

Table 80. Records - DL/I properties and DL/I record structure (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Record structure - variation 1: Alternate specification. If RecordA specifies an alternate specification of RecordB, RecordB provides all the items for RecordA. There is no item structure in RecordA. **Note:** The field names in the embedded record must be the same as the DL/I field names in the PSB.	Record structure - variation 1: The EGL embed statement specifies the record that provides the field structure for the current record. RecordA embeds RecordB. For example: `embed RecordB;` EGL permits the field names in the record to differ from the field names in the DL/I PSB. If the embedded record is not a DLISegment and the field names differ, set the *dliFieldName* property as follows: `embed RecordB` `  { fieldInRecordB` `  {dliFieldName="nameInPSB"} } ;`	The migration tool migrates an alternate specification to the embed statement. If the alternate specification record is not a DL/I segment, the tool overrides the dliFieldName property for any item that was renamed due to a conflict with an EGL reserved word or because the field name starts with the # or @ symbol. Special considerations apply. For details, see "Alternate specification records" on page 68.
Record structure - variation 2 with Shared Items: • itemName • Occurs • Shared • levelNumber is hidden, but is based on the data item hierarchy within the record. **Note:** • Type, Length, Decimals and Description are visible in the record editor, but are not stored in the record. • The field names must be the same as the DL/I field names in the PSB.	Record structure - variation 2 with EGL type definitions example: `levelNumber itemName` `  itemName [occurs]` `  {dliFieldName="nameInPSB"};` **Note:** • Type, Length, Decimals and Description are **not** visible in the editor. • EGL permits the field names in the record to differ from the field names in the DL/I PSB.	If you select the Migration Syntax Preference *Convert shared data items to primitive item definitions* and the data item part is available, the migration tool converts the shared item to an EGL variable that is defined using a primitive type definition based on the type, length, and decimals specified for the data item part. Migration of type, length, and decimals information is the same as described in Table 71 on page 229. If you do not select the Migration Syntax Preference *Convert shared data items to primitive item definitions* or the data item part is not available, the migration tool converts the shared item to an EGL variable that is defined using a type definition. For migration, the type definition is always the same as the item name. The migration tool omits the occurs information if occurs is 1. If an item is renamed due to a conflict with an EGL reserved word or because the name starts with the # or @ symbol, the migration tool includes the dliFieldName property.

Table 80. Records - DL/I properties and DL/I record structure (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Record structure - variation 2 with Nonshared Items: • itemName • Occurs • Type • Length • Decimals • Nonshared • Description • levelNumber is hidden, but is based on the data item hierarchy within the record. **Note:** • Type, Length, Decimals and Description are stored in the record. • The field names must be the same as the DL/I field names in the PSB.	Record structure - variation 2 with EGL primitive types example: *levelNumber itemName* *dataType*(*lengthInformation*) **[***occurs***]** **{dliFieldName="***nameInPSB***";}** **Note:** • Type, Length, Decimals and Description are visible in the editor. • EGL permits the field names in the record to differ from the field names in the DL/I PSB.	The migration tool converts a nonshared item to an EGL variable that is defined using a primitive type. Migration of type, length, and decimals information is the same as described in Table 71 on page 229. The migration tool omits the occurs information if occurs is 1. If an item is renamed due to a conflict with an EGL reserved word or because the name starts with the # or @ symbol, the migration tool includes the dliFieldName property.

Table 81. Records - UI record properties and record structure

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
UI record properties: • General – UI title – Submit value item – Edit function – Run edit function on web • Input Edit Order • Help text	VGUI record properties: • General properties – title – commandValueItem – validatorFunction – runValidatorFromProgram • validationOrder • help **Note:** The *validationOrder* property is specified on each item in the record. An example of a VGUI record definition is as follows: **Record** recordName **type VGUIRecord** **{alias="***originalVAGenName***",** **commandValueItem**=itemX**,** **validatorFunction**=functionY**,** **runValidatorFromProgram**=yes**,** **title**="Page Title"**,** **help**="help text line" **}** *recordStructure* **end** // end recordName	The EGL *runValidatorFromProgram* property is the reverse of the VAGen property. The migration tool converts *yes* to *no* and *no* to *yes*.

Table 81. Records - UI record properties and record structure (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Not applicable.	alias	If the record name conflicts with an EGL reserved word or starts with the # or @ symbol, the migration tool does the following: • Renames the UI record. • Sets the alias property to the original VAGen UI record name. Special considerations apply. See "Reserved words and UI record names" on page 70 for additional details.
The record structure is similar to that of a working storage record, except there is additional information for each data item: • UI type • UI properties	The record structure is similar to that of a basic record except that there are additional properties for each field: • uiType • validation properties, formatting properties, and PageHandler field properties	No special considerations.

Table 82. Record - UI item properties - general

VisualAge Generator 4.5	EGL	Migration tool considerations
Not applicable	alias	If the field name conflicts with an EGL reserved word or starts with the # or @ symbol, the migration tool does the following: • Renames the field. • Sets the alias property to the original field name. Special considerations apply. See "Reserved words and UI record names" on page 70 for additional details.
UI types - values are: • Form • Hidden • Input • Input/Output • None • Output • Program Link • Submit • Submit Bypass	uiType - values are: • uiForm • hidden • input • inputOutput • none • output • programLink • submit • submitBypass	No special considerations.
UI label	displayName (PageHandler field property)	No special considerations.
Array items: • Occurrences item • Selected index item	Structured field arrays: • numElementsItem • selectedIndexItem	No special considerations.

Table 83. Record - UI item properties - edits

VisualAge Generator 4.5	EGL	Migration tool considerations
Edit type – values are: • None • Boolean • Date • Time	EGL supports multiple properties: • Not applicable • isBoolean = yes • dateFormat = defaultDateFormat • timeFormat = ″HH:mm:ss″ (formatting properties)	No special considerations.
Edit function	validatorFunction (validation property)	No special considerations.
Run edit function on web	runValidatorFromProgram	The EGL property is the reverse of the VAGen property. The migration tool converts yes to no and no to yes.
Edit table	validatorDataTable (validation property)	No special considerations.
Minimum input	minimumInput (validation property)	No special considerations.
Fill character **Note:** • The default fill characters are as follows: – Blank for character, mixed, and numeric items. – 0 for hex items. • The fill character must be blank for DBCS and unicode items. • Null is not a valid fill character.	fillCharacter (formatting property) **Note:** • The default fill characters are as follows: – Blank for character, mbchar, and numeric items. – 0 for hex items. • The fill character must be blank for dbchar. Any character is valid as the fill character for unicode. • null is not a valid fill character.	No special considerations.
Fold	upperCase (formatting property)	No special considerations.
Input required	inputRequired (validation property)	No special considerations.
Check SO/SI space	needsSOSI (validation property)	No special considerations.
Currency and Currency symbol	`currency = yes | no` `currencySymbol = "symbol"`	No special considerations.
Minimum value and Maximum value **Note:** If either Minimum value or Maximum value is specified, both must be specified.	`validValues = [[minimumValue, maximumValue]]` (validation property)	The migration tool combines the Minimum value and Maximum value into the EGL *validValues* property.

Table 83. Record - UI item properties - edits (continued)

VisualAge Generator 4.5	EGL	Migration tool considerations
Sign - None | Leading | Trailing **Note:** The default sign for numeric items in a UI record is Leading.	sign = none | leading | trailing (formatting property) **Note:** The default sign for a numeric field is always leading.	• For a numeric field with a UI type of hidden, input, output, or input/output, the migration tool does the first of the following that applies: – If the UI sign edit is specified, the tool migrates to the corresponding sign property. – If a UI edit type of date, time, or Boolean is specified, the tool sets sign = none. – The tool sets a default of sign = leading. • For a numeric field with any other UI type, the migration tool omits the sign property.
Separator	numericSeparator (formatting property)	No special considerations.
Zero edit	zeroFormat (formatting property)	No special considerations.

Table 84. Record -- UI item properties - error messages

VisualAge Generator 4.5	EGL	Migration tool considerations
Edit table	validatorTableMsgKey (validation property)	No special considerations.
EZE function	validatorFunctionMsgKey (validation property)	No special considerations.
Minimum input	minimumInputMsgKey (validation property)	No special considerations.
Input required	inputRequiredMsgKey (validation property)	No special considerations.
Data type	typeChkMsgKey (validation property)	No special considerations.
Numeric range	validValuesMsgKey (validation property)	No special considerations.

Table 85. UI item properties - help

VisualAge Generator 4.5	EGL	Migration tool considerations
Help text	help (PageHandler field property)	No special considerations.

Table 86. UI item properties - submit

VisualAge Generator 4.5	EGL	Migration tool considerations
Initial value	Initializer in the following format for a field that is not an array: `="initialValue"` Initializer in the following format for a structured field array: `=["initialValue1","initialValue2"]`	No special considerations.

Table 87. Record - UI item properties - program link

VisualAge Generator 4.5	EGL	Migration tool considerations
Program link information: • Program • First UI record • Open as new window • Link parameters	Program link information: • programName • uiRecordName • newWindow • linkParms EGL combines the VAGen program link properties into a complex property as follows: `@programLinkData { programName = "PRGA", uiRecordName = "MYUI", newWindow = yes [ , linkParmsInfo ] }` **Note:** See below for the details of the optional linkParmsInfo.	No special considerations.
Link parameters: • Item in the First UI record • Value – Literal – Item in the current record **Note:** • When using the program link customizations for a form UI type, data within the current form is automatically moved by name to the First UI record of the next program. Additional fields within the First UI record can be initialized by listing them in the Link parameters. • When using the program link customizations for a program link UI type, only fields in the First UI record that are explicitly listed in the Link parameters are initialized.	EGL combines the VAGen link parameters into a complex property: `linkParms = [ @LinkParameter { name = "item1InFirstUI", value = "literal" }, @LinkParameter { name = "item2InFirstUI", valueRef = "itemInCurrent"}]` **Note:** EGL follows the same rules as VisualAge Generator for program link customizations for both the uiForm and the programLink UI types.	No special considerations.

Tables

The VAGen tables section is organized into the following tables:

- VAGen tables - general syntax, table type, properties, and prolog, Table 88 on page 250
- VAGen tables - table structure, Table 89 on page 251
- VAGen tables — table contents, Table 90 on page 252

Table 88. Tables — general syntax, table type, properties, and prolog

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen table part: • tableName • Basic information – Table type – Table structure (item list) • Properties • Prolog • Table Contents	EGL syntax example: `//*** DataTable=tableName***` `// prolog` `//******************` `DataTable tableName` `type tableType` `{ [otherTableProperties]` `[alias =` `"originalTableName"] }` `tableStructure` `[{ contents =` `[{rowContents}] }]` `end // end tableName`	The migration tool does not rename tables for you even if the name conflicts with the EGL reserved word list. The migration tool does not set the alias property. If you must rename a table, you can use the alias property to specify the original name of the VAGen table. See the information about table names in "Reserved words and table names" on page 71 for details.
Table types: • Unspecified • Match Invalid • Match Valid • Range Match Valid • Message	DataTable types: • basicTable • matchInvalidTable • matchValidTable • rangeChkTable • msgTable	No special considerations.
Properties — Runtime attributes: • Resident • Shared	DataTable properties: • resident • shared	No special considerations.
Properties - Fold table contents	Not applicable. If you want the table contents to be folded, you must enter the contents in upper case.	If the VAGen table specifies that the table contents should be folded, the migration tool ensures that the char, hex, and mixed data in the table contents is converted to upper case.
Prolog	Not applicable.	The migration tool converts the prolog to a comment that precedes the DataTable definition.

Table 89. Tables — Table structure

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen Table structure - with Shared Items: • itemName • Shared • levelNumber is hidden, but it is based on the data item hierarchy within the record. **Note:** Type, Length, Decimals and Description are visible in the table editor, but are not stored in the table.	DataTable structure - with EGL type definitions: `levelNumber itemName` `itemName ;` **Note:** Type, Length, Decimals and Description are **not** visible in the editor.	If you select the Migration Syntax Preference *Convert shared data items to primitive item definitions* and the data item part is available, the migration tool converts the shared item to an EGL variable that is defined using a primitive definition based on the type, length, and decimals specified for the data item part. Migration of type, length, and decimals information is the same as described in Table 71 on page 229. If you do not select the Migration Syntax Preference *Convert shared data items to primitive item definitions* or the data item part is not available, the migration tool converts the shared item to an EGL variable that is defined using a type definition. For migration, the type definition is always the same as the item name.
VAGen Table structure — with Nonshared Items: • itemName • Type • Length • Decimals • Nonshared • Description • levelNumber is hidden, but it is based on the data item hierarchy within the table. **Note:** Type, length, decimals, and description are stored with the item in the table.	DataTable structure — with EGL primitive types: `levelNumber itemName` `dataType(lengthInformation) ;` `// Description` **Note:** Type, length, decimals and description are visible in the editor.	The migration tool converts a nonshared item to an EGL variable that is defined using a primitive type. Migration of type, length, and decimals information is the same as described in Table 71 on page 229.

Table 90. Tables — table contents

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Table contents: • Table contents are entered in a formatted editor. Table contents are entered for the top level (parent) items in the table structure. • Character and hex data is not enclosed in quotes.	DataTable contents: • Each row's contents is enclosed in square brackets. There is an outer set of square brackets that encloses the entire set of rows. • Values within the row contents must be separated by commas. • Character data including hex data must be enclosed in double-quotes. Example: `contents = [ [ rowContents ]` `{ , [ rowContents ] }` `]` `where` `rowContents = value { , value}`	If the VAGen table specifies that the table contents should be folded, the migration tool ensures that the char, hex, and mixed data in the table contents is converted to upper case. The migration tool also encloses character data, including hex data, in double-quotes.

Map groups

The map groups section is organized into the following tables.

- Map Groups — general information, Table 91 on page 252
- Map Groups — general syntax and floating areas, Table 92 on page 253
- Map Groups — device names, types, and sizes, Table 93 on page 254

Table 91. Map Groups — general information

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
The map group part is only required if there are floating areas. If there is no map group part, VisualAge Generator automatically generates all maps with the same map group name as though the map group part did exist.	The formGroup is required.	The migration tool creates a formGroup part if one does not exist in the migration set.
Map names consist of a map group name and a map name.	The form name does not include the formGroup name. A form can be defined (nested) within a formGroup. Alternatively, a form can be outside the formGroup. In this case, the formGroup must include a use statement to specify the form name and an import statement to import the package in which the form is located. This technique enables you to have one definition of a common form (for example, a pop-up list form) and make it available in many different formGroups.	The migration tool migrates all maps to forms. The tool does not attempt to identify common, identical map definitions across multiple map groups. If you migrate in single file mode, the migration tool includes a use statement for each form within a formGroup. You should move the forms so that they are nested within their formGroup. If you migrate using Stage 1 – 3 migration, the migration tool automatically nests all forms within the formGroup.

Table 91. Map Groups — general information (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
When a program specifies a map group, the program can use any map within the map group just by referencing the map name.	When a program includes a *use* statement to indicate which formGroup it is using, the program can reference any map within the formGroup just by referencing the form name.	No special considerations.

Table 92. Map Groups — general syntax and floating areas

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
The map group part can contain the following: • Map group name • Floating area information – Device name – Device size – Size - Lines - Columns – Position - Starting line - Starting column	The formGroup can contain the following: • formGroup name • formGroup properties • Screen floating area information • Print floating area information • Use statements for the forms that are included in the formGroup. An example of the format of a formGroup is as follows: `FormGroup groupName {` `[ alias="generationName"]` `[ screenFloatingArea` `{screenFloatingAreaInformation}]` `[printFloatingArea` `{printFloatingAreaInformation}] }` `Form formName type textForm` `{formProperties}` `[variableFields]` `[constantFields]` `end // end formName` `use formName2;` `end // end groupName`	The migration tool uses the VAGen device type to determine whether the floating area information is for a Display map (screenFloatingArea) or a Printer map (printFloatingArea). See Table 93 on page 254 about setting deviceType.
Not applicable.	alias	The migration tool does not rename map groups even if they conflict with an EGL reserved word. Special considerations apply. See “Reserved words and formGroup names” on page 72 for details and potential problems.

Table 92. Map Groups — general syntax and floating areas (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Floating area information includes the following: • Device name • Device size (rows x columns) • Floating area specification – Size - Lines - Columns – Position - Starting line - Starting column **Note:** • In VisualAge Generator, you define the size and starting position of the floating area. • Different floating area specifications are permitted, but not recommended, for devices that have the same size.	Floating area information includes the following: • Device size • Margin information Print floating area information also includes the device type. Here is an example of the screen floating area that is used for text forms: `screenFloatingArea { screenSize=[lines,columns], topMargin=nn, bottomMargin=nn, leftMargin=nn, rightMargin=nn }` Here is an example of the print floating area that is used for print forms: `printFloatingArea { deviceType=singleByte, pageSize=[lines,columns], topMargin=nn, bottomMargin=nn, leftMargin=nn, rightMargin=nn }` **Note:** Only one floating area specification is permitted for a screenSize or pageSize.	The migration tool uses the VAGen device type to determine whether the floating area specification is for display maps (screenFloatingArea) or print maps (printFloatingArea). The migration tool computes the margin information as follows: • The topMargin is set to the VAGen floatingAreaStartingLine - 1. • The bottomMargin is set to the VAGen deviceRows - (floatingAreaStartingLine + floatingAreaLines) + 1. • The leftMargin is set to the VAGen floatingAreaStartingColumn - 1. • The rightMargin is set to the VAGen deviceColumns - (floatingAreaStartingColumn + floatingAreaColumns) + 1. See Table 93 on page 254 for information about setting the deviceType.
Printer type can be one of the following: • Printer • DBCS printer	deviceType=singleByte | doubleByte **Note:** The deviceType property is only specifed for print forms.	The migration tool sets the EGL deviceType property based on the VAGen printer type. The migration tool always qualifies the deviceType value with DeviceTypeKind (for example, deviceType = DeviceTypeKind.doubleByte). This avoids any name conflicts with variable fields on forms within the formGroup.

Table 93. Map Groups — device names, types, and sizes

VisualAge Generator Device Name	Device Size (lines x columns)	Device Type	Migration tool considerations
3643–2	6 x 40	Display	This device size is not supported for COBOL generation.
3277–1	12 x 40	Display	This device size is not supported for COBOL generation.
3643–4	16 x 64	Display	This device size is not supported for COBOL generation.

Table 93. Map Groups — device names, types, and sizes (continued)

VisualAge Generator Device Name	Device Size (lines x columns)	Device Type	Migration tool considerations
3278–1, 3278–1B, ANY–1D	12 x 80	Display	No special considerations.
3278–2, 3278–2B, ANY–2D	24 x 80	Display	No special considerations.
3278–3, 3278–3B, ANY-3D	32 x 80	Display	No special considerations.
3278–4, 3278–4B, ANY-4D	43 x 80	Display	No special considerations.
3278–5, 3278–5B, ANY-5D	27 x 132	Display	No special considerations.
ANY-D (3290 configured as 62x160)	255 x 160	Display	This device size is not supported for COBOL generation.
5550D	24 x 80	DBCS Display	No special considerations.
3767, PRINT-B, PRINTER	255 x 132	Printer	For the printFloatingArea, the EGL deviceType=singleByte
5550P	255 x 158	DBCS Printer	For the printFloatingArea, the EGL deviceType=doubleByte

Maps

The maps section is organized into the following tables.

- Maps — general information, Table 94 on page 255
- Display maps — general syntax, map type, and properties, Table 95 on page 256
- Printer maps — general syntax, map type, and properties, Table 96 on page 258
- Map constant and variable fields — general information, Table 97 on page 259
- Map constant and variable fields — general syntax, data type, length, decimals, and description, Table 98 on page 261
- Map constant and variable fields — attributes, Table 99 on page 264
- Map variable fields — general edits, Table 100 on page 265
- Map variable fields — numeric edits, Table 101 on page 267
- Map variable fields — error messages, Table 102 on page 268

Table 94. Maps — general information

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
There are two types of maps: • Display maps • Printer maps	There are two types of forms: • Text forms • Print forms	No special considerations.

Table 94. Maps — general information (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Map names consist of a map group name and a map name.	The form name does not include the formGroup name. A form can be defined (nested) within a formGroup. Alternatively, a form can be outside the formGroup. In this case, the formGroup must include a use statement to specify the form name and an import statement to import the package in which the form is located. This technique enables you to have one definition of a common form (for example, a pop-up list form) and make it available in many different formGroups.	The migration tool migrates all maps to forms. The tool does not attempt to identify common, identical map definitions across multiple map groups. If you migrate in single file mode, the migration tool includes a use statement for each form within a formGroup. You should move the forms so that they are nested within their formGroup. If you migrate using Stage 1 – 3 migration, the migration tool automatically nests all forms within the formGroup.
When a program specifies a map group, the program can use any map within the map group just by referencing the map name.	When a program includes a *use* statement to indicate which formGroup it is using, the program can reference any map within the formGroup just by referencing the form name.	No special considerations.

Table 95. Display maps — general syntax, map type, and properties

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Display maps can contain the following: • Map group name and map name • Map properties – General properties - Help map name - Help key - Bypass keys - Variable field folding – Layout properties - Map size - Starting position - Floating map – Devices - Type (Display or Print) - Supported devices • Constant fields • Variable fields • Field edit order for variable fields	Text form parts can contain the following: • Form name • Form type • Form properties • Constant fields • Variable fields • Validation order for variable fields An example of the format of a text form created by the migration tool is as follows: `Form mapName type textForm` `{ screenSizes=[sizeList],` `formSize=[24,80], position=[1,1],` `helpForm="helpFormName",` `helpKey=pf1,` `validationBypassKeys=[pf3],` `msgField="VAGen_EZEMSG"}` `[ variableFields ]` `[ constantFields ]` `end // end mapName`	The migration tool uses the VAGen device type to determine whether the map is a Display map (text form) or a Printer map (print form). See Table 93 on page 254 for information about determining whether the device is a display or printer.
Help map name	helpForm	No special considerations.
Help key	helpKey	No special considerations.

Table 95. Display maps — general syntax, map type, and properties (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Bypass keys You can specify a maximum of 5 Bypass keys for a map.	validationBypassKeys You can specify a maximum of 5 validationBypassKeys for a form.	No special considerations.
Variable field folding	Not supported for a form. Each char or mbchar variable field on the form must specify whether the data the user enters is to be automatically converted to upper case.	The migration tool does the following: • If Variable field folding is specified for the entire map, the migration tool includes *upperCase=yes* for every character and mixed field. • If Variable field folding is not specified for the entire map, the migration tool uses the Fold information specified for each character or mixed field to determine whether to set the upperCase property for that field.
Map size — Lines and Columns	formSize = [Lines, Columns]	No special considerations.
Starting position - Line and Column NEXT,SAME is required if the map is a floating map.	position = [Line, Column] If the position information is omitted, the form is a floating form	If Floating map is selected, the migration tool omits the position information.
Floating map	Not applicable. If the position information is omitted, the form is a floating form.	If Floating map is selected, the migration tool omits the position information.
Device Type - Display or DBCS Display	type textForm	The migration tool uses the Device Type information to determine whether to migrate the map to a text or print form.
Supported devices **Note:** Supported devices shows the device type, number of lines, and number of columns	`screenSizes = [[Lines, Columns], [Lines, Columns]]` **Note:** Include a [Lines, Columns] pair for each screen size that you want to have supported for the form.	The migration tool uses the device type information to determine the corresponding screenSizes property. If several VAGen devices have the same screen Size, the migration tool only includes the screen size once. Special considerations apply because not all of the devices supported by VAGen are supported for COBOL generation in EGL. See "Map groups, maps, and device sizes" on page 74 for details.
Not applicable. In VisualAge Generator, the message field is always named EZEMSG.	msgField This is the name of the field that is to contain any EGL error messages.	The migration tool sets the msgField property if EZEMSG is anywhere on the map.

Table 95. Display maps — general syntax, map type, and properties (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Not applicable.	alias	The migration tool includes the alias property if the map has to be renamed due to a conflict with an EGL reserved word or because the map name starts with the # or @ symbol. The migration tool also includes the alias property for a map in a program's help map group if the map has to be renamed due to a conflict with the name of a map in the program's main map group. Special considerations apply. See "Map names and help map names" on page 75 for details.

Table 96. Printer maps — general syntax, map type, and properties

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Printer maps can contain the following: • Map group name and map name • Map properties – General properties - Help map name - Help key - Bypass keys - Variable field folding - SO/SI take position – Layout properties - Map size - Starting position - Floating map – Devices - Type (Display or print) - Supported devices • Constant fields • Variable fields • Field edit order for variable fields	Print forms can contain the following: • Form name • Form properties • Constant fields • Variable fields An example of the format of a text form created by the migration tool is as follows: `Form mapName type printForm` `{formSize=[255,158], position=[1,1],` `addSpaceForSOSI=yes }` `[ variableFields ]` `[ constantFields ]` `end // end mapName`	The migration tool uses the VAGen device type to determine whether the map is a Display map (text form) or a Printer map (print form). The migration tool always omits the following properties for print forms: • General properties – Help map name – Help key – Bypass keys – Variable field folding • Devices – Supported devices • Field edit order for variable fields See Table 93 on page 254 for information about determining whether the device is a display or printer.
Help map name	Not applicable for a print form.	The migration tool omits this property for a print form.
Help key	Not applicable for a print form.	The migration tool omits this property for a print form.
Bypass keys	Not applicable for a print form.	The migration tool omits this property for a print form.
Variable field folding	Not applicable for a print form.	The migration tool omits this property for a print form.
SO/SI take position	addSpaceForSOSI	No special considerations.
Map size — Lines and Columns	formSize = [Lines, Columns]	No special considerations.

Table 96. Printer maps — general syntax, map type, and properties (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Starting position - Line and Column NEXT,SAME is required if the map is a floating map.	position = [Line, Column] If the position information is omitted, the form is a floating form.	If Floating map is selected, the migration tool omits the position information.
Floating map	Not applicable. If the position information is omitted, the form is a floating form.	If Floating map is selected, the migration tool omits the position information.
Device Type - Printer or DBCS Printer	type printForm	The migration tool uses the Device Type information to determine whether to migrate the map to a text or print form.
Supported devices	Not applicable for a print form.	The migration tool omits this property for a print form.
Not applicable. In VisualAge Generator, the message field is always named EZEMSG.	msgField This is the name of the field that is to contain any EGL error messages.	The migration tool sets the msgField property if EZEMSG is anywhere on the map.
Not applicable.	alias	The migration tool includes the *alias* property if the map has to be renamed due to a conflict with an EGL reserved word or because the map name starts with the # or @ symbol. The migration tool also includes the alias property for a map in a program's help map group if the map has to be renamed due to a conflict with the name of a map in the program's main map group. Special considerations apply. See "Map names and help map names" on page 75 for details.

Table 97. Map constant and variable fields — general information

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
All positions on a map must be accounted for as one of the following: • a variable field • a constant field • an attribute byte at the beginning of a constant or variable field	All positions on a form do not have to be accounted for. Blank constants that have the default properties (noHighLight, normalIntensity, protect=skip, defaultColor, no outlining, and no cursor) do not need to be specified.	The migration tool omits blank constants that have the default properties.
Constant fields on display maps can have attributes specified that do not really apply to constants. For example: • Unprotected • Input required • Require fill on input • Numeric attribute • Modified data tag	Constant fields on text forms cannot specify properties that do not make sense for a constant.	The migration tool omits properties for constants on text form if the properties are not supported.

Table 97. Map constant and variable fields — general information (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Constant field on printer maps can have attributes that do not really apply to printers. For example: • Color • Intensity • Highlighting other than underscore • Protection • Initial cursor field • Light pen detect	Constant fields on print forms cannot specify properties that do not make sense for a constant.	The migration tool omits properties for constants on print forms if the properties are not supported.
Variable fields on printer maps can specify attributes that do not really apply to printers. For example: • Color • Intensity • Highlighting other than underscore • Protection • Initial cursor field • Input required • Require fill on input • Numeric attribute • Modified data tag • Light pen detect	Variable fields on print forms cannot specify properties that to not make sense for a print form.	The migration tool omits properties for variable fields on print forms if the properties are not supported.
Variable fields on printer maps can specify edits that do not really apply to printers. For example: • Edit routine • Minimum input • Fold • Hex edit • Input required • Minimum value • Maximum value • Edit messages	Variable fields on print forms cannot specify properties that to not make sense for a print form.	The migration tool omits properties for variable fields on print forms if the properties are not supported.

Table 98. Map constant and variable fields — general syntax, data type, length, decimals, and description

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
A variable on a map has the following information: • Name • Information based on what you dropped on the map: – Data type – Position • Basic information: – Descripton – Initial value – Length in bytes – Array index – Numeric edit • Attributes • Edits, including number of decimals • Error messages **Note:** *position* is the position of the attribute byte. The length in bytes is the length of the field in bytes, excluding the attribute byte. The length in bytes is also used for the length of the data value.	The information for a variable field on a map includes the following: • Name • Type and length in characters for character fields • Type, precision, and scale for numeric fields • Position • Field length in bytes • Presentation properties • Formatting properties • Validation properties • Value In general, the following is true: • VAGen attributes correspond to EGL presentation properties. • VAGen edits and messages correspond to EGL formatting properties or validation properties. • However, some of the VAGen attributes and edits are merged into a single EGL property or moved to a different category. Here is an example of an EGL variable field: `itemName` `  dataType(lengthInformation)` `  // description` `  { position=[row,column],` `  fieldLen=length,` `  validationOrder=n,` `  [presentationProperties]` `  [formattingProperties]` `  [value="initialValue"]` `  [arrayInformation]` `  }` **Note:** *position* is the position of the attribute byte. *fieldLen* is the length of the field in bytes, excluding the attribute byte. The primitive information given in *dataType(lengthInformation)* is the length of the data value.	The migration tool sets the EGL fieldLen property to the VAGen Length in bytes. The tool sets the lengthInformation for the dataType as follows: • For char, dbchar, and mbchar fields, migration tool sets the lengthInformation to the number of characters, not the number of bytes. • For VAGen char fields that specify the Numeric edit, the migration tool does the following: – Converts the field to the EGL num type. – Sets the precision to the VAGen length in bytes and then reduces the precision by one if decimals are specified for the field in VisualAge Generator. – Sets the scale to the number of decimals specified in VisualAge Generator. Special considerations apply. See "Numeric variable fields" on page 77 for details.

Table 98. Map constant and variable fields — general syntax, data type, length, decimals, and description (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
A constant on a map has the following information: • Information based on what you dropped on the map: – Data type – Position • Basic information: – Initial value – Length in bytes • Attributes **Note:** *position* is the position of the attribute byte. The *length in bytes* is the length of the field in bytes, excluding the attribute byte.	The information for a constant field on a map includes the following: • Position • Field length • Presentation properties • Value In general, the following is true: • VAGen attributes correspond to EGL presentation properties. • Attributes that apply only to input editing are not supported for EGL constant fields. The data type for a constant is determined based on the *value* property. Here is an example of an EGL constant field: `{ position=[row,column], fieldLen=length, [presentationProperties] [value="initialValue"] }` **Note:** *position* is the position of the attribute byte. *fieldLen* is the length of the field in bytes, excluding the attribute byte.	The migration tool sets the EGL fieldLen property to the VisualAge Generator Length.
Data type: • Character constant • Character variable • DBCS constant • DBCS variable • Mixed constant • Mixed variable • Character variable with the Numeric edit selected **Note:** The type is determined based on the type of field you drop on the map and whether you select the Numeric edit box.	EGL data type: • Not applicable • char • Not applicable • dbchar • Not applicable • mbchar • num	No special considerations.
Description	Not applicable.	The migration tool converts the description to a comment that follows the data type and length information.

Table 98. Map constant and variable fields — general syntax, data type, length, decimals, and description (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Initial value	value **Note:** • In VisualAge Generator Compatibility mode, the *value* property is only used when displaying a field on the screen that has not had a value assigned to it. The *value* property is not used to set the initial value of the field in storage. • When VisualAge Generator Compatibility mode is not specified, the *value* property provides the initial value of field in the program when the program starts.	No special considerations.
Length	An EGL variable has the following: • A length, which is the number of characters or digits in the field. • A fieldLen, which is the space the field occupies on the map, excluding the attribute byte.	The migration tool uses the VAGen length to set both the EGL length and the EGL fieldLen properties. Special considerations apply for numeric fields. See "Numeric variable fields" on page 77 for details.
Array index **Note:** • The array size is determined based on the highest array index for the variable field. • You can override some attributes such as cursor position, color, highlighting, intensity, protection, and cursor position for elements of the array. • You can also override the initial value for elements of the array.	`itemName` `datatype(lengthInfo)` `[ arraySize ]` `{ properties for index 1 ,` `indexOrientation = across | down,` `columns = n1,` `linesBetweenRows = n2,` `spacesBetweenColumns = n3,` `this[n]` `{ properties for index n }` `}` `itemName` `datatype(lengthInfo)` `[ arraySize ]` `{ properties for index 1,` `this[n]` `{ properties for index n }` `}` **Note:** • The array size is specified immediately after the datatype and length information. • You can override cursor location, and presentation properties such as color, highlighting, intensity, and protect. • You can also override the value property.	For standard arrays, the migration tool uses the indexOrientation, columns, linesBetweenRows, and spacesBetweenColumns properties to provide position information. The tool only includes this[n] if the cursor location or presentation properties of an array element differ from the first element of the array. For nonstandard arrays, the migration tool includes this[n] for each element of the array after the first to provide the position=[row,column] property. The tool also includes the cursor location or presentation properties for an array element if they differ from the first element of the array.

Table 98. Map constant and variable fields — general syntax, data type, length, decimals, and description (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Field Edit Order **Note:** • Field Edit Order is specified from the Define pulldown. • The default Field Edit Order is based on the position of the variable fields on the map, left to right, then top to bottom. • Some versions of Cross System Product and VisualAge Generator did not record the field edit order in the External Source Format.	validationOrder **Note:** The default validationOrder is based on the position of the variable fields on the map, left to right, then top to bottom.	The migration tool omits the validationOrder if it is not included in the External Source Format for the map.

Table 99. Map constant and variable fields — attributes

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Intensity: • Normal • Dark • Bright	intensity: • normalIntensity • invisible • bold (presentation property)	No special considerations.
Highlight: • No highlight • Blink • Reverse video • Underscore	highlight: • noHighlight • blink • reverse • underline (presentation property)	No special considerations.
Protection: • Unprotected • Protected • Autoskip	protect: • no • yes • skip (presentation property)	No special considerations.
Color: • Mono • Blue • Red • Pink • Green • Turquoise • Yellow • White	color: • defaultColor • blue • red • magenta • green • cyan • yellow • white (presentation property)	No special considerations.
Initial cursor field	`cursor = yes | no` (form field property)	No special considerations.

Table 99. Map constant and variable fields — attributes (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Input required	inputRequired (validation property)	The migration tool merges the VAGen Input required attribute and the Input required edit as follows: • If either the Input required attribute or the Input required edit is selected, the migration tool includes inputRequired. • If neither is selected, the migration tool omits inputRequired.
Require fill on input	fill (validation property)	No special considerations.
Numeric attribute **Note:** This property is supported for CHA fields, including CHA fields that have *Numeric edit* selected.	isDecimalDigit (validation property) **Note:** This property is only supported for char fields.	If the Numeric attribute is selected, the migration tool does the following: • Includes isDecimalDigit for char fields. • Omits isDecimalDigit for numeric fields. EGL provides a software edit for numeric fields to maintain compatibility with VAGen. See "Map fields and the numeric hardware attribute" on page 79 for additional details.
Modified data tag	modified (presentation property)	No special considerations.
Light pen detect	detectable (presentation property)	No special considerations.
Outlining: • left • right • over • under • box	outline: • left • right • top • bottom • box (presentation property)	No special considerations.

Table 100. Map variable fields — general edits

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Edit routine	validatorFunction OR validatorDataTable (validation property)	The migration tool does the following: • Sets the validatorFunction property if the map edit routine is EZEC10 or EZEC11. • Sets the validatorFunction property if the edit routine is a function. • Sets the validatorDataTable property if the edit routine is a table. **Note:** Special considerations apply if the edit routine is not available during migration. See "Map variable fields and edit routines" on page 78 for additional details and potential problems.

Table 100. Map variable fields — general edits (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Justify - Left | Right | None **Note:** For map items, the default is right for numeric fields and left for all other fields.	align = left | right | none (formatting property) **Note:** For form fields, the default is right for numeric fields and left for all other fields.	No special considerations.
Date edit mask Values are as follows: • SYSGREGRN • SYSJULIAN • dateEditPattern	dateFormat = *value* Values are as follows: • systemGregorianDateFormat • systemJulianDateFormat • *"dateEditPattern"* (formatting property) **Note:** In the dateEditPattern, the migration tool converts to the following EGL notation: • yy or yyyy indicates the year. • MM indicates the month. • dd indicates the day of the month. • DDD indicates the day of the year.	No special considerations.
Minimum input	minimumInput (validation property)	No special considerations.
Fill character **Note:** The default fill character for items used on a map is null for character, DBCS, or MIXED fields; blank for numeric fields; and 0 for hex fields.	fillCharacter (formatting property) **Note:** • The default fill character for items used on a map is null for char, dbchar, or mbchar fields; blank for numeric fields; and 0 for hex fields. • strLib.nullFill is the EGL constant for the null fill character. Alternatively, use "" (two consecutive quotes).	No special considerations.
Fold	upperCase (formatting property)	The migration tool does the following: • If Variable field folding is specified for the entire map, the migration tool includes upperCase=yes for every character and mixed field. • If Variable field folding is not specified for the entire map, the migration tool uses the Fold information specified for each character or mixed field to determine whether to set the upperCase property for that field.
Hex edit	isHexDigit (validation property)	No special considerations.

Table 100. Map variable fields — general edits (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Input required	inputRequired (validation property)	The migration tool merges the VAGen Input required attribute and the Input required edit as follows: • If either the Input required attribute or the Input required edit is selected, the migration tool includes inputRequired. • If neither is selected, the migration tool omits inputRequired.
Check SO/SI space	needsSOSI (validation property)	No special considerations.

Table 101. Map variable fields — numeric edits

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Minimum value and Maximum value **Note:** If either Minimum value or Maximum value is specified, both must be specified.	validValues = **[[**minimumValue, maximumValue**]]** (validation property) **Note:** Multiple pairs of values and single values can be listed in the validValues property.	The migration tool combines the Minimum value and Maximum value into the EGL *validValues* property.
Sign = None | Leading | Trailing **Note:** The default sign for numeric items on a map is None.	sign = none | leading | trailing (formatting property) **Note:** The default sign for a numeric field is always leading.	For a numeric field, the migration tool migrates the first of the following that applies: • If the map sign edit is specified, the tool migrates to the corresponding sign property. • If the map sign edit is not specified, the tool sets sign = none.
Currency	currency = yes | no currencySymbol = ″symbol″ (formatting property) **Note:** If currency = yes but the currencySymbol is not specified, the actual currency symbol used at runtime is set the same way it is in VisualAge Generator.	The migration tool only sets currency to *yes* or *no*. The tool never sets currencySymbol=″symbol″ for form variable fields because there was no equivalent information in VisualAge Generator.
Separator	numericSeparator (formatting property)	No special considerations.
Zero edit	zeroFormat (formatting property)	No special considerations.

Table 102. Map variable fields — error messages

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Edit routine	validatorFunctionMsgKey OR validatorDataTableMsgKey (validation properties)	The migration tool migrates the edit routine message as follows: • Sets validatorFunctionMsgKey if the edit routine is EZEC10 or EZEC11. • Sets validatorDataTableMsgKey if the edit routine is a table. • Does not migrate the edit routine message if the edit routine is a function because the message is not used in this situation in VisualAge Generator. See "Map variable fields and edit routines" on page 78 for additional details and potential problems.
Minimum input	minimumInputMsgKey (validation property)	No special considerations.
Input required	inputRequiredMsgKey (validation property)	No special considerations.
Data type	typeChkMsgKey (validation property)	No special considerations.
Numeric range	validValuesMsgKey (validation property)	No special considerations.

Programs

The programs section is organized into the following tables:

- Programs - general syntax, program type, called parameters, and prolog Table 103 on page 269
- Programs - program specifications, properties, tables and additional records list Table 104 on page 271
- Programs - main functions and flow statements Table 105 on page 275

Table 103. Programs — general syntax, program type, called parameters, and prolog

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Programs part: • programName • Program type • Specifications (vary based on program type): – Working Storage record – PSB – Firstmap – First UI Record – Map Group – Help Map Group • Tables and Additional Records • Called Parameters • Prolog • Properties (vary based on program type) • Structure diagram – Main Functions – Flow Statements (hidden in the structure diagram, but can be specified for any main function)	EGL syntax sample: `//*** Program=programName` `// prolog` `//******************` `Program programName` `  type eglProgramType` `  //vagenProgramType` `[ ( calledParameters ) ]` `{` `[alias= "originalProgramName"]` `includeReferencedFunctions` `=yes,` `allowUnqualifiedItemReferences` `=yes,` `localSQLScope=yes,` `throwNrfEofExceptions=yes,` `handHardIOErrors=no` `[ propertiesBasedOnType ]` `}` `  [ dataDeclarations ]` `  [ useDeclarations ]` `  function main ( )` `  {  functionLabel:` `functionName( ) ;` `  [{functionFlowStatements}]}` `  end  // end main` `end  // end programName`	The migration tool does not rename programs for you even if they conflict with the EGL reserved word list. The migration tool does not set the alias property. If you must rename a program, you can use the alias property to specify the original name of the VAGen program. See "Program names and reserved words" on page 83. The migration tool includes the VAGen program type as a comment in the program definition. The migration tool migrates the Tables and Additional Records list as follows: • Records migrate to dataDeclarations. • Tables migrate to useDeclarations. The migration tool always includes the following properties to preserve VAGen behavior: • includeReferencedFunctions • allowUnqualifiedItemReferences • localSQLScope • throwNrfEofExceptions • handleHardIOErrors
Programs types: • Main transaction • Called Transaction • Main Batch • Called Batch • Web Transaction **Note:** See later row on ″Main Transaction Exection Mode Values″ for additional details.	EGL program types: • textUIProgram • textUIProgram • basicProgram • basicProgram • VGWebTransaction	The migration tool includes the VAGen program type as a comment in the program definition. See Table 104 on page 271 for information on how the segmentation values correspond to EGL properties.

Table 103. Programs — general syntax, program type, called parameters, and prolog (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Called Parameters **Note:** • Called parameters are entered in a special window. • The parameter type indicates whether the parameter is an item, record, or map. • The parameter name is always the name of another VAGen part. There is no equivalent of an EGL type definition or primitive type. • Two special function words are supported as parameters: – EZEDLPSB – EZEDLPCB[*n*], where *n* is a numeric literal See the next rows of this table for details.	EGL called parameters example: **(** *parameterName typeInfo* { **,** *parameterName typeInfo* } **)** **Note:** • Parameters must be separated by commas. • A parameter can be a dataItem, record, or form. There is no direct correspondence to the VAGen parameter types. • The EGL typeInfo can be: – a primitive type for a dataItem – a type definition for a dataItem, record, or form.	The migration tool includes the original VAGen parameter type as a comment. If you select the Migration Syntax Preference *Convert shared data items to primitive item definitions* and the data item part is available, the migration tool converts the shared item to an EGL parameter that is declared using a primitive definition based on the type, length, and decimals specified for the data item part. Migration of type, length, and decimals information is the same as described in Table 71 on page 229. If you do not select the Migration Syntax Preference *Convert shared data items to primitive item definitions* or the data item part is not available, the migration tool converts the shared item to an EGL parameter that is declared using a type definition. For migration, the type definition is always the same as the item name. Special considerations apply. See "Redefined records" on page 66 for details and potential problems.
Called parameter: EZEDLPSB	EGL called parameter example to pass the PSB: parameter list: **(psbData psbDataRecord)** program properties: **{ @DLI { psbParm = ″psbData″ }}**	No special considerations.

Table 103. Programs — general syntax, program type, called parameters, and prolog (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Called parameter: EZEDLPCB[*n*] where *n* is a numeric literal	EGL called parameter example to pass the PCBs: parameter list: **(** *pcbName* *pcbType*_PCBRecord **)** program properties: **{ @DLI {** **pcbParms** = [*pcbList*] } } **Note:** • The *pcbList* is used to match the name of the PCB parameter to its corresponding position within the program's PSB. • The values for *pcbType* are: – IO – ALT – DB – GSAM	The migration tool always uses a pcbName in the form: pcb*n*, where *n* is the same numeric literal used in VAGen called parameter list. If the program's PSB part is available, the migration tool does the following: • Includes the pcbType information. • Includes the pcbList information to associate each PCB parameter with the corresponding PCB in the PSB part. Special considerations apply if the program's PSB part is not available. For details, see "Program with EZEDLPCB in called parameter list" on page 86.
Prolog	Not applicable.	The migration tool converts the prolog to a comment that precedes the program definition.

Table 104. Programs — program specifications, properties, tables and additional records list

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
General information: • Some VAGen properties and specifications migrate to EGL properties, data declarations, or use declarations.	General information: • The rows that follow indicate whether the corresponding EGL language element is a program property, data declaration, or use declaration.	No special considerations.
Main Transaction Execution Mode values: • Nonsegmented • Segmented • Single segment **Note:** Called transactions always run in nonsegmented mode.	segmented — values: • segmented = no • segmented = yes • segmented = yes (program property) **Note:** The segmented property is not specified for called programs.	If the segmented information is not in the External Source Format file, the migration tool defaults to *segmented = no*.

Table 104. Programs — program specifications, properties, tables and additional records list (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Working Storage record (Specifications) • The Working Storage record can be specified for both main and called programs. It is sometimes referred to as the program's primary working storage record. • The primary working storage record is always initialized.	inputRecord (program property) • The inputRecord property can only be specified for main programs. • The inputRecord is always initialized. • A data declaration is also required.	The migration tool converts the primary working storage record to the inputRecord property for main programs. The migration tool also includes a data declaration for the primary working storage record for both main and called programs. The tool includes the *initialized = yes* property for the data declaration in called programs. If the primary working storage record contains level 77 items, the migration tool includes a data declaration statement for the level 77 record. See "Level 77 items in records" on page 67 for details and potential problems.
PSB (Specifications) **Note:** In VisualAge Generator, the PSB is a part type.	EGL uses both program properties and a record declaration to specify a PSB: program properties: **{ @DLI { psb** = *"psbName"*, **callInterface** = **DLICallInterfaceKind.CBLTDLI**, **handleHardDLIErrors** = **yes** }} program record declaration: *psbName psbPartName* **;** **Note:** In EGL, the PSB is a subtype of the record part.	The migration tool always uses *psb* as value for the *psb* property. This ensures that any function that needs to reference a variable in the PSB can qualify the variable with *psb*. The migration tool always includes the following properties for an IMS or DL/I program to preserve VAGen behavior: • callInterface • handleHardDLIErrors The migration tool includes a declaration of a variable called psb and specifies *psbPartName* as the name of the VAGen PSB part after any required renaming.
Firstmap (Specifications)	inputForm (program property)	No special considerations.
First UI Record (Specifications)	inputUIRecord (program property)	No special considerations.
Map Group (Specifications)	**use** *formGroup.formName* *{, formGroup.formName }* **Note:** use formGroup is also permitted. In this case, all forms within the formGroup are used to resolve unqualified variable names.	The migration tool includes the following maps: • Maps used in CONVERSE, DISPLAY, and CLOSE I/O options. • Maps used in an XFER with a map statement. • Maps listed in the program's called parameter list. • The map specified as the First Map for the program.
Help Map Group (Specifications)	**use** *formGroup* **{ helpGroup=yes }** (use declaration)	No special considerations.

Table 104. Programs — program specifications, properties, tables and additional records list (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Message table prefix (Program property)	msgTablePrefix (program property)	No special considerations.
Allow implicit data items (Program property)	Not supported.	The migration tool does not create implicit definitions for you. See "Implicit data items in programs" on page 84 for details and potential problems.
Keys assignment: • Help key (1 key) • Bypass keys (up to 5 keys) • F1–12 = F13–24 (Program property) **Note:** The keys assignment is specified once for the program and applies to both the map group and the help map group.	EGL keys assignment example: `use formGroup` `  { [ helpGroup = yes, ]` `  helpKey = pfNumber,` `  validationBypassKeys =` `  [ pfNumberList ] ,` `  pfKeyEquate = yes | no } ;` (Use declaration properties for the program's formGroup and help formGroup.) **Note:** • The values in the validationBypassKeys list must be separated by commas. • The validationBypassKeys property is not specified for the program's help formGroup.	The migration tool includes the EGL equivalent of the keys assignment information on the *use declaration* statements for both the formGroup and the help formGroup. The migration tool omits the validationBypassKeys property from the use declaration for the help formGroup.

Table 104. Programs — program specifications, properties, tables and additional records list (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Tables and Additional Records: • Records **Note:** • Redefinition information is stored in the VAGen Redefined record, not in the program. • Records that are used as I/O objects are never included in the Tables and Additional Records list.	EGL additional record example: `recordName recordName` `  [{ redefines = "otherRecord"};` (data declaration) **Note:** • The redefines property must be specified on the program's data declaration if the record provides a different record layout for the same physical storage as another record. • Data declarations are required for all records used in the program, including the I/O records.	The migration tool always uses the same record name as the type definition. If a VAGen record is used in the program as a redefined record, the migration tool includes the redefines property on the data declaration statement. See "Redefined records" on page 66 for details and potential problems. The migration tool also includes data declarations for all records that are used as I/O objects by the program. The migration tool includes data declarations for records that are specified as attributes of any MQ Message record that is used as an I/O object by the program. If the program specifies a PSB, the migration tool includes data declarations for all DL/I segments used as I/O objects or in the hierarchical path to an I/O object. For Web transaction programs, the migration tool includes data declarations for UI records that are referenced in a CONVERSE I/O statement or in an XFER statement.
Tables and Additional Records: • Tables • You can specify Keep After Use for each table.	EGL *use* declaration example: `use tableName` `  [{deleteAfterUse = yes}];` `(use declaration)`	The migration tool converts tables on the Tables and Additional Records list to *use* declarations. *DeleteAfterUse* has the opposite meaning from the VAGen Keep After Use. The migration tool reverses yes and no. If you select the VAGen Migration Preference *Do not include deleteAfterUse for tables*, the migration tool automatically omits the *deleteAfterUse* property and issues a warning message for the affected program and table.

Table 105. Programs — main functions and flow statements

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen programs specify the main functions as the top-level functions in the VAGen Structure Diagram. All other functions appear only when you expand the Structure Diagram. Each main function can have flow statements. These statements do not appear in the Structure Diagram, but can be accessed from the diagram.	EGL programs specify only one main function. This function is always named *main*. There are no flow statements. An example of the syntax for the program's main function is as follows: `function main ( )` `{ functionLabel:` `functionName( ) ;` `[ { functionFlowStatements } ] }` `end // end main`	The migration tool builds the EGL main function. The tool includes the following within the main function for each VAGen main function: • functionLabel so that the VAGen main function can be referenced in an EGL *exit stack functionLabel* statement. The tool always sets the functionLabel to the functionName. • function invocation statement to invoke the VAGen main functionName. • flow statements, if any, for the VAGen main function. See the following for details on the migration of flow statements: • See "Statements" on page 292 • See "EZE words" on page 305 • See "Service Routines" on page 313

Functions

The following tables compare the VAGen function part with the EGL function part and describe how the migration tool handles the conversion.

The functions section is organized into the following tables:

- Functions - general syntax, description, parameters, return value, and local storage, Table 106 on page 276
- Functions - EXECUTE I/O option, Table 107 on page 278
- Functions - I/O options for maps and UI records, Table 108 on page 279
- Functions - I/O for files or databases — general information and I/O error routine, Table 109 on page 279
- Functions - I/O options for serial, indexed, relative, and message queue records, Table 110 on page 280
- Functions - I/O options for default (unmodified) SQL statements, without Execution Time Statement Build, Table 111 on page 281
- Functions - I/O options for modified SQL statements, without Execution Time Statement Build, Table 112 on page 283
- Functions - I/O options for SQL statements with Execution Time Statement Build, Table 113 on page 286
- Functions - I/O options for default (unmodified) DL/I statements, Table 114 on page 288
- Functions - Segment Search Arguments for modified DL/I statements, Table 115 on page 289

Table 106. Functions — general syntax, description, parameters, return value, and local storage

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Function parts can contain the following: • Function name • I/O option • I/O object • Properties: – Error routine – Description • Function return value • Function parameters • Function local storage • SQL statement • DL/I call • Statements before the I/O option • Statements after the I/O option	Function parts can contain the following: • functionName • functionParameterList • returnItemType • dataDeclarations • Statements before the I/O statement • I/O statement • Statements after the I/O Statements An example of the format of a function created by the migration tool is as follows: `// Description` `Function functionName` `(functionParamterList)` `[ returns( returnItemType ) ]` `[ dataDeclarations ]` `[ beforeStatements ]` `[ I/O Statement ]` `[ afterStatements ]` `end // end functionName` **Note:** • The VAGen I/O option, I/O object, error routine, SQL statement, and DL/I call are used to create the EGL I/O statement.	For details on how the migration tool handles the Description, Function return value, Function parameters, and Function local storage, see the following rows in this table. See the following for details on the migration of before and after statements: • For statements, see “Statements” on page 292. • For EZE words, see “EZE words” on page 305. • For service routines, see “Service Routines” on page 313. See the following for details on I/O options and error routines: • See Table 107 on page 278 for the EXECUTE I/O option. • See Table 108 on page 279 for I/O options for maps and UI records. • See Table 109 on page 279 general information on file and database I/O. • See Table 110 on page 280 for I/O options for serial, indexed, relative, and message queue records. For details on SQL statements, see the following tables in this section: • See Table 111 on page 281 for I/O options for unmodified SQL statements. • See Table 112 on page 283 for I/O options for modified SQL statements without Execution Time Statement Build. • See Table 113 on page 286 for I/O options for SQL statements with Execution Time Statement Build. For details on DL/I calls, see the following tables in this section: • See Table 114 on page 288 for I/O options for default (unmodified) DL/I statements. • See Table 115 on page 289 for Segment Search Arguments for modified DL/I statements.
Description	Not applicable	The migration tool converts the function description to a comment that precedes the Function definition.

Table 106. Functions — general syntax, description, parameters, return value, and local storage (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Function parameters: • Function parameters are entered in a special window. • Items used as function parameters can be shared or nonshared. The definition for nonshared items is stored in the function.	Function parameters: • Parameters must be separated by commas. • Each parameter has type information. • Optionally, each parameter has parameter type information. An example of the format of function parameters is as follows: `( parameterName typeInfo` `[ parameterType ]` `{ , parameterName typeInfo` `[ parameterType ] } )` A specific example of function parameters is as follows: `(parmSharedItem parmSharedItem` `field,` `parmNonSharedItem char(10)` `nullable,` `parmRecord parmRecord)`	Function parameters: The migration tool sets the type information as follows: • For a record, the typeInfo is a type definition that specifies the same record name. • If the item type is one of the VAGen Any* types, the typeInfo is the corresponding EGL special item type. • If the item is a shared data item, then the migration tool does the following: – If you select the Migration Syntax Preference *Convert shared data items to primitive item definitions* and the data item part is available, the migration tool converts the shared item to an EGL function parameter that is declared using a primitive definition based on the type, length, and decimals specified for the data item part. Migration of type, length, and decimals information is the same as described in Table 71 on page 229. – If you do not select the Migration Syntax Preference *Convert shared data items to primitive item definitions* or the data item part is not available, the migration tool converts the shared item to an EGL function parameter that is declared using a type definition. For migration, the type definition is always the same as the item name. • If the item is a nonshared data item, then the typeInfo is migrated based on the item type, length, and decimals, and follows the rules described in Table 71 on page 229.
Function parameters: • Function parameter types: – Record – Item – Map item – SQL item	Function parameters: • Function parameter types: – Not applicable – Not applicable – field – nullable	
Function parameters: • Special item types, length is not specified: – AnyChar – AnyDBCS – AnyMix – AnyHex – AnyUnicode – AnyNumeric	Function parameters: • Special item types, length is not specified: – char – dbchar – mbchar – hex – unicode – number	
Function return value: • Data type • Length • Decimals • Description	EGL returns value: • The following is an example of the *returns* statement format: `returns( returnItemType )` `// Description`	If the function includes a return value, the migration tool migrates the data type, length, and decimals based the rules described in Table 71 on page 229.

Table 106. Functions — general syntax, description, parameters, return value, and local storage (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Function local storage: • Function local storage is entered in a special window. • Items used as function local storage can be shared or nonshared. The definition for nonshared items is stored in the function.	Function variable declarations: • Function variable declarations must include variable names and their associated type information. • An example of the format of function variable declarations is as follows: `// Function Declarations` `variableName typeInfo ;` `{ variableName typeInfo ; }`	The migration tool sets the typeInfo as follows: • For a record, the typeInfo is a type definition that specifies the same record name. • If the item is a shared data item, then the migration tool does the following: – If you select the Migration Syntax Preference *Convert shared data items to primitive item definitions* and the data item part is available, the migration tool converts the shared item to an EGL variable that is declared using a primitive definition based on the type, length, and decimals specified for the data item part. Migration of type, length, and decimals information is the same as described in Table 71 on page 229. – If you do not select the Migration Syntax Preference *Convert shared data items to primitive item definitions* or the data item part is not available, the migration tool converts the shared item to an EGL variable that is declared using a type definition. For migration, the type definition is always the same as the item name. • If the item is a nonshared data item, then the typeInfo is migrated based on the item type, length, and decimals, and follows the rules described in Table 71 on page 229.
Function local storage: • Function local storage types: – Record – Item	Function local storage: • Function local storage types: – Not applicable – Not applicable	

Table 107. Functions — EXECUTE I/O option

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: none • I/O option: EXECUTE	No equivalent statement.	The migration tool eliminates the EXECUTE I/O option.

Table 108. Functions — I/O options for maps and UI records

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: mapName • I/O option: DISPLAY **Note:** DISPLAY is used for both display and printer maps.	To display a text form, use the *display* statement. To print a print form, use the *print* statement. The following are examples of a display statement and a print statement: `display mapName;` `print mapName;` **Note:** In VisualAge Generator Compatibility mode, *display printForm* is treated as though it is *print printForm.*	The migration tool converts to the display or print statement based on the map type. See "DISPLAY statement for maps" on page 89 for details and potential problems.
• I/O object: mapName • I/O option: CONVERSE	Use the *converse* statement. The following is an example of a converse statement: `converse mapName;`	No special considerations.
• I/O object: UIRecordName • I/O option: CONVERSE	Use the *converse* statement. The following is an example of a converse statement: `converse UIRecordName;`	No special considerations.

Table 109. Functions — I/O for files or databases — general information and I/O error routine

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen record I/O: • I/O option • I/O object (always a record) • I/O error routine (optional) **Note:** The record can be a serial, indexed, relative, message queue, SQL row, or DL/I segment record.	EGL record I/O: • An I/O statement • Record name • *try onException end* statement with error routine name (optional) If an I/O error routine is specified, the statements are enclosed within a *try...end* block. An example of file or database I/O with an error routine is as follows: `try` `  add recordName ;` `  [onException  error-routine ; ]` `end`	The migration tool does the following: • Changes the VAGen I/O option to the corresponding EGL I/O statement.

Table 109. Functions — I/O for files or databases — general information and I/O error routine (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
An error routine is optional for functions that do file or database I/O. **Note:** The error routine is invoked if there is a soft error or if EZEFEC = 1.	An error routine is optional for functions that do I/O for records. An I/O example without an error routine is as follows: `add recordName;` An I/O example with an error routine is as follows: `try` `  add recordName ;` `  onException  error-routine ;` `end` **Note:** The *onException* statement is invoked if there is a soft error or if handleHardIOErrors = 1. If the function does DL/I I/O, the onException statement is also invoked if handleHardDLIErrors = 1.	The migration tool does the following: • If the error-routine is not specified, the tool does not include the try, onException, or end statements. • If an error-routine is specified, the tool includes the try and end statements. • The migration tool converts to the onException statement based on the VAGen error routine name. When the migration tool migrates programs, it always migrates the VAGen main function names to both the main function label and the main function invocation statement. That way, when migrating a function's I/O error routine, the mainFunctionLabel is always the same as the mainFunctionName. Special considerations apply for the migration of error routines that are function names. See "I/O error routine" on page 90 for details and potential problems.
Error routine values: `EZECLOS` `EZEFLO` `EZERTN` `mainFunctionName` `nonmainFunctionName`	onException block statements: `onException exit program;` `onException exit stack;` `Omit the onException statement.` `onException exit stack` `  mainFunctionLabel;` `onException` `  nonmainFunctionName();`	

Table 110. Functions — I/O options for serial, indexed, relative, and message queue records

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: recordName • I/O option: ADD	Use the *add* statement. The following is an example: `add recordName;`	No special considerations.
• I/O object: recordName • I/O option: SCAN	Use the *get next* statement. The following is an example: `get next recordName;`	No special considerations.
• I/O object: recordName • I/O option: SCANBACK	Use the *get previous* statement. The following is an example: `get previous recordName;`	No special considerations.
• I/O object: recordName • I/O option: CLOSE	Use the *close* statement. The following is an example: `close recordName;`	No special considerations.
• I/O object: recordName • I/O option: INQUIRY	Use the *get* statement. The following is an example: `get recordName;`	No special considerations.
• I/O object: recordName • I/O option: UPDATE	Use the *get forUpdate* statement. The following is an example: `get recordName forUpdate;`	No special considerations.

Table 110. Functions — I/O options for serial, indexed, relative, and message queue records (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: recordName • I/O option: DELETE	Use the *delete* statement. The following is an example: `delete recordName;`	No special considerations.
• I/O object: recordName • I/O option: REPLACE	Use the *replace* statement. The following is an example: `replace recordName;`	No special considerations.

Table 111. Functions — I/O options for default (unmodified) SQL statements without Execution Time Statement Build)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: recordName • I/O option: ADD	Use the *add* statement. The following is an example: `add recordName;`	No special considerations.
• I/O object: recordName • I/O option: SCAN	Use the *get next* statement. The following is an example: `get next recordName;`	No special considerations.
• I/O object: recordName • I/O option: CLOSE	Use the *close* statement. The following is an example: `close recordName;`	No special considerations.
• I/O object: recordName • I/O option: INQUIRY (with and without Single row select)	Use the *get* statement. If you are doing a single row select, also use *singleRow*. An example without single row select is as follows:: `get recordName;` An example with single row select is as follows: `get recordName singleRow;`	If Single row select is specified in VisualAge Generator, the migration tool includes the EGL singleRow option.
• I/O object: recordName • I/O option: UPDATE	Use the *get forUpdate* statement. The following is an example: `get recordName forUpdate resultSetID;`	The migration tool always includes the *resultSetID* when migrating an SQL UPDATE statement. The tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. Special considerations apply if the migration tool cannot determine if the record is SQL or non-SQL. See "SQL I/O with multiple updates" on page 96 for details and potential problems.
• I/O object: recordName • I/O option: DELETE	Use the *delete* statement. The following is an example: `delete recordName;`	No special considerations.

Table 111. Functions — I/O options for default (unmodified) SQL statements without Execution Time Statement Build) (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: recordName • I/O option: REPLACE (with or without UPDATE/SETUPD functionName)	Use the *replace* statement. The following are some examples: `replace recordName;` `replace recordName from resultSetID;`	If the UPDATE/SETUPD function name was included in VisualAge Generator, the migration tool includes the resultSetID and sets the resultSetID to the UPDATE/SETUPD function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences.
• I/O object: recordName • I/O option: SETINQ (with and without Declare cursor with hold)	Use the *open* statement. If you are doing a *Declare cursor with hold*, also use the *hold* option. The following are examples of both types of statement: `open resultSetID for recordName;` `open resultSetID hold for recordName;`	The migration tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. If *Declare cursor with hold* is selected in VisualAge Generator, the migration tool includes the EGL *hold* option.
• I/O object: recordName • I/O option: SETUPD (with and without Declare cursor with hold)	Use the *open forUpdate* statement. If you are doing a *Declare cursor with hold*, also use the *hold* option. The following are examples of both types of statement: `open resultSetID forUpdate for recordName;` `open resultSetID hold forUpdate for recordName;`	The tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. If *Declare cursor with hold* is selected in VisualAge Generator, the migration tool includes the EGL *hold* option.
• I/O object: recordName • I/O option: SQLEXEC with Model SQL Statement **Note:** • The SQL record name is included in this form of SQLEXEC. • The values for the model type are: – None – Update – Delete • If the model type is None, VisualAge Generator does not do any I/O. Generation still processes the I/O error routine, but there will not be an error.	Use the *execute* statement. The following is an example: `execute modelType for recordName;` **Note:** *modelType* is either update or delete.	The migration tool sets the EGL modelType based on the VAGen Model SQL Statement value. If the VAGen Model SQL Statement is None, the migration tool omits the I/O statement because the VAGen I/O statement did not do anything. The migration tool includes the *try*, *onException*, and *end* statements based on the function's I/O error routine.

Table 112. Functions — I/O options for modified SQL statements, without Execution Time Statement Build

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
General Information for modified SQL statements: • VisualAge Generator builds the table clause from the SQL row record at test and generation time. The table clauses are as follows: – **insert into** *sqlTableName* for the ADD I/O option – **from** *sqlTableName sqlTableLabel* for the INQUIRY, UPDATE, SETINQ, and SETUPD I/O options – **update** *sqlTableName* for the REPLACE I/O option • Depending on when the function was last modified, other SQL clauses might not be stored in the function definition. If the SQL clause is not stored, VisualAge Generator creates a default clause based on the record definition of the I/O object. • !itemColumnName variables are permitted. These variables specify the name of an item in the SQL row record. At test or generation time, VisualAge Generator substitutes the corresponding SQL column name. • sqlClauses are written in SQL syntax.	General Information for modified SQL statements: • If you need to modify any SQL clause, EGL requires that all clauses be explicitly specified. The table clause must be explicitly included in the SQL statement. The table clauses are as follows: – **insert into** *sqlTableName* for the add statement. – **from** *sqlTableName sqlTableLabel* for the get and open statements. – **update** *sqlTableName* for the replace statement. • EGL requires that all clauses be explicitly specified if any SQL clause is specified. The required SQL clauses vary with the type of I/O. • EGL requires that the SQL column names be explicitly included in the SQL statement. !itemColumnName variables are not supported. • sqlClauses are written in SQL syntax.	The migration tool uses the tables and table labels from the SQL row record to build the tables clause for the EGL I/O statement. Both table names and table name host variables are included in the table clause of the EGL I/O statement. If a required SQL clause is not stored in the function definition, the migration tool creates a default clause based on the record definition in the same way as in VisualAge Generator. The migration tool converts any !itemColumnName variables to their corresponding SQL column name. The migration tool converts VAGen comments (/*) to SQL comments (—) Special considerations apply if the SQL record and its alternate specification record, if any, are not available during migration. See "SQL I/O statements" on page 91 for details and potential problems.
• I/O object: recordName • I/O option: ADD Clauses that can be modified: • Columns • VALUES	Use the *add* statement. The following is an example: `add recordName` `  with #sql{` `  insert into` `  sqlTablename` `  (columnName1, columnName2)` `  values` `  (valueInfo1, valueInfo2)` `};`	The migration tool creates the *insert into* clause based on the table name in the record definition. Special considerations apply. See "SQL I/O statements" on page 91 for details and potential problems.

Table 112. Functions — I/O options for modified SQL statements, without Execution Time Statement Build (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: recordName • I/O option: INQUIRY (with and without Single row select) Clauses that can be modified: • SELECT • INTO • WHERE, GROUP BY, HAVING • ORDER BY	Use the *get* statement. The following is an example with single row select: `get recordName singleRow` `  with #sql{` `  select` `  Name1,` `  Name2,` `  Age` `  from` `  sqlTable1 sqlLabel1,` `  sqlTable2 sqlLabel2` `  where` `  Name1 = :Namex` `  order by` `  Age` `}` `into` `nameA, nameB, myage;`	If Single row select is specified in VisualAge Generator, the migration tool includes the EGL singleRow option. The migration tool creates the *from* clause based on the table names and table labels in the record definition. Special considerations apply. See "SQL I/O statements" on page 91 for details and potential problems.
• I/O object: recordName • I/O option: UPDATE Clauses that can be modified: • SELECT • INTO • WHERE • FOR UPDATE OF	Use the *get forUpdate* statement . The following is an example: `get recordName forUpdate` `resultsetID` `  with #sql{` `  select` `  Name1, Name2, Age` `  from` `  sqlTable1 sqlLabel1` `  where` `  Name1 = :Namex` `  for update of` `  Name2, Age` `  }` `  into` `  Name1, Name2, Age;`	The migration tool always includes the resultSetID when migrating an UPDATE statement for an SQL record. The tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. The migration tool creates the *from* clause based on the table name and table label in the record definition. Special considerations apply. See "SQL I/O statements" on page 91 for details and potential problems.
• I/O object: recordName • I/O option: REPLACE (optional UPDATE/SETUPD functionName) Clause that can be modifed: • SET	Use the *replace* statement. The following is an example of the *replace* statement: `replace recordName` `with #sql{` `  update` `  sqlTableName` `  set` `  columnName1 = value1,` `  columnName2 = value2` `}` `from resultSetID;`	If an UPDATE/SETUPD function name is included in VisualAge Generator, the migration tool includes the *from resultSetID* clause. The migration tool sets the resultSetID to the UPDATE/SETUPD function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. The migration tool creates the *update* clause based on the table name in the record definition. Special considerations apply. See "SQL I/O statements" on page 91 for details and potential problems.

Table 112. Functions — I/O options for modified SQL statements, without Execution Time Statement Build (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: recordName • I/O object: SETINQ (with or without Declare cursor with hold) Clauses that can be modified: • SELECT • INTO • WHERE, GROUP BY, HAVING • ORDER BY	Use the *open* statement. If you are doing a *Declare cursor with hold*, also use the *hold* option. The following is an example of an *open* statement using the *hold* option: `open resultSetID hold with #sql{ select Name1, Name2 from sqlTable1 sqlLabel1, sqlTable2 sqlLabel2 where Name1 > :Name2 order by Name1 } into Name1, Name2 for recordName;`	The tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. If *Declare cursor with hold* is selected in VisualAge Generator, the migration tool includes the EGL *hold* option after the resultSetID. The migration tool creates the *from* clause based on the table names and table labels in the record definition. Special considerations apply. See "SQL I/O statements" on page 91 for details and potential problems.
• I/O object: record • I/O option: SETUPD (with or without Declare cursor with hold) Clauses that can be modified: • SELECT • INTO • WHERE • FOR UPDATE OF	Use the *open forUpdate* statement. The following is an example using the *hold* option: `open resultSetID hold forUpdate with #sql{ select Column1, Column2 from sqlTable1 sqlLabel1 where Column1 > :Item1 for update of Column2 } into Item1, Item2 for recordName;`	The migration tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. If *Declare cursor with hold* is selected in VisualAge Generator, the migration tool includes the EGL *hold* option. The migration tool creates the *from* clause based on the table name and table label in the record definition. Special considerations apply. See "SQL I/O statements" on page 91 for details and potential problems.
• I/O object: record • I/O option: SQLEXEC with Model SQL Statement **Note:** • The SQL record name is optional in this form of SQLEXEC. • The values for the model type are as follows: – None – Update – Delete	Use the *execute* statement. The following is an example of the statement: `execute modelType #sql{ UPDATE mysqltable set Column1 = Column1 * 2 where Column2 = :Column2 } for recordName;` **Note:** The values for model type include Update and Delete.	The migration tool does the following: • Converts SQLEXEC to the *execute* statement. • Uses the I/O object, if it is specified, as the recordName in the *for* clause. The migration tool includes the VAGen Model SQL Statement value, if any, as a comment on the EGL *execute* statement. The migration tool migrates the VAGen SQLEXEC clauses to EGL SQL clauses.

Table 113. Functions - I/O options for modified SQL statements with Exection Time Statement Build

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Execution time statement build can only be used with the following I/O options: • INQUIRY • UPDATE • SETINQ • SETUPD • SQLEXEC You specify Execution time statement build to cause VisualAge Generator to prepare the SQL statement dynamically every time the I/O statement is executed.	In EGL, you code the SQL prepare statement directly whenever you want the SQL statement to be dynamically prepared. You must also code the open, execute, or get statement that follows the prepare. For example, the EGL equivalent of a VAGen INQUIRY I/O option with Execution time statement build is as follows: `prepare prepID from` `  "sqlStatementString"` `  for recordName;` `get recordName with prepID` `  into itemList;` **Note:** • The sqlStatementString in the prepare statement is a concatenated string of constants and variables that is written in SQL notation. An example of a where clause that uses both column names and variable is as follows: `[other clauses]` `+ " where columnName = "` `+ itemName` `+ " AND columnName2 = "` `+ itemName2` `+ .... [other clauses]` • The examples shown in the rest of this table do not include splitting the variables outside the double quotes.	The migration tool sets the prepID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. The migration tool uses the SQL clauses in the function and the table names and table name variables in the record definition to build the sqlStatementString. The migration tool builds the sqlStatementString as follows: • Does all the processing as though the Execution time statement build were not specified, including the following: – Using the table names and table labels from the SQL row record to build the tables clause for the EGL I/O statement. Both table names and table name host variables are included in the tables clause of the EGL I/O statement. – Creating default clauses as necessary based on the record definition. – Converting any !itemColumnName variables to their corresponding SQL column name. – Converting VAGen comments (/*) to EGL comments (//) in the prepare statement. Then the migration tool does additional processing to create the sqlStatementString, including: • Enclosing constants, column names and SQL operators in double quotes. • Placing variables outside double quotes. • Using the + string concatenation operator to concatenate the strings and variables together. Special considerations apply if the SQL record and its alternate specification record, if any, are not available during migration. See “SQL I/O statements” on page 91 for details and potential problems.

Table 113. Functions - I/O options for modified SQL statements with Exection Time Statement Build (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: record • I/O option: INQUIRY (with and without Single row select) Clauses that can be modified: • SELECT • INTO • WHERE, GROUP BY, HAVING • ORDER BY	Use the *prepare* statement. The following is an example: `prepare prepID from` `  " select columnName "` `+ ", columnName2 "` `+ " from table1 t1 "` `+ "[ where whereClause ]"` `+ "[order by orderByClause ]"` `for recordName;` `get recordname with prepID` `  into itemList;`	No special considerations.
• I/O object: record • I/O option: UPDATE Clauses that can be modified: • SELECT • INTO • WHERE • FOR UPDATE OF	Use the *prepare* statement. The following is an example: `prepare prepID from` `  " select columnName "` `+ ", columnName2 "` `+ " from table1 t1 "` `+ "[ where whereClause ]"` `+ " for Update of columnList "` `for recordName;` `get recordName forUpdate` `  resultSetID` `  with prepID` `  into itemList;`	The migration tool always includes the resultSetID when migrating an UPDATE statement for an SQL record. The tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences.
• I/O object: record • I/O option: SETINQ (with or without Declare cursor with hold) Clauses that can be modified: • SELECT • INTO • WHERE, GROUP BY, HAVING • ORDER BY	Use the *prepare* statement. The following is an example: `prepare prepID from` `  " select columnName "` `+ ", columnName2 "` `+ " from table1 t1 "` `+ "[ where whereClause ]"` `+ "[order by orderByClause ]"` `for recordName;` `open resultSetID [ hold ]` `  with prepID` `  into itemList` `  for recordName;`	The migration tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. If *Declare cursor with hold* is selected in VisualAge Generator, the migration tool includes the EGL hold option after the resultSetID.
• I/O object: record • I/O option: SETUPD (with or without Declare cursor with hold) Clauses that can be modified: • SELECT • INTO • WHERE • FOR UPDATE OF	Use the *prepare* statement. The following is an example: `prepare prepID from` `  " select columnName "` `+ ", columnName2 "` `+ " from  table1 t1 "` `+ "[ where whereClause ] "` `+ " for update of columnList "` `for recordName;` `open resultSetID [ hold ]` `forUpdate` `with prepID` `into itemList` `for recordName;`	The tool sets the resultSetID to the function name followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. If *Declare cursor with hold* is selected in VisualAge Generator, the migration tool includes the EGL hold option after the resultSetID.

Table 113. Functions - I/O options for modified SQL statements with Exection Time Statement Build (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: record • I/O option: SQLEXEC with Model SQL Statement **Note:** • The SQL record name is optional in this form of SQLEXEC. • The values for the model type are as follows: – None – Update – Delete	Use the *prepare* statement. The following is an example: `prepare prepID from` `  " grant " + group_privileges` `+ " on " + table_name` `+ " to " + userid` `[ for recordName ] ;` `execute prepID` `[ for recordName ] ;` `// model = type`	The migration tool includes the VAGen Model SQL Statement value, if any, as a comment on the EGL execute statement. The migration tool converts the VAGen SQLEXEC clauses to EGL SQL clauses.

Table 114. Functions — I/O options for default (unmodified) DL/I statements

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: recordName • I/O option: ADD • PSB: psbName • Database identifier: databaseName | pcbNumber	Use the *add* statement. The following is an example: `add recordName` `[ usingPCB pcbInfo ];`	The migration tool includes the usingPCB keyword if the VAGen function specifies the Database identifier. The migration tool sets the pcbInfo value based on the information stored in the VAGen function: • *databaseName* followed by a customer-specified suffix. You can control the suffix with the Stage 2 VAGen Migration Preferences. • pcb*n*, where *n* is the pcbNumber specified in VisualAge Generator.
• I/O object: recordName • I/O option: SCAN • PSB: psbName • Database identifier: databaseName | pcbNumber • SCAN options: – Scan update – Scan parent	Use the *get next* statement. The following is an example: `get next recordName` `[ usingPCB pcbInfo ];` An example with both Scan update and Scan parent is as follows: `get next inParent` `recordName forUpdate` `[ usingPCB pcbInfo ];`	The migration tool includes the usingPCB keyword if the VAGen function specifies the Database identifier as described for the ADD I/O option. The migration tool includes the inParent keyword if the VAGen function specifies the Scan parent option. The migration tool includes the forUpdate keyword if the VAGen function specifies the Scan update option.
• I/O object: recordName • I/O option: INQUIRY • PSB: psbName • Database identifier: databaseName | pcbNumber	Use the *get* statement. The following is an example: `get recordName` `[ usingPCB pcbInfo ] ;`	The migration tool includes the *usingPCB* keyword if the VAGen function specifies the Database identifier as described for the ADD I/O option.

Table 114. Functions — I/O options for default (unmodified) DL/I statements (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
• I/O object: recordName • I/O option: UPDATE • PSB: psbName • Database identifier: databaseName | pcbNumber	Use the get forUpdate statement. The following is an example: `get recordName forUpdate [ usingPCB pcbInfo ] ;`	The migration tool includes the usingPCB keyword if the VAGen function specifies the Database identifier as described for the ADD I/O option.
• I/O object: recordName • I/O option: DELETE • PSB: psbName • Database identifier: databaseName | pcbNumber	Use the *delete* statement. The following is an example: `delete recordName [ usingPCB pcbInfo ] ;`	The migration tool includes the usingPCB keyword if the VAGen function specifies the Database identifier as described for the ADD I/O option.
• I/O object: recordName • I/O option: REPLACE • PSB: psbName • Database identifier: databaseName | pcbNumber	Use the *replace* statement. The following is an example: `replace recordName [ usingPCB pcbInfo ] ;`	The migration tool includes the usingPCB keyword if the VAGen function specifies the Database identifier as described for the ADD I/O option.

Table 115. Functions - Segment Search Arguments for modified DL/I statements

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
General information specified for a modified DL/I call with SSAs: • I/O option • I/O object • PSB • Database identifier • Scan update • Scan parent • Zero, one or more SSAs that include: – Segment Name – Command Codes – Boolean Operator – Segment Field – Relational Operator – Comparison Value Item **Note:** • SSAs are entered in a specialized DL/I Call Editor. • VisualAge Generator formats the SSAs at generation time.	General format for a modified DL/I call with SSAs is that SSAs are entered between curly braces as follows: `with #dli` `{ dliFunction` `SSAList } ;` For example: `ioOptionWithModifiers` `recordNameList` `[ usingPCB pcbInfo]` `with #dli` `{ dliFunction` `segmentName1*cmdCodes` `(segmentFieldA` `relationalOperatorA` `:comparisonValueItemA` `booleanOperator` `segmentFieldB` `relationalOperatorB` `:comparisonValueItemB)` `segmentName2*cmdCodes` `(segmentFieldC` `relationalOperatorC` `:comparisonValueItemC)` `};` **Note:** • SSAs are entered in a text editor. • EGL formats the SSAs at generation time according to the DL/I formatting rules.	The migration tool builds the recordNameList based on a combination of the I/O object and the command codes specified for the SSAs.

Table 115. Functions - Segment Search Arguments for modified DL/I statements (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Modified DL/I call with all SSAs deleted. **Note:** This technique is used in scanning all segments in the database.	General format for a modified DL/I call with all SSAs deleted: *ioOptionWithModifiers* *recordNameList* [**usingPCB** *pcbInfo*] **with #dli{** *dliFunction* **};**	The migration tool sets the recordNameList to the name of the I/O object.
VisualAge Generator I/O options: • ADD • SCAN • SCAN - Scan update • SCAN - Scan parent • SCAN - Scan update and Scan parent • INQUIRY • UPDATE • DELETE • REPLACE	Corresponding EGL ioOptionWithModifiers: • add • get next • get next forUpdate • get next inParent • get next inParent forUpdate • get • get forUpdate • delete • replace	No special considerations. The ioOptionWithModifiers are the same values that are used when converting unmodified DL/I I/O options.
VisualAge Generator I/O options: • ADD • SCAN • SCAN - Scan update • SCAN - Scan parent • SCAN - Scan update and Scan parent • INQUIRY • UPDATE • DELETE • REPLACE	Corresponding EGL dliFunction: • ISRT • GN • GHN • GNP • GHNP • GU • GHU • DLET • REPL **Note:** The dliFunction must be consistent with the ioOptionWithModifiers.	No special considerations.
VisualAge Generator I/O option, SSAs, and Command Codes **Note:** • Command codes are optional. There is a maximum of 4 command codes for an SSA. • VisualAge Generator does special processing at generation and runtime to support the D and N command codes that are related to path calls.	EGL I/O option, recordNameList, SSAs and Command Codes **Note:** • The * is only specified if one or more optional command codes are specified. There is a maximum of 4 command codes for an SSA. • The EGL recordNameList varies based on the I/O option and the command codes specified for the SSAs. See the next rows of this table for details.	The migration tool builds the recordNameList based on a combination of the I/O object and the command codes specified for the SSAs.
VisualAge Generator I/O object and Command Codes without the D or N Command Codes **Note:** Only the I/O object (target DL/I segment) is retrieved or updated in the database.	The EGL recordNameList is the name of the target DL/I segment.	The migration tool sets the recordNameList to the name of the I/O object.

Table 115. Functions - Segment Search Arguments for modified DL/I statements (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VisualAge Generator ADD I/O option with the D Command Code **Note:** • The D command code indicates the top segment of the hierarchy that is to be inserted into the database. All segments after the D command code are also inserted. • Only one segment can specify the D command code. • The target segment never specifies the D command code.	Use the *add* statement. All segments that are to be inserted must be listed as objects of the I/O statement. The following is an example for specifying a DL/I Insert call: `add recordName1 ,` `recordName2 ,` `recordName3` `[ usingPCB pcbInfo ]` `with #dli{ ISRT` `recordName1*D` `recordName2` `recordName3` `} ;`	The migration tool creates the recordNameList for the I/O statement to include the DL/I segment record that specifies the D command code and all subsequent DL/I segment records in the hierarchy.
VisualAge Generator SCAN, INQUIRY, and UPDATE I/O options with the D Command Code **Note:** • The D command code indicates a segment of the hierarchy that is to be retrieved from the database. Each segment other than the target segment that is to be retrieved from the database must specify the D command code. The target segment is always retrieved. • Multiple SSAs can specify the D command code. • The target segment never specifies the D command code.	Use the form of the *get* statement that corresponds to the I/O option. All segments that are to be retrieved from the database must be listed as objects of the I/O statement. The following is an example for specifying a DL/I Get Hold Next in Parent call: `get next inParent` `recordName1 ,` `recordName3` `forUpdate` `[ usingPCB pcbInfo ]` `with #dli{ GHNP` `recordName1*D` `recordName2` `recordName3` `} ;`	The migration tool creates the recordNameList for the I/O statement to include each DL/I segment record that specifies a D command code and the target segment.
VisualAge Generator REPLACE I/O option with the N Command Code **Note:** • The N command code indicates that a segment is not to be replaced even though it was retrieved for update with the D command code on a previous SCAN or UPDATE. • Multiple segments can specify the N command code. • The target segment never specifies the N command code.	Use *replace* statement. Only the target segment is specified in the recordNameList. The following is an example for specifying a DL/I Replace call: `replace recordName3` `[ usingPCB pcbInfo ]` `with #dli{ REPL` `recordName1*N` `recordName3` `} ;`	The migration tool sets the recordNameList to the name of the I/O object.

Table 115. Functions - Segment Search Arguments for modified DL/I statements (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VisualAge Generator Relational Operators for SSAs: • EQ and = • GT and > • LT and < • GE and >= and => • LE and <= and =< • NE and ^= and =^	Corresponding EGL relational operators for SSAs: • = • > • < • >= • <= • != **Note:** • EGL only supports one variant of the relational operators for SSAs. • EGL converts != to a not equal operator that is acceptable to DL/I.	No special considerations.
VisualAge Generator Boolean Operators for SSAs: • AND and & • OR and | **Note:** VisualAge Generator does not provide support for the dependent OR.	Corresponding EGL Boolean operators for SSAs: • & • | (vertical bar) **Note:** • EGL only supports one variant of the Boolean operators for SSAs. • EGL also supports the dependent OR (# symbol).	No special considerations.
Comparison Value Item **Note:** • The comparison value item can be any item in the program. • If the item is not qualified, VisualAge Generator looks first for the item in the segment record associated with the current SSA.	Comparison value item **Note:** • The comparison value item can be a literal or any item in the program. • If the item is not qualified, EGL looks first in the target segment, which is the lowest segment in the hierarchy. • The comparison value item must be preceded by a semicolon to indicate a host variable. For example: :*qualifier.itemName* EGL removes the semicolon during generation.	If a comparison value item is not qualified, the migration tool checks the DL/I segment record associated with the current SSA to determine if the item is in that record. If so, the migration tool includes the DL/I segment record as the qualifier for the comparison value item. Special considerations apply if the DL/I segment record is not available or if the comparison value item is not in the record. For details and potential problems, see "DL/I I/O and comparison value items" on page 96.

Statements

The statements section is organized into the following tables:

- General rules - data item qualification and numeric literals, Table 116 on page 293
- Function invocation, Table 117 on page 293
- Assignment, MOVE, and MOVEA, Table 118 on page 294
- SET, Table 119 on page 295
- RETRIEVE and FIND, Table 120 on page 297

- IF, WHILE, and TEST, including EZEAID, EZESYS, and I/O error values, Table 121 on page 298
- CALL, Table 122 on page 303
- DXFR, Table 123 on page 303
- XFER, Table 124 on page 304

Table 116. Statements - General rules - data item qualification and numeric literals

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Item qualification rules: If an item is not qualified, VisualAge Generator looks for the item in the following order: • Items in the function's local storage or parameter list. • The function's I/O object and records in the function's local storage or parameter list. If the item name is not unique in this category, the item name must be qualified. • Records, maps, and tables in the program's primary working storage record, called parameter list, table and additional records list, and all I/O objects. If the item name is not unique in this category, the item name must be qualified. • If the item name is not found within the program and the program allows implicit items, VisualAge Generator creates a data item definition based on the use of the item.	Item qualification rules: If an item is not qualified, EGL looks for the item in the following order: • Items in the function's local storage or parameter list. • The records and forms used in the function's I/O statements and records in the function's local storage or parameter list. If the item name is not unique in this category, the item name must be qualified. • Records, forms, and dataTables in the program's data declarations, use declarations, and parameter list. If the item name is not unique in this category, the item name must be qualified. • EGL does not permit implicit items. Every item must be explicitly defined.	See "Level 77 items in records" on page 67 and "Implicit data items in programs" on page 84 for details and potential problems.
Numeric literals: • Not enclosed in quotes. • Can use either a period (.) or a comma (,) as the decimal point, depending on the national language.	Numeric literals: • Not enclosed in quotes. • Must use the period as the decimal point. At generation time, the decimalSymbol build descriptor option determines whether the period or comma is used as the decimal point in the generated Java or COBOL code.	The migration tool converts the commas used as decimal points to a period except for initial values of form variable fields.

Table 117. Statements — Function invocation

VisualAge Generator4.5	EGL produced by the migration tool	Migration tool considerations
VAGen syntax example: `functionName( [argumentList] );`	EGL syntax example: *`functionName`*`( [`*`argumentList`*`] );`	See "EZE words" on page 305 for the EGL equivalent system library functions. See Table 109 on page 279 for function invocations from an I/O error routine.
In flow statements: `functionName();`	Flow statements are not supported. **`goto`** *`functionName`*`;`	No special considerations.

Table 118. Statements — Assignment, MOVE, and MOVEA

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen syntax example: `target = functionName ( [argumentList] ) ;`	EGL syntax example: *target = functionName ([argumentList]) ;*	See "EZE words" on page 305 for the EGL equivalent system library functions.
`target = numericExpression;` or `target = numericExpression (R;`	*target = numericExpression ;* or *target* = **mathLib.round** (*numericExpression*) ;	If the (R option is specified, the migration tool converts the option to the EGL round system function.
`target = source;` or `MOVE source [ TO ] target;` **Note:** • The target can be a record, map, data item, or certain EZE data words. • The source can be a record, map, literal, data item, or certain EZE data words. • If the target is a record or map, the source must also be a record or map. A move corresponding occurs.	*target = source ;* or **move** *source* **to** *target* **byName ;** or **move** *source* **to** *target ;* **Note:** • For assignment statements: – The target can be a record, item, or certain system variables. If the target is a record, the source must also be a record; the source is moved to the target on a byte-by-byte basis. – The source can be a record, literal, item, or certain system variables. – Forms cannot be used in assignment statements. – Move corresponding is never done for an assignment statement. • For move statements: – The target and source can be the same as in VisualAge Generator assignment or MOVE statements. – If *byName* is specified, EGL does a move corresponding. – If no modifier is specified, the move is either an item to item move or a move corresponding depending on the part type of the source. The data conversion and truncation rules are the same as in VisualAge Generator.	The migration tool considers the following EGL rules when migrating assignment and move statements: • EGL prefers that the assignment statement be used for item-to-item moves. • The *move byName* statement is required for moves involving records or forms to preserve the VAGen *move corresponding* behavior. • Move without a modifier is tolerated and treated as an item-to-item move or a move corresponding depending on the part type of the source. Therefore, the migration tool does the following: • Converts to an assignment statement for any of the following: – The source or target is an EZE data word (for example: EZEAPP). – The source is a literal. – The source or target is a qualified or subscripted item. – The source or target is an item in the function's parameter list or local storage. • Converts to a move byName if the source or target is the function's I/O object or a record in the function's parameter list or local storage. • Converts to a move without a modifier in all other situations. See "Assignment statements" on page 98 for details and potential problems.

Table 118. Statements — Assignment, MOVE, and MOVEA (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`MOVEA source [TO] target;` or `MOVEA source [TO] target` `FOR occurrence;` **Note:** The *source* can be an array or a scalar.	**move** *source* **to** *target* **for all ;** or **move** *source* **to** *target* **for** *occurrence* **;**	The migration tool converts the MOVEA statement to a move statement with the *for* modifier. The tool also does the following: • Includes the *for all* option if the FOR occurrence option was not specified in VisualAge Generator. • Includes the *for occurrence* option if the FOR occurrence option was specified in VisualAge Generator. • Sets the target subscript to 1 if the subscript was not previously specified. • Does not set the subscript to 1 for the source because the source can be an array or a scalar item.

Table 119. Statements — SET

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
General information: • Commas or blanks can be used to separate multiple options on a single SET statement.	General information: • Commas are required to separate multiple options on a single set statement.	No special considerations.
`SET record SCAN;` OR `SET record EMPTY;` **Note:** SET record EMPTY does not affect level 77 items.	**set** record **position;** OR **set** record **empty;**	The migration tool does not add a statement for the level 77 record.
`SET sqlItem NULL;` **Note:** *sqlItem* can be an item in an SQL row record or an SQLITEM parameter for a function.	**set** *sqlItem* **null;** **Note:** *sqlItem* can be an *isNullable=yes* item in an SQL row record or a nullable parameter for a function.	No special considerations.
`SET map [ ALARM │` `[ CLEAR │ EMPTY] ] ;` **Note:** • CLEAR and EMPTY are mutually exclusive. • ALARM and either CLEAR or EMPTY can be combined with the PAGE option.	**set** *form* [**alarm** │ [**initial** │ **empty**]] **;** **Note:** • *Initial* and *empty* are mutually exclusive. • The replacement for the PAGE option cannot be combined with any other options.	If ALARM, CLEAR, or EMPTY are used in combination with the PAGE option, the migration tool splits the VAGen statement into two EGL statements.

Table 119. Statements — SET (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`SET map PAGE ;` **Note:** PAGE can be combined with ALARM and with either CLEAR or EMPTY.	`converseLib.clearScreen();` `// display form` or `converseLib.pageEject();` `// printer form` **Note:** The replacement for the PAGE option cannot be combined with any other options.	The migration tool migrates SET map PAGE as follows: • If SET map PAGE is used in combination with any other options, the migration tool splits the VAGen statement into two EGL statements. • If the map is a display map, the migration tool converts the statement to *converseLib.clearScreen();* • If the map is a printer map, the tool converts the statement to *converseLib.pageEject();* • If the map is not available to determine the map type, the migration tool converts the statement to *converseLib.EZE_SETPAGE();* See "SET map PAGE statement" on page 100 for details and potential problems.
`SET mapItem` `[ CURSOR | FULL |` `[ NORMAL | DEFINED ] ] ;` **Note:** • *mapItem* can be a field on a map or a MAPITEM parameter for a function. • NORMAL and DEFINED are mutually exclusive. • CURSOR and FULL can be combined with either NORMAL or DEFINED. • VisualAge Generator tolerates setting CURSOR, FULL, NORMAL, and DEFINED for print maps, but they had no effect on the printed output.	**set** *formField* [**cursor** | **full** | [**normal** | **initialAttributes**]] ; **Note:** • *formField* can be a variable field on a form or a field parameter for a function. • *normal* and *initialAttributes* are mutually exclusive. • *cursor* and *full* can be combined with either *normal* or *initialAttributes*. • EGL does not support setting *cursor, full, normal*, or *initialAttributes* for print forms.	The migration tool migrates to the EGL equivalent of each option without regard to whether the formField is on a text or print form. See "SET mapItem attributes" on page 101 for details and potential problems.

Table 119. Statements — SET (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
SET mapItem [CURSOR | FULL | color | extendedHighlight | MODIFIED | [BRIGHT | DARK] | [PROTECT | AUTOSKIP]] ; **Note:** • *mapItem* can be a field on a map or a MAPITEM parameter for a function. • BRIGHT and DARK are mutually exclusive. • PROTECT and AUTOSKIP are mutually exclusive. • Any of the other options can be combined. • VisualAge Generator tolerates setting these attributes for print maps. However, only the extended highlighting option of USCORE has any effect on the printed output.	**set** *formField* [**cursor** | **full** | *color* | *extendedHighlight* | **modified** | [**bold** | **invisible**] | [**protect** | **skip**]] ; **Note:** • *formField* can be a variable field on a form or a field parameter for a function. • *Bold* and *invisible* are mutually exclusive. • *Protect* and *skip* are mutually exclusive. • Any of the other options can be combined. • Except for the extended highlighting option of underline, EGL does not support setting these attributes for print forms.	The migration tool migrates to the EGL equivalent of each option without regard to whether the formField is on a text or print form. See "SET mapItem attributes" on page 101 for details and potential problems. See later rows in this table for color and *extendedHighlight* information.
color: MONO | BLUE | GREEN | PINK | RED | TURQ | YELLOW | WHITE	color: defaultColor | blue | green | magenta | red | cyan | yellow | white	No special considerations.
extendedHighlight: NOHILITE | BLINK | RVIDEO | USCORE	extendedHighlight: noHighLight | blink | reverse | underline	No special considerations.

Table 120. Statements — RETRIEVE and FIND

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
RETR dataItem1 table[.searchColumn] dataItem2 [returnColumn] ; **Note:** • If the *searchColumn* is not specified, the default is the first column in the table. • If the *returnColumn* is not specified, the default is the second column in the table.	**if (***dataItem1* **in** *dataTable.searchColumn***)** **dataItem2** = *dataTable.returnColumn*[**sysVar.arrayIndex**]; **end** **Note:** The *searchColumn* and *returnColumn* are required.	The migration tool converts the RETR statement to an *if* statement and an assignment statement. Special considerations apply if the table is not available during migration. See "RETR statement" on page 100 for details and potential problems.

Table 120. Statements — RETRIEVE and FIND (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`FIND dataItem` `  table[.searchColumn]` `  trueStatement;` OR `FIND  dataItem` `  table[.searchColumn]` `  , falseStatement ;` OR `FIND  dataItem` `  table[.searchColumn]` `  trueStatement` `  [,]  falseStatement ;` **Note:** • If the *searchColumn* is not specified, the default is the first column in the table. • If FIND is used in program flow, the *trueStatement* and the *falseStatement* can be the name of a main function or EZECLOS. • If FIND is used in a function, the *trueStatement* and the *falseStatement* can be the name of any function, EZECLOS, EZEFLO, or EZERTN.	**if (***dataItem in dataTable.searchColumn***)** `  EGLtrueStatement ;` **end** OR **if (***dataItem* **in** *dataTable.searchColumn***)** **else** `  EGLfalseStatement ;` **end** OR **if (***dataItem* **in** *dataTable.searchColumn***)** `  EGLtrueStatement ;` **else** `  EGLfalseStatement ;` **end** **Note:** The *searchColumn* is required.	The migration tool converts the FIND statement to an *if* statement and the EGL equivalent of the true and false statements. See later rows in this table for conversion of the trueStatement and falseStatement to the corresponding EGL statements.
true/falseStatement in flow: • functionName() (main only) • EZECLOS	**Corresponding EGL replacements:** • **goto** *functionName***;** • **exit program;**	No special considerations.
true/falseStatement in a function: • functionName (any function) • EZECLOS • EZEFLO • EZERTN	**Corresponding EGL replacements:** • *functionName()***;** • **exit program;** • **exit stack;** • **return;**	No special considerations.

Table 121. Statements — IF, WHILE, and TEST, including EZEAID, EZESYS, and I/O error values

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`IF logicalExpression ;` `  { statement ; }` `[ ELSE;` `  { statement ; } ]` `END;`	**if (** *EGLLogicalExpression* **)** `  { EGLStatement ; }` **[else** `  { EGLStatement ; } ]` **end**	See later rows in this table for the relationship between the VAGen logical expressions and the EGL logical expressions.
`WHILE logicalExpression ;` `  { statement ; }` `END;`	**while (** *EGLLogicalExpression* **)** `  { EGLStatement ; }` **end**	See later rows in this table for the relationship between the VAGen logical expressions and the EGL logical expressions.

Table 121. Statements — IF, WHILE, and TEST, including EZEAID, EZESYS, and I/O error values (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`TEST testCondition` `  trueStatement ;` `TEST testCondition` `  , falseStatement ;` `TEST testCondition` `  trueStatement` `  [, ] falseStatement ;` **Note:** • The TEST statement is similar to an IF ... IS statement. The exception to this is TEST mapItem nnn, +nnn, and -nnn, which does not have an IF statement equivalent. • If TEST is used in program flow, the *trueStatement* and the *falseStatement* can be the name of a main function or EZECLOS. • If TEST is used in a function, the *trueStatement* and the *falseStatement* can be the name of any function, EZECLOS, EZEFLO, or EZERTN.	`if ( EGLLogicalExpression )` `  EGLtrueStatement ;` `end` `if ( EGLLogicalExpression )` `else` `  EGLfalseStatement ;` `end` `if ( EGLLogicalExpression )` `  EGLtrueStatement ;` `else` `  EGLfalseStatement ;` `end`	With the exception of TEST mapItem nnn, +nnn, and -nnn, the migration tool converts the TEST statement to the equivalent *if ... is* statement and the EGL equivalent of the true and false statements. See later rows in this table for the relationship between the VAGen logical expressions and the EGL logical expressions. See later rows in this table for conversion of the *trueStatement* and *falseStatement* to the corresponding EGL statements.
VisualAge Generator boolean operators for IF and WHILE: • AND • OR	Corresponding EGL boolean operators for *if* and *while*: • && • ||	No special considerations.
VisualAge Generator relational operators for IF and WHILE: • EQ and = • NE and ^= • LE and <= and =< • LT and < • GE and >= and => • GT and >	Corresponding EGL relational operators for *if* and *while*: • == • != • <= • < • >= • >	No special considerations.
VisualAge Generator state operators for IF and WHILE: • IS • NOT	Corresponding EGL state operators for *if* and *while*: • is • not	The migration tool always migrates a VAGen TEST statement to an EGL *if ... is* statement.
VisualAge Generator array operator for IF and WHILE: • IN	Corresponding EGL state operators for *if* and *while*: • in	Special considerations apply. See "Checking for IN literal or scalar" on page 102.

Table 121. Statements — IF, WHILE, and TEST, including EZEAID, EZESYS, and I/O error values (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VisualAge Generator *mapItem* state conditions: • BLANK or BLANKS • CURSOR • DATA • MODIFIED • NULL or NULLS • NUMERIC	Corresponding EGL *formField* state conditions: • blanks • cursor • data • modified • blanks • numeric	The migration tool converts to the equivalent EGL state conditions. Special considerations apply to *mapItem* NULL. See "Checking SQL and map items for NULL" on page 103 for details and potential problems.
Special mapItem state condition for the TEST statement: nnn | +nnn | -nnn **Note:** This compares the length of the data the user entered to nnn. The test is =, >, or < corresponding to nnn, +nnn, or -nnn.	EGL does not provide direct support for this state condition. However, you can achieve the equivalent function by doing the following: • Use the system library function *converseLib.fieldInputLength*, which returns the length of the data entered by the user. • Use an *if* statement to compare the resulting length for == , >, or < corresponding to nnn, +nnn, or -nnn, respectively.	When migrating any program, the migration tool always includes a declaration for: `<custPrefix>EZE_ITEMLEN` The migration tool does the following for TEST nnn, +nnn, or -nnn: • Adds an extra statement just before the TEST statement to set `<custPrefix>EZE_ITEMLEN` using the system library function *converseLib.fieldInputLength(item)*. • Changes the TEST statement to an if statement and compares `<custPrefix>EZE_ITEMLEN` to == nnn, > nnn, or < nnn.
VisualAge Generator map state conditions: • MODIFIED	Corresponding EGL form state conditions: • modified	No special considerations.
VisualAge Generator EZEAID state conditions: • ENTER • BYPASS • PA*n*, where *n* = 1, 2, 3 • PF*n*, where *n* is 1 to 24 • PA • PF	Corresponding EGL *converseVar.eventKey* state conditions: • enter • bypass • pa*n*, where *n* = 1, 2, 3 • pf*n*, where *n* is 1 to 24 • pakey • pfkey	No special considerations.
VisualAge Generator *sqlItem* state conditions: • BLANK or BLANKS • NULL • NUMERIC • TRUNC	Corresponding EGL *sqlItem* state conditions: • blanks • null • numeric • trunc	The migration tool converts to the equivalent EGL state conditions. Special considerations apply to sqlItem NULL. See "Checking SQL and map items for NULL" on page 103 for details and potential problems.

Table 121. Statements — IF, WHILE, and TEST, including EZEAID, EZESYS, and I/O error values (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VisualAge Generator record state conditions: • DED • DUP • EOF • ERR • FMT • FNA • FNF • FUL • HRD • LOK • NRF • UNQ **Note:** • DUP is supported for both SQL and non-SQL records. • For SQL records, DUP and UNQ are equivalent and are always hard errors. • For non-SQL records, DUP and UNQ are not equivalent; both are soft errors. • LOK is only supported on OS/400 and is a soft error.	Corresponding EGL record state conditions: • deadLock • duplicate or unique • endOfFile • ioError • invalidFormat • fileNotAvailable • fileNotFound • full • hardIOError • deadLock • noRecordFound • unique **Note:** • *duplicate* is only supported for non-SQL records and is a soft error. • *unique* is a hard error for both SQL and non-SQL records. • LOK is converted to *deadLock*, which is always a hard error.	The migration tool converts to the equivalent EGL state conditions. Special considerations apply to migrating DUP based on the record type. See "I/O error values UNQ and DUP" on page 104 for details and potential problems. Special considerations also apply to migrating LOK. See "I/O error value LOK" on page 106 for details and potential problems.
UI record state conditions: • MODIFIED	Corresponding EGL VGUI record conditions: • modified	No special considerations.
VisualAge Generator *dataItem* state conditions: • BLANK or BLANKS • NUMERIC	Corresponding EGL *dataItem* state conditions: • blanks • numeric	No special considerations.

Table 121. Statements — IF, WHILE, and TEST, including EZEAID, EZESYS, and I/O error values (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VisualAge Generator EZESYS state conditions: • AIX • AIXCICS • HP • IMSBMP • IMSVS • MVSBATCH • MVSCICS • NTCICS • OS2 • OS2CICS • OS2GUI • OS400 • SCO • SOLACICS • SOLARIS • TSO • VMCMS • VMBATCH • VSEBATCH • VSECICS • WINGUI • WINNT • ITF	Corresponding *sysVar.systemType* state conditions: • aix • AIXCICS • hpux • imsbmp • imsvs • zosbatch • zoscics • NTCICS • OS2 • OS2CICS • OS2GUI • iseriesc • SCO • SOLACICS • solaris • TSO • VMCMS • VMBATCH • vsebatch • vsecics • WINGUI • win • debug	The migration tool converts to the equivalent EGL state conditions. Special considerations apply to checking the state for EZESYS. See "EZESYS" on page 108 for details and potential problems. **Note:** Not all of the VAGen runtime environments are supported. However, the migration tool always converts to an equivalent value, even if it will not be valid in EGL. There will be an error in the Problems view if the old VAGen value is not supported.
true/falseStatement in flow: • functionName() (main only) • EZECLOS	**Corresponding EGL replacements:** • **goto** functionName **;** • **exit program;**	No special considerations.
true/falseStatement in a function: • functionName (any function) • EZECLOS • EZEFLO • EZERTN	**Corresponding EGL replacements:** • functionName()**;** • **exit program;** • **exit stack;** • **return;**	No special considerations.

Table 122. Statements — CALL

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`CALL programName argument` `[ { [,] argument} ]` `[ (options ] ;` OR `CALL serviceRoutine argument` `[ { [,] argument} ]` `[ (options ] ;` **Note:** Commas to separate the arguments are optional.	**call** *programName argument* `[ { , argument } ]` `[ options ]  ;` **Note:** • Commas to separate the arguments are **required**. • The programName cannot be a reserved word. If the program is a non-EGL program, use a linkage table entry to specify the real name.	See later rows in this table for conversion of the options to the corresponding EGL statements or options. See "Service Routines" on page 313 for information on migrating the CALL statement for them.
REPLY option	If the REPLY option is specified in VisualAge Generator, the corresponding EGL statements are as follows: **try** `  call programName argument` `[ { , argument } ]` `[ otherOptions ]  ;` **end**	The migration tool includes the *try...end* block if the REPLY option is specified.
otherOptions: • NOMAPS • NONCSP	Corresponding EGL otherOptions: • noRefresh • externallyDefined	No special considerations.

Table 123. Statements — DXFR

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`DXFR target` `[ recordName ]` `[ (NONCSP ] ;` where target is `programName` OR `EZEAPP` **Note:** • Any record can be passed. • If a working storage record is passed, any level 77 items are not included.	**transfer to program** *target* `[ passing  recordName ]` `[ externallyDefined ] ;` where *target* is `programName` OR `sysVar.transferName` **Note:** Any record can be passed.	No special considerations.

Table 124. Statements — XFER

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Variation 1 - Migrate to Transfer (no map or UI record) `XFER target` `[ recordName ]` `[ (NONCSP] ;` where target is `transactionName` OR `EZEAPP` **Note:** • This format of XFER does not include a map or UI record. • Any record can be passed. If a working storage record is passed, any level 77 items are not included. • *transactionName* is the program name in nontransactional runtime environments.	EGL syntax for *transfer* statement: **transfer to transaction** *target* [**passing** *recordName*] [**externallyDefined**] ; where *target* is `transactionName` OR `sysVar.transferName` **Note:** • Any record can be passed. • *transactionName* is the program name in nontransactional runtime environments.	If there is no comma in the statement, the migration tool converts the XFER to an EGL transfer to transaction statement.
Variation 2 - Migrate to Show (XFER with a map or XFER with a UI record) `XFER target` `[ recordName ]` `, mapName` `[ (NONCSP ] ;` OR `XFER target` `[ recordName ]` `, UIRecordName ;` where *target* is • transactionName • EZEAPP • ' ' for XFER with a UI record **Note:** • Any record can be passed. If a working storage record is passed, any level 77 items are not included. • transactionName is the program name in nontransactional target environments. • (NONCSP is only supported for XFER with a map.	EGL syntax for *show* statement varies depending on whether a form or a VGUI record is used. **show** *formName* **returning to** *target* [**passing** *recordName*] [**externallyDefined**] ; OR **show** *UIRecordName* [**returning to** *target*] [**passing** *recordName*] ; where *target* is • transactionName • sysVar.transferName **Note:** • Any record can be passed. • transactionName is the program name in nontransactional target environments. • For *show* with a VGUI record, if the target is ' ', the returning to target clause is omitted.	If there is a comma in the statement, the migration tool converts the XFER statement to an EGL show statement.

EZE words

Program flow EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL.

Table 125. Program flow EZE words

EZE word in VisualAge Generator 4.5	EGL
EZECLOS	**This depends on the location:** • If used as an I/O error routine, the migration tool converts EZECLOS to the following, within the try...end block: `onException exit program;` • Used anywhere else, including use as the true or false operand of a TEST or FIND, the migration tool converts EZECLOS to the following: `exit program;` **Note:** The exit program has a default return code of sysVar.returnCode, which is the equivalent of EZERCODE. This default provides the same capability as VisualAge Generator.
EZEFLO **Note:** EZEFLO cannot be used in flow statements.	**This depends on the location:** • If used as an I/O error routine, the migration tool converts EZEFLO to the following, within the try...end block: `onException exit stack;` • Used anywhere else, including use as the true or false operand of a TEST or FIND, the migration tool converts EZEFLO to the following: `exit stack;`
EZERTN or EZERTN(return value) **Note:** • EZERTN cannot be used in flow statements. • EZERTN(return value) cannot be used as an I/O error routine.	**EZERTN — This depends on the location:** • If used as an I/O error routine, the migration tool includes the try...end block but omits the onException statement. • Used anywhere else, the migration tool converts EZERTN to the following: `return;` `OR` `return(returnValue);` **Note:** If the returnValue is EZESYS, see EZESYS for additional considerations.

SQL EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL.

Table 126. SQL EZE words

EZE word in VisualAge Generator 4.5	EGL definition
EZECONCT	VGLib.connectionService The arguments are the same as in VAGen. However, for debug and Java generation, not all of the values for the unit of work argument are supported. JDBC only supports single-phase commit.
EZESQCOD	sysVar.sqlcode
EZESQISL **Note:** • For VisualAge Generator 4.5, EZESQISL is supported for use with ODBC. • Otherwise, EZESQISL is not supported or is ignored in VisualAge Generator for all environments, but it has been kept for compatablity.	VGVar.sqlIsolationLevel **Note:** EGL supports VGVar.sqlIsolationLevel for the following: • connectionService regardless of whether VAGen Compatibility mode is selected • connect only when VAGen Compatibility mode is selected
EZESQLCA	sysVar.sqlca **Note:** sysVar.sqlca is only partially supported in EGL. For debug and Java generation, EGL does not set the fields within sysVar.sqlca that contain the values for VGVar.sqlerrmc and VGVar.sqlwarn[7].
EZESQRD3	VGVar.sqlerrd[3] **Note:** The migration tool changes this to an array reference.
EZESQRRM	VGVar.sqlerrmc **Note:** sqlerrmc is not supported for debug or Java generation.
EZESQWN1	VGVar.sqlwarn[2] **Note:** The migration tool changes this to an array reference.
EZESQWN6	VGVar.sqlwarn[7] **Note:** The migration tool changes this to an array reference. sqlwarn[7] is not supported for debug or Java generation.
N/A	SysVar.sqlState **Note:** This is new for EGL and has no equivalent in VisualAge Generator 4.5. The migration tool does not convert anything to this.

DL/I EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL.

Table 127. DL/I EZE words

EZE word in VisualAge Generator 4.5	EGL
EZEDLCER	dliVar.cicsError
EZEDLCON	dliVar.cicsCondition

Table 127. DL/I EZE words (continued)

EZE word in VisualAge Generator 4.5	EGL
EZEDLDBD	dliVar.dbName
EZEDLERR	dliVar.handleHardDLIErrors
EZEDLKEY	dliVar.keyArea[1:dliVar.keyAreaLen]
EZEDLKYL	dliVar.keyAreaLen
EZEDLLEV	dliVar.segmentLevel
EZEDLPCB **Note:** This is an array; default subscript is 1.	The migration tool always sets the variable that declares the program's PSB to *psb*. Therefore, in statements, EZEDLPCB[*n*] converts as follows: • EZEDLPCB[0] converts to psb.iopcb. • EZEDLPCB converts to psb.pcb1, because 1 is the default subscript. • EZEDLPCB[*n*], where *n* is a numeric literal converts to psb.pcb*n*. In a program's called parameter list, special considerations apply. For details, see Table 103 on page 269.
EZEDLPRO	dliVar.procOptions
EZEDLPSB	In statements except the CALL statement, EZEDLPSB converts to: dliLib.psbData.psbName In the CALL statement, EZEDLPSB converts to: dliLib.psbData In a program's called parameter list, special considerations apply. For details, see Table 103 on page 269.
EZEDLRST	dliVar.cicsRestart
EZEDLSEG	dliVar.segmentName
EZEDLSSG	dliVar.numSensitiveSegs
EZEDLSTC	dliVar.statusCode
EZEDLTRM **Note:** EZEDLTRM is equivalent to EZECNVCM. Both are converted to converseVar.commitOnConverse.	converseVar.commitOnConverse

Date and time EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL.

Table 128. Date and time EZE words

EZE word in VisualAge Generator 4.5	EGL definition
EZEDAY	VGVar.currentShortJulianDate
EZEDAYL	VGVar.currentJulianDate
EZEDAYLC	VGVar.currentFormattedJulianDate

Table 128. Date and time EZE words (continued)

EZE word in VisualAge Generator 4.5	EGL definition
EZEDTE	VGVar.currentShortGregorianDate
EZEDTEL	VGVar.currentGregorianDate
EZEDTELC	VGVar.currentFormattedGregorianDate
EZETIM	VGVar.currentFormattedTime

Other data EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL.

Table 129. Other data EZE words

EZE word in VisualAge Generator 4.5	EGL definition
EZEAID	converseVar.eventKey
EZEAPP	sysVar.transferName
EZECNVCM	converseVar.commitOnConverse
EZECONVT	sysVar.callConversionTable
record.EZEDEST	record.resourceAssociation **Note:** The qualification is still the record name.
EZEDESTP	converseVar.printerAssociation
EZEFEC	VGVar.handleHardIOErrors
EZELOC	sysVar.remoteSystemID
EZELTERM	sysVar.terminalID for a text program. sysVar.conversationID for a VGWebTransaction program. **Note:** • In a text program, both sysVar.terminalID and sysVar.conversationID provide the terminalID information. • In a VGWebTransaction program, both sysVar.terminalID and sysVar.conversationID provide the conversationID information.

Table 129. Other data EZE words (continued)

EZE word in VisualAge Generator 4.5	EGL definition
EZEMNO	• If EZEMNO is used as the *target* of a MOVE or assignment, the following occurs: – If EZEMNO is set from a numeric literal other than 9999, EZEMNO becomes: `converseLib.validationFailed(numericLiteral);` – If EZEMNO is set from numeric literal 9999, EZEMNO becomes: `converseLib.validationFailed();` – If EZEMNO is set from an item, EZEMNO becomes: `if (itemName == 9999)` `converseLib.validationFailed();` `else` `converseLib.validationFailed(itemName);` `end` • If EZEMNO is used anywhere else, it is replaced with: `converseVar.validationMsgNum`
EZEMSG **Note:** EZEMSG as a data item exists only if it is placed on a map. If it is placed on multiple maps, EZEMSG must be qualified.	<custPrefix>EZEMSG **Note:** • There is no dot between <custPrefix> and EZEMSG • Where EZEMSG is used in functions, the migration tool keeps the same qualifications for <custPrefix>EZEMSG that were used by EZEMSG in those functions. For example, xxxx.EZEMSG becomes xxxx.<custPrefix>EZEMSG • Where EZEMSG is used in maps, the migration tool does the following: – Changes the field name to <custPrefix>EZEMSG – Sets the map msgField property to <custPrefix>EZEMSG
EZEOVER	VGVar.handleOverflow
EZEOVERS	sysVar.overflowIndicator
EZERCODE **Note:** VisualAge Generator permitted, but did not recommend, negative values and values greater than 512 for EZERCODE.	sysVar.returnCode **Note:** EGL does not permit negative values or values greater than 512 for sysVar.returnCode.
EZEREPLY	VGVar.handleSysLibraryErrors
EZERT2 **Note:** In VisualAge Generator 4.5, EZERT2 is used only as the condition code for MQ Series access.	VGVar.mqConditionCode

Table 129. Other data EZE words (continued)

EZE word in VisualAge Generator 4.5	EGL definition
EZERT8 **Note:** EZERT8 is set for the following: • CALL statements if the (REPLY option is specified. • EZE system function invocations if EZEREPLY is set to 1. • I/O statements for serial, indexed, relative, and message queue records.	sysVar.errorCode **Note:** sysVar.errorCode is set for the following: • All CALL statements. • All sysLib system function invocations. • Some strLib, mathLib, and VGLib system function invocations • I/O statements for serial, indexed, relative, and message queue records. The value of sysVar.errorCode changes more frequently in EGL than it did in VisualAge Generator.
EZESEGM	converseVar.segmentedMode
EZESEGTR	sysVar.transactionID
EZESYS	To use the EGL values in an *if* or *while* statement, use: `sysVar.systemType` To get the old VAGen values for use in any other statement, use: `myItem = VGLib.getVAGSysType();` and then use *myItem* in the statement. If you need to use the old VAGen value in a migrated VAGen program, use: `<custPrefix>EZESYS` where <custPrefix> is the Renaming Prefix you specified during Stage 2 of migration. Based on the VAGen Migration Preference *Do not initialize old EZESYS values*, the migration tool includes or omits a data declaration for <custPrefix>EZESYS and a statement to initialize it to the old VAGen value. See "EZESYS" on page 108 for details and potential problems.
EZETST **Note:** Set for IF...IN, and MOVEA. EZETST is 2–byte binary.	sysVar.arrayIndex **Note:** arrayIndex is int (4–byte binary).
EZEUSR	sysVar.sessionID
EZEUSRID	sysVar.userID

General function EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL. Except where noted, the argument lists are the same in VisualAge Generator as they are in EGL, so they are omitted from the table.

Table 130. General function EZE words

EZE word in VisualAge Generator 4.5	EGL definition
result = EZEBYTES(itemOrRecord) **Note:** VisualAge Generator documents that only items and records can be used as arguments for EZEBYTES. However, VisualAge Generator tolerates a map as the argument for EZEBYTES.	result = sysLib.bytes(itemOrRecord) **Note:** EGL does not support a form as the argument for sysLib.bytes. The migration tool converts the argument without regard to whether it is an item, record, or map.
EZECOMIT()	sysLib.commit()
EZECONV(target,direction, conversionTable)	sysLib.convert
EZEC10(xxx, yyy, zzz)	sysLib.verifyChkDigitMod10
EZEC11(xxx, yyy, zzz)	sysLib.verifyChkDigitMod11
EZEG10(xxx, yyy, zzz)	sysLib.calculateChkDigitMod10
EZEG11(xxx, yyy, zzz)	sysLib.calculateChkDigitMod11
EZEPURGE(queueName)	sysLib.purge
EZEROLLB()	sysLib.rollback()
EZEWAIT(variableName) **Note:** *variableName* provides the time in hundredths of a second.	sysLib.wait(*variableName*); **Note:** • *variableName* provides the time in seconds. • The migration tool converts the time to seconds. See "EZEWAIT" on page 110 for details and potential problems.

String EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL. The argument lists are the same in VisualAge Generator as they are in EGL, so they are omitted from the table.

Table 131. String EZE words

EZE word in VisualAge Generator 4.5	EGL definition
EZESBLKT	strLib.setBlankTerminator
EZESCCWS	strLib.concatenateWithSeparator
EZESCMPR	VGLib.compareBytes
EZESCNCT	VGLib.concatenateBytes
EZESCOPY	VGLib.copyBytes
EZESFIND	strLib.findStr
EZESNULT	strLib.setNullTerminator
EZESSET	strLib.setSubStr
EZESTLEN	strLib.strLen
EZESTOKN	strLib.getNextToken

Math EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL. Except where noted, the argument lists are the same in VisualAge Generator as they are in EGL, so they are omitted from the table.

Table 132. Math EZE words — General math functions

EZE word in VisualAge Generator 4.5	EGL definition
EZEABS	mathLib.abs
EZECEIL	mathLib.ceiling
EZEEXP	mathLib.exp
EZEFLOOR	mathLib.floor
EZEFREXP	mathLib.frexp
EZELDEXP	mathLib.ldexp
EZELOG	mathLib.log
EZELOG10	mathLib.log10
EZEMAX	mathLib.maximum
EZEMIN	mathLib.minimum
EZEMODF	mathLib.modf
EZENCMPR	mathLib.compareNum
EZEPOW	mathLib. pow
EZEPRSCN	mathLib.precision
EZEROUND	mathLib.round **Note:** mathLib.round is also used to replace VAGen statements with the *(R* option. The assignment statement migration for those statements has the following syntax: `result = mathLib.round(numericExpression);`
EZESQRT	mathLib.sqrt

Table 133. Math EZE words — Trigonometric math functions

EZE word in VisualAge Generator 4.5	EGL definition
EZEACOS	mathLib.acos
EZEASIN	mathLib.asin
EZEATAN	mathLib.atan
EZEATAN2	mathLib.atan2
EZECOS	mathLib.cos
EZECOSH	mathLib.cosh
EZESIN	mathLib.sin
EZESINH	mathLib.sinh
EZETAN	mathLib.tan
EZETANH	mathLib.tanh

Table 134. Math EZE words — Floating point math functions

EZE word in VisualAge Generator 4.5	EGL definition
EZEFLADD	mathLib.floatingSum
EZEFLDIV	mathLib.floatingQuotient
EZEFLMOD	mathLib.floatingMod
EZEFLMUL	mathLib.floatingProduct
EZEFLSET	mathLib.floatingAssign
EZEFLSUB	mathLib.floatingDifference

User interface EZE words

The left table column shows the VisualAge Generator 4.5 EZE word. The right column shows what the migration tool converts the EZE word to in EGL. The argument lists are the same in VisualAge Generator as they are in EGL, so they are omitted from the table.

Table 135. User interface EZE words

EZE word in VisualAge Generator 4.5	EGL definition
EZEUIERR	sysLib.setError
EZEUILOC	sysLib.setLocale

Object scripting EZE words

Table 136. Object scripting EZE words

EZE word in VisualAge Generator 4.5	EGL definition
EZESCRPT(targetScriptName)	The migration tool issues an error message. The function part cannot be migrated correctly. The original EZESCRPT statement is included as a comment in the EGL source code.

Service Routines

The service routines section is organized into the following tables:

- Service Routines - general syntax, Table 137 on page 313
- Service Routines - VisualAge Generator and EGL equivalent routines, Table 138 on page 314

Table 137. Service Routines - general syntax

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`CALL serviceRoutine` `  [ argumentList ] ;`	`syslib.`*`EGLSystemFunction`* `  ( [ `*`argumentList`*` ] );` **Note:** EGL system functions use the same argument list as in VisualAge Generator.	No special considerations.

Table 137. Service Routines - general syntax (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`CALL serviceRoutine [ argumentList ] (REPLY ;`	`try` `  sysLib.`*`EGLSystemFunction`* `  ( [ `*`argumentList`*` ] );` `end;` **Note:** EGL system functions use the same argument list as in VisualAge Generator.	If the (REPLY option is included in VisualAge Generator, the migration tool includes a *try... end* block.

Table 138. Service Routines - VisualAge Generator and EGL equivalent routines

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
CALL AUDIT	sysLib.audit	No special considerations.
CALL COMMIT	sysLib.commit	No special considerations.
CALL CREATX	sysLib.startTransaction	No special considerations.
CALL CSPTDLI	VGLib.VGTDLI **Note:** EGL also supports EGLTDLI and AIBTDLI.	No special considerations.
CALL EZCHART	`call EZCHART [ `*`arguments`*` ]` `  externallyDefined ;` **Note:** There is no replacement for EZCHART in EGL.	The VAGen migration tool converts EZCHART to a call to an externally defined program. If the REPLY option is specified in VisualAge Generator, the migration tool nests the call statement within a *try ... end* block.
CALL RESET	sysLib.rollback	No special considerations.

PSBs

In VisualAge Generator, the PSB is a part type. The PSB contains a subset of the information in the IMS or DL/I PSB. There is no name associated with a TP PCB. The database name associated with DB and GSAM PCBs does not have to be unique. A DL/I I/O function can refer to a specific PCB within the PSB either by the database name or by the PCB number. In statements and a program's called parameter list, the EZEDLPCB special function word enables you to refer to a PCB by number. The I/O PCB is not explicitly included in the VAGen PSB, but is always present for the IMSVS, IMSBMP, and MVS Batch target environments. The I/O PCB is considered to be PCB number 0.

In EGL, the PSB is a subtype of the record part type. The PSBRecord is a *non-fixed* record. The name of each PCB variable within the PSBRecord must be unique. A DL/I I/O function can refer to a specific PCB by using the name given to the PCB variable within the PSBRecord. Similarly, in statements and in a program's parameter list, you use the name given to the PCB variable within the PSB.

The migration tool creates a variable name for each TP PCB based on its numeric position within the VAGen PSB. The tool creates a variable name for each DB or GSAM PCB using a combination of the database name from the VAGen PSB, a customer-specified suffix indicating the type of the PCB, and, if necessary, a number to create a unique variable name. The tool also creates a variable to

redefine the named DB and GSAM PCBs. The redefinition variable is based on the numeric position of the PCB within the VAGen PSB. This enables the migration tool to use either variable (database name or PCB number) during migration.

Table 139. PSB

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
PSB information: • Name • PCB information varies by PCB type – Number – Type - TP - DB - GSAM – Database – Segment – Parent – Index Key **Note:** • The PSB is a separate part type. • The I/O PCB is not explicitly specified, but must be in the DL/I PSB for the IMSVS, IMS BMP, and MVS Batch environments.	EGL syntax example: **Record** *psbName* **type PSBRecord** **{defaultPSBName** = "*originalPSBName*"**}** **iopcb IO_PCBRecord;** **{ @PCB { pcbType=PCBKind.TP }};** **pcb0 IO_PCBRecord** **{ redefines="iopcb" };** [*otherPCBInformation*] **end** // end *psbName* **Note:** • The PSB is a type of record. • The I/O PCB must be explicitly specified. • EGL uses the @PCB complex property to specify the PCB type. • EGL provides record definitions for the following records: – IO_PCBRecord – ALT_PCBRecord – DB_PCBRecord – GSAM_PCBRecord • EGL ignores (removes) the I/O PCB variable when generating for a CICS environment.	The migration tool only includes the defaultPSBName property if the PSB must be renamed due to a reserved word or because the name started with the # or @ symbol. The migration tool always adds the variable iopcb and the pcb0 redefinition to every PSB.
PCB Type - TP • Number	**ELAALT ALT_PCBRecord** **{@PCB { pcbType = PCBKind.TP }};** **pcb1 ALT_PCBRecord** **{ redefines = "ELAALT" };** **ELAEXP ALT_PCBRecord** **{@PCB { pcbType = PCBKind.TP }};** **pcb2 ALT_PCBRecord** **{ redefines = "ELAEXP" };** **pcb***n* **ALT_PCBRecord** **{ @PCB { pcbType = PCBKind.TP }};** **Note:** • EGL ignores (removes) the alternate PCB variables when generating for a CICS environment.	The migration tool uses ELAALT and ELAEXP as the names for the first two TP PCBs in the VAGen PSB. The migration tool also creates redefinitions for these two TP PCBs so they can be referred to by number. If there are additional TP PCBs, the migration tool creates a variable name for the TP PCB based on the PCB number within the PSB. This enables the migration tool to use pcb*n* as the replacement for EZEDLPCB[*n*].

Table 139. PSB (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
PCB Type - DB • Number • Database • Segment • Parent • Index Key **Note:** • The same database name can be used for multiple PCBs in the PSB.	*DBName_dbSuffix* **DB_PCBRecord** **{ @PCB { pcbType = PCBKind.DB,** **secondaryIndex** = "*indexKeyName*", **secondaryIndexItem** = "*renamedIndexKey*", **hierarchy** = **[@Relationship** **{ segmentRecord** = "*segmentName*", **parentRecord** = "*parentSegmentName*" **}] } };** **pcb***n* **DB_PCBRecord** **{ redefines** = "*DBName_dbSuffix*" **};** **Note:** • Because the PSB is a record and each database name becomes a field within the record, each database name must be unique.	The migration tool creates the variable name for a DB PCB based on the VAGen Database name followed by a suffix. You can specify the suffix with the Stage 2 VAGen Migration Database I/O Preferences. If necessary, to create a unique DBName, the migration tool includes a number. For example: DBName_*n*_dbSuffix, where *n* is the same number as in the pcb*n* redefinition. The migration tool only includes the secondaryIndexItem property if the VAGen Index Key must be renamed due to a conflict with an EGL reserved word or because the name starts with the # or @ symbol. The migration tool also creates a redefinition of the DB PCB based on the PCB number within the VAGen PSB.
PCB Type - GSAM • Number • Database	*DBName_gsamSuffix* **GSAM_PCBRecord** **{ @PCB** **{ pcbType = PCBKind.GSAM }};** **pcb***n* **GSAM_PCBRecord** **{ redefines** = "*DBName_gsamSuffix*" **};** **Note:** • Because the PSB is a record and each database name becomes a field within the record, each database name must be unique. • EGL ignores (removes) the GSAM PCB variables when generating for a CICS environment.	The migration tool creates the variable name for a GSAM PCB based on the VAGen Database name followed by a suffix. You can specify the suffix with the Stage 2 VAGen Migration Database I/O Preferences. If necessary, to create a unique DBName, the migration tool includes a number. For example: DBName_*n*_gsamSuffix, where *n* is the same number as in the pcb*n* redefinition. The migration tool also creates a redefinition of the GSAM PCB based on the PCB number within the VAGen PSB.

Control parts

In VisualAge Generator, control parts are entered using a free-form text editor. The control parts are not validated until they are actually used during generation. Whether something is in upper or lower case is not significant. In EGL, control parts are stored in .eglbld files in XML notation, with a special editor for each type of control part.

In EGL, upper and lower case *are* significant. The tables in this section compare the information you enter in the VisualAge Generator free-form text editor with the XML tag or attribute value that is used in EGL. The tables only show the tag or attribute values, not the actual XML syntax.

Note:

- The migration tool includes as comments those generation options, linkage table options, and resource association options that have no corresponding EGL replacement but which might be useful to you in determining related information that is required for EGL. For example, the migration tool includes the generation option /jspreldir as a comment. These comments are not displayed when you use the normal EGL Build Part Editor. However, you can see the comments if you open the file with the Text Editor.
- The migration tool eliminates generation options that have no corresponding EGL replacement if the information is not useful in determining current or future EGL options. For example, there is no replacement for */lineinfo*, which was an option to assist IBM support in debugging the VAGen generator. This option is not useful for the EGL generator, so the migration tool does not include it as a comment.
- The migration tool does not rename control parts, except for the following:
  - The migration tool removes the .BND suffix from the end of a bind control part name.
  - The migration tool removes the .LKG suffix from the end of a link edit part name.
  - The migration tool changes any other dots to underscores in control part names.
  - The tool also changes dots to underscores in control part names that are referenced in the /OPTIONS, /RESOURCE, and /LINKEDIT generation options.
  - The migration tool issues an error message if the part name conflicts with an EGL reserved word.

The control parts section is organized into the following tables:

Table 140. General control part information

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen control part names: • Can include the period (.) in the name. • For bind and linkedit parts, any portion of the name after the first period is treated as a suffix. The suffix can be specified in the /bind and /linkedit generation options.	EGL build parts: • The period (.) is not valid in a build part name.	The migration tool changes the period (.) to an underscore (_).
Upper and lower case are not significant in VAGen control part tags and values.	Upper and lower case are significant in EGL control part tags and values.	The migration tool converts the control part tags and values to the correct case required for EGL.

Generation options part

Table 141. Generation options

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
VAGen generation options part: • Contains one or more generation options. • Can be chained using the /options generation option. • Can reference any other control part that is included in the workspace at generation time. The referenced control parts are **not** considered to be associates of the generation options part.	EGL build descriptor part: • Contains one or more build descriptor options. • Can be chained using the *nextBuildDescriptor* build descriptor option • Can only reference other build parts where one of the following is true: – The build parts are included in the same *.eglbld* file. – The build parts are in files that are imported by the *.eglbld* file.	If your VAGen control parts are all in the same VisualAge Java package or VisualAge Smalltalk application, the control parts will all be placed in the same *.eglbld* file. In this situation, no import statements are required. If your VAGen control parts are in different VisualAge Java packages or VisualAge Smalltalk applications, the migration tool does not create the import statements. You will need to add the import statements. There will be an error in the Problems view if EGL is unable to resolve references to other control parts.
VAGen generation option values are only enclosed in quotes if they contain special characters for a directory or file name.	EGL build descriptor option values must be enclosed in quotes. However, if you use the EGL Build Parts Editor, the editor automatically inserts the quotes for you into the XML source. You do not see the quotes in the editor.	The migration tool includes the quotes automatically when it builds the XML source for the *.eglbld* file.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Many VAGen generation options can be specified as /xxxx or /noxxxx to reflect the positive or negative of the generation option. The following is an example: • */prep* indicates that you want the preparation step to be automatically started immediately after generation. • */noprep* indicates that you do not want the preparation step to be started automatically because you plan to run it at a later time.	Many EGL build descriptor options can be specified as xxxx="YES" or xxxx="NO" to reflect the positive or negative of the build descriptor option. The following is an example: • *prep="YES"* indicates that you want the preparation step to be automatically started immediately after generation. • *prep="NO"* indicates that you do not want the preparation step to be started automatically because you plan to run it at a later time.	The migration tool processes the options as follows: • The migration tool converts /xxxx to the corresponding xxxx="YES" option unless otherwise indicated. • The migration tool converts /noxxxx to the corresponding xxxx="NO" option unless otherwise indicated.
/ansisql	Not supported.	The migration tool includes this option as a comment.
/bidicontable=xxxx	bidiConversionTable="xxxx"	No special considerations.
/bind=xxxx In VisualAge Generator, xxxx is the suffix of the bind part. The bind part for a program is named pgmname.xxxx, where xxxx is the suffix specified by the /bind option. The reasons you might specify a /bind=suffix are as follows: 1. A special bind is needed for the program because you bind the program into multiple DB2 plans, and 2. VisualAge Generator did not enable you to easily create a bind part with exactly the same name as the program.	bind="xxxx" The meaning of the bind option is not the same as in VisualAge Generator. In EGL, xxxx is the full name of the bind part. The bind option only needs to be specified if the bind part name differs from that of the program. In most cases, the program and bind part will have the same name, so there is no need to include the bind option. The bind option is only necessary if you generate the same program for multiple runtime environments and require special bind commands for each environment. Another use for the bind option is to specify the name of a part that contains a template for your bind command. A project administrator or DBA can define a bind part that includes substitutable SYMPARMS for member-specific parameters. You can use the EGL bind option to point to this template part. This technique works well if you bind a package for each program.	Because the value for bind has different meanings in VisualAge Generator and EGL, the migration tool cannot migrate this option. The migration tool includes /bind as a comment.
`/checktype=`*xxxx* *xxxx* is one of the following: • none • low • all	`checkType="`*xxxx*`"` *xxxx* is one of the following: • NONE • LOW • ALL	No special considerations.
/cicsdbcs	Not supported.	The migration tool does not include this option as a comment because all supported CICS translators now include support for DBCS.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`/cicsentries=xxxx` *xxxx* is one of the following: • none • rdo • macro	`cicsEntries="xxxx"` xxxx is one of the following: • NONE • RDO • MACRO	No special considerations.
/cobollevel=le | vs	Not supported.	The migration tool includes this option as a comment.
`commentlevel=n` or `/commentlevel=commentText` *n* or *commentText* are one of the following: • 0 or minimum • 1 or info • 2 or logic • 3 or data • 4 or statements **Note:** • Either the numeric value or its equivalent *commentText* can be specified. • 0 = genoption comments only • 1 = alias names, standard generation information • 2 = program and table prolog, and function descriptions • 3 = record prologs and data item descriptions • 4 = source statements and comments • For C++, the only valid values are 0 = none and 1 = comments	`commentLevel="n"` *n* is one of the following: • 0 • 1 • 1 • 1 • 1 **Note:** • 0 = no comments • 1 = comments are included	The migration tool migrates /commentlevel=0 or minimum to 0 and all other values to 1.
`/configmapname="xxxx"` *xxxx* is the name of a VisualAge Smalltalk configuration map.	Not supported.	The migration tool includes this option as a comment because it might be useful in determining groups of related EGL projects that should be checked into your source code repository as a unit.
`/configmapversion="xxxx"` *xxxx* is the version name of the VisualAge Smalltalk configuration map specified by /configmapname.	Not supported.	The migration tool includes this option as a comment because it might be useful in determining groups of related EGL projects that should be checked into your source code repository as a unit.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/contable=*xxxx* *xxxx* is the name of a conversion table.	clientCodeSet="*yyyy*" serverCodeSet="*zzzz*" *yyyy* and *zzzz* are the names of the client and server conversion tables, respectively.	The migration tool sets both the *clientCodeSet* and the *serverCodeSet* options from the VAGen /contable generation option. See Table 142 on page 334 for the correspondence between the VAGen and EGL values. If the value for /contable=xxxx is not in Table 142 on page 334, the migration tool sets both clientCodeSet and serverCode to *xxxx*.
/createdds	genDDSFile=″YES″ | ″NO″ **Note:** This is for ISERIESC.	No special considerations.
/currency=xxx (1 to 3 characters)	currencySymbol=″xxx″	No special considerations.
/data = 24 | 31	data=″24″ | ″31″	No special considerations.
/dbms=*xxxx* *xxxx* is one of the following: • db2 • oracle • odbc **Note:** In VisualAge Generator, Oracle and ODBC are only supported for certain workstation platforms.	dbms="*xxxx*" *xxxx* is one of the following: • DB2 • ORACLE • DB2 **Note:** • In EGL, Oracle is only supported if you use Java generation. • EGL Java generation supports JDBC instead of ODBC.	The migration tool changes *odbc* to *DB2* and issues a warning message.
/dbpassword=xxxx	sqlPassword=″xxxx″	The migration tool merges the VAGen /dbpassword and /sqlpassword options into the EGL *sqlPassword* option. If a generation options part includes both /dbpassword and /sqlpassword, the migration tool includes the sqlPassword twice. There should be an error in the Problems view.
/dbuser=xxxx	sqlID=″xxxx″	The migration tool merges the VAGen /dbuser and /sqlID options into the EGL *sqlID* option. If a generation options part includes both /dbuser and /sqlID, the migration tool includes the sqlID twice. There should be an error in the Problems view.
/debugtrace	debugTrace=″YES″ | ″NO″	No special considerations.
/destaccount=xxxx	Not supported.	The migration tool includes this option as a comment.
/destdir=xxxx	destDirectory=″xxxx″	No special considerations.
/desthost=xxxx	destHost=″xxxx″	No special considerations.
/destlib=xxxx	destLibrary=″xxxx″ **Note:** This is for ISERIESC.	No special considerations.
/destpassword=xxxx	destPassword=″xxxx″	No special considerations.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/destuid=xxxx	destUserID="xxxx"	No special considerations.
/dxfrcancel	cancelAfterTransfer="YES" | "NO"	No special considerations.
/dxfrxctl	useXctlForTransfer="YES" | "NO"	No special considerations.
/ejbgroup=xxxx	Not supported.	The migration tool includes this option as a comment.
/endcommarea	endCommarea="YES" | "NO"	No special considerations.
/errdest=xxxx	errorDestination="xxxx" **Note:** This is for IMS.	No special considerations.
/fastpath	imsFastPath="YES" | "NO" **Note:** This is for IMS.	No special considerations.
/fold	Not supported.	The migration tool includes this option as a comment.
/ftptranslationcmddbcs=xxxx	Not supported. EGL only supports TCP/IP for transferring files to the host.	The migration tool includes this option as a comment.
/ftptranslationcmdsbcs=xxxx	Not supported. EGL only supports TCP/IP for transferring files to the host.	The migration tool includes this option as a comment.
/genauthortimevalues /nogenauthortimevalues	Not supported.	The migration tool includes this option as a comment.
/genhelpmaps	genHelpFormGroup="YES" | "NO"	No special considerations.
/genmaps	genFormGroup="YES" | "NO"	No special considerations.
/genout=xxxx	genDirectory="xxxx"	The migration tool converts /genout and places the result in both the original build descriptor and the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option. If you generate for Java, you might need to specify the genProject build descriptor option in addition to or instead of the genDirectory option. genProject is required in these cases: • If you generate for HP-UX or SOLARIS • If you generate VGWebTransactions or VGUI records
/genproperties /nogenproperties	`genProperties="GLOBAL"` `genProperties="NO"` EGL also provides genProperties="PROGRAM".	The migration tool converts /genproperties to the EGL *genProperties*="GLOBAL" because this is the closest value in terms of what is generated.
/genresourcebundle /nogenresourcebundle	genResourceBundle="YES" | "NO"	The migration tool converts /genresourcebundle and places the result in both the original build descriptor and the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option.
/genret	genReturnImmediate="YES" | "NO"	No special considerations.
/gentables	genDataTables="YES" | "NO"	No special considerations.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/genuirecords	genVGUIRecords=″YES″ | ″NO″	No special considerations.
/groupname=xxxx	Not supported.	The migration tool includes this option as a comment.
/inedit=all /inedit=inonly	validateOnlyIfModified="NO" validateOnlyIfModified="YES"	No special considerations.
/initaddws In VisualAge Generator, the primary working storage record is always initialized. The /initaddws generation option provides initialization of other working storage records specified on the Tables and Additional Records list.	initNonIOData="YES" | "NO" In EGL, the record specified as the inputRecord for main programs is always initialized. The *initNonIOData* build descriptor option provides initialization of other basic records specified in the data declarations for the program. In addition, EGL enables you to specify the initialized property for any record declaration in the program. The initialized property provides a finer control than the initNonIOData build descriptor option.	The migration tool migrates the primary working storage record for main programs to the EGL *inputRecord* property and also includes the record declaration without the initialized property. The migration tool migrates the primary working storage record for called programs to a record declaration with the initialized property. If the migration tool created an additional record for level 77 items, the migration tool includes a data declaration for the record and also includes the initialized property. This provides the same initialization for primary working storage records as in VisualAge Generator. All other basic records are initialized based on the *initNonIOData* build descriptor option.
/initrecd	initIORecords=″YES″ | ″NO″	No special considerations.
/javadestdir=xxxx	destDirectory=″xxxx″	The migration tool converts /javadestdir and places the result in the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option.
/javadesthost=xxxx	destHost=″xxxx″	The migration tool converts /javadesthost and places the result in the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option.
/javadestpassword=xxxx	destPassword=″xxxx″	The migration tool converts /javadestpassword and places the result in the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option.
/javadestuid=xxxx	destUserID=″xxxx″	The migration tool converts /javadestuid and places the result in the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/javasystem=*xxxx* *xxxx* is one of the following: • AIX • LINUX • OS2 • OS390 • OS400 • SOLARIS • WINNT	system=″xxxx″ The corresponding EGL values are: • AIX • LINUX • not supported • USS • ISERIESJ • SOLARIS • WIN	The migration tool converts the supported /javasystem values and places the result in the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option. The tool includes unsupported values as a comment in the original build descriptor part.
/jobcard=xxxx	Not supported. The equivalent function is provided as follows: • The z/OS and iSeries build servers handle the jobcard. These environments ignore the JOBCARD symbolic parameter. • VSE supports the JOBCARD symbolic parameter.	The migration tool converts this option to the JOBCARD symbolic parameter.
/jobname=xxxx	Not supported. The equivalent function is provided as follows: • For z/OS and iSeries, you can use $USERID as the job name in the build script. EGL generation substitutes $USERID with the value from the destUserID build descriptor option concatenated with a number to provide a unique job name. These environments ignore the JOBNAME symbolic parameter. • VSE supports the JOBNAME symbolic parameter.	The migration tool converts this option to the JOBNAME symbolic parameter
/jspreldir=″xxxx″	Not supported.	The migration tool includes this option as a comment.
/leftjust	leftAlign=″YES″ | ″NO″	No special considerations.
/lineinfo	Not supported.	The migration tool does not include this option as a comment because the option was only meanighful for IBM support to debug the VAGen generator. It had no effect on the generated COBOL.
/lines=nn	Not supported.	The migration tool includes this option as a comment.
`/linkage=xxxx` *xxxx* is the name of a VAGen linkage table part.	`linkage="xxxx"` *xxxx* is the name of an EGL linkage options part.	No special considerations.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`/linkedit=xxxx` In VisualAge Generator, *xxxx* is the suffix of the linkedit part. The linkedit part for a program is named pgmname.xxxx, where xxxx is the suffix specified by the /linkedit option. The reasons you might have specified a /linkedit=suffix are as follows: 1. A special linkedit is needed for the program such as for static linkedit to PL/I, and 2. VisualAge Generator did not enable you to easily create a linkedit part with exactly the same name as the program.	`linkEdit="xxxx"` The meaning of *linkEdit* is not the same as in VisualAge Generator. In EGL, *xxxx* is the full name of the linkedit part. The linkEdit option only needs to be specified if the linkedit part name differs from that of the program. In most cases, the program and linkedit part will have the same name, so there is no need to include the linkEdit option. The linkEdit option is only necessary if you generate the same program for multiple runtime environments and require special linkedit commands for each environment.	Because the value for linkedit has different meanings in VisualAge Generator and EGL, the migration tool cannot migrate this option. The migration tool includes /linkedit as a comment.
`/listing` `/listingonerror` `/nolisting` **Note:** This is a three-way switch.	Not supported.	The migration tool includes this option as a comment.
/locvalid	Not supported.	The migration tool includes this option as a comment.
`/log=xx` `OR` `/nolog`	`imsLogID="xx"` `OR` `include /nolog as a comment` **Note:** This is for IMS.	The migration tool processes this option as follows: • /log=xx is converted to imsLogID=″xx″ • /nolog is converted to a comment.
`/math=xxxxx` *xxxxx* is one of the following: • cobol • cspae	`math="xxxxx"` *xxxxx* is one of the following: • COBOL • CSPAE	No special considerations.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/mfsdev = ('*deviceName*', '*MFSInfo*', '*eAI*') **Note:** • The VAGen *deviceName* is used. *MFSInfo* provides the corresponding MFS information to use for the VAGen device. *eAI* provides the extended attribute information. • The values for *eAI* are: EATTR, NOEATTR, and NCD. • Multiple *MFSInfo* and *eAI* values can be provided for a single deviceName. • See the *VisualAge Generator Server Guide for MVS, VSE, and VM* for the details of this generation option.	<mfsDevice width="*nn*", height="*nn*", devStmtParms="*MFSInfo*", extendedAttributes="*eAI*" /> **Note:** • The EGL device size (width and height) are used. *MFSInfo* and *eAI* provide the same information as in VisualAge Generator. • The values for *eAI* are: YES, NO, and NCD. • Multiple *MFSInfo* and *eAI* values can be provided for a single device size. • See the *EGL Reference* for the details of this build descriptor option.	The migration tool converts the VAGen deviceName to the corresponding width and height. For the relationship between the device names and sizes, see Table 93 on page 254. If two deviceNames convert to the same width and height and have the same values specified for MFSInfo and eAI, the migration tool only includes one entry. The migration tool does not change the value of *MFSInfo*. The migration tool converts the values of *eAI* to their corresponding EGL values.
/mfseattr /nomfseattr /mfseattrncd In VisualAge Generator, these 3 options provide a 3-way switch to give information that is needed to generate extended attribute support for maps in MFS format.	mfsExtendedAttr="YES" mfsExtendedAttr="NO" mfsExtendedAttr="NCD" **Note:** This is for IMS.	No special considerations.
/mfsignore	mfsIgnore=″YES″ | ″NO″ **Note:** This is for IMS	No special considerations.
/mfstest	mfsUseTestLibrary=″YES″ | ″NO″ **Note:** This is for IMS	No special considerations.
/msgtableprefix=*xxxx* In VisualAge Generator, the message table prefix is specified on the program. When you generate the UI record by itself you must specify the message table prefix during generation.	msgTablePrefix = *″xxxx″* In EGL, the same considerations for the msgTablePrefix apply as in VisualAge Generator.	The migration tool converts /msgtableprefix and places the result in both the original build descriptor and the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option. If you generate a VGUI record by itself without generating the program that uses it, you must include the package name with the message table prefix (for example, msgTablePrefix = *″packageName.prefixID″*).

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/msp=*xxxx* *xxxx* is one of the following: • all • gsam • mfs • seq	formServicePgmType="*xxxx*" *xxxx* is one of the following: • ALL • GSAM • MFS • SEQ **Note:** This is for IMS.	No special considerations.
/nullfill	fillWithNulls=″YES″ | ″NO″	No special considerations.
/numovfl	checkNumericOverflow=″YES″ | ″NO″	No special considerations.
/options=*xxxx* *xxxx* is the name of another VAGen generation options part.	nextBuildDescriptor="*xxxx*" *xxxx* is the name of another EGL build descriptor part.	No special considerations.
/packagename=xxxx	Not supported.	The migration tool includes this option as a comment.
/possign=*x* *x* is one of the following: • f • c	positiveSignIndicator="*x*" *x* is one of the following: • F • C **Note:** This is for ISERIESC.	No special considerations.
/prep	prep =″YES″ | ″NO″	No special considerations.
/prepfile	buildPlan=″YES″ | ″NO″	No special considerations.
/printdest=*xxxx* *xxxx* is one of the following: • ezeprint • termid	printDestination="*xxxx*" *xxxx* is one of the following: • PROGRAMCONTROLLED • TERMINALID	No special considerations.
/project="*xxxx*"["*version*"] *xxxx* is the name of a VisualAge for Java project, and *version* is the version name for the specified project.	Not supported.	The migration tool includes this option as a comment because it might be useful in determining groups of related EGLprojects that should be checked into your source code repository as a unit.
/projectid=xxxx	projectID=″xxxx″	No special considerations.
/recovery	restoreCurrentMsgOnError=″YES″ | ″NO″ **Note:** This is for IMS.	No special considerations.
/resource=*xxxx* *xxxx* is the name of a VAGen resource associations part.	resourceAssociations="*xxxx*" *xxxx* the name of an EGL resource associations part.	No special considerations.
/resourcebundlelocale=xxxx	resourceBundleLocale = ″*xxxx*″	The migration tool converts /resourcebundlelocale and places the result in both the original build descriptor and the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/resvword=xxxx	reservedWord="xxxx"	No special considerations.
/rt=xxxx	returnTransaction="xxxx"	No special considerations.
/runfile	genRunFile="YES" | "NO"	No special considerations.
/sendtranslationcmddbcs=xxxx	Not supported. **Note:** EGL only supports TCP/IP for transferring files to the host.	The migration tool includes this option as a comment.
/session=xxxx	Not supported. **Note:** EGL only supports TCP/IP for transferring files to the host.	The migration tool includes this option as a comment.
/setfull	setFormItemFull="YES" | "NO"	No special considerations.
/sp	checkToTransaction="YES" | "NO"	No special considerations.
/spa=xxxx,ADF,yyyy **Note:** ADF is optional. yyyy is optional so all of the following are valid in VisualAge Generator: /spa=xxxx /spa=xxxx,ADF,yyyy /spa=xxxx,,yyyy	In EGL, there are 3 separate options: `spaSize="xxxx"` `spaADF= "YES" | "NO"` `spaStatusBytePosition="yyyy"`	The migration tool splits the /spa option into the 3 EGL options. The migration tool only includes spaADF if the value is YES.
/spzero	spacesZero="YES" | "NO"	No special considerations.
/sqldb=xxxx	sqlDB="xxxx"	No special considerations.
/sqlid=xxxx	sqlID="xxxx"	The migration tool merges the VAGen /dbuser and /sqlID options into the EGL *sqlID* option. If a generation options part includes both /dbuser and /sqlID, the migration tool includes the sqlID twice. There should be an error in the Problems view.
/sqlpassword=xxxx	sqlPassword="xxxx"	The migration tool merges the VAGen /dbpassword and /sqlpassword options into the EGL *sqlPassword* option. If a generation options part includes both /dbpassword and /sqlpassword, the migration tool includes the sqlPassword twice. There should be an error in the Problems view.
/sqlvalid	validateSQLStatements="YES" | "NO"	No special considerations.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/symparm=*pppppppp*,'*vvvv*' • *pppppppp* is the name of the symbolic parameter. *pppppppp* is 1 - 8 characters. • *vvvv* is the value. Two consecutive single-quotes within the value is one single-quote.	EGL supports many of the same predefined symbolic parameters as VisualAge Generator. You can also use any user-defined symbolic parameters as long as they do not conflict with any of the new EGL symbolic parameters.	The migration tool processes symbolic parameters as follows: • The migration tool converts any VAGen-defined symbolic parameters to the corresponding EGL symbolic parameter. • If there is no corresponding EGL symbolic parameter, the migration tool converts the VAGen-defined symbolic parameter to the syntax of an EGL symbolic parameter without changing the parameter name or value. The migration tool also issues an error message. • The migration tool converts any user-defined symbolic parameters to the syntax of an EGL symbolic parameter without changing the parameter name or value.
/SYMPARM=EZALTXTR,'xxxx'	transferErrorTransaction="xxxx"	No special considerations.
/SYMPARM=EZONEAS2,'xxxx'	oneFormItemCopybook="YES"	No special considerations.
/syncdxfr	synchOnPgmTransfer="YES" | "NO" **Note:** This is for DL/I for the CICS environment.	No special considerations.
/syncxfer	synchOnTrxTransfer="YES" | "NO"	No special considerations.
/syscodes	sysCodes="YES" | "NO"	No special considerations.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`/system=`*xxxx* *xxxx* is one of the following: • MVSBATCH • MVSCICS • IMSBMP • IMSVS • AIX • JAVALINUX • JAVAOS390 • JAVAOS400 • JAVAWINNT • JAVAWRAPPER • WINNT • LINUX • OS400 • VSEBATCH • VSECICS • HP • SOLARIS The following environments can also be specified in VAGen, but are not converted by the migration tool: JAVA, JAVAGUI, WINGUI, OS2GUI, OS2, OS2CICS, AIXCICS, NTCICS, SOLACICS, TSO, VMCMS, VMBATCH	`system="`*xxxx*`"` The corresponding EGL values are: • ZOSBATCH • CICS for z/OS • IMSBMP • IMSVS • AIX • LINIX • USS • ISERIESJ • WIN • WIN • WIN • LINUX • ISERIESC • VSEBATCH • VSECICS • HPUX • SOLARIS	The migration tool processes this option as follows: • If /system=xxxx has a corresponding value in EGL, the migration tool migrates to the corresponding EGL value. • If /system=xxxx does not have a corresponding value in EGL, the migration tool includes /system=xxxx as a comment. • For /system=JAVAWRAPPER, the migration tool also includes the EGL build descriptor option *enableJavaWrapperGen="ONLY"*. This specifies that the you want to generate only the Java wrapper for a program. • For the COBOL environments, the migration tool issues a warning message that you need to set the *destPort* build descriptor option.
`/targnls=`*xxx* *xxx* is a 3-character national language code.	`targetNLS="`*xxx*`"` *xxx* is the 3-character national language code. All the values except ENP (uppercase English) are identical in VisualAge Generator and EGL. ENP does not have a counterpart in EGL.	The migration tool converts /targnls and places the result in both the original build descriptor and the new build descriptor part referenced by the *secondaryTargetBuildDescriptor* option. The migration tool uses the VAGen value as the targetNLS value. If the value is ENP, there will be an error in the Problems view. You can edit the .eglbld file and change the value. You might want to use ENU (mixed case English) as a replacement for ENP.
`/templates=xxxx` In VisualAge Generator, templates are used to generate the preparation and runtime JCL, as well as to generate CICS transaction and program entries.	`templateDir="xxxx"` In EGL, build scripts replace preparation templates. The only templates that are used are to produce runtime JCL for the ZOSBATCH, VSEBATCH, IMSBMP, and ISERIESC target environment.	No special considerations.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`/trace=xxxx,yyyy` *xxxx* is one of the following: • none • sqlerr • sqlio *yyyy* is optional. If *yyyy* is present, it is set to *stmt*. Any combination of *none, sqlerr,* or *sqlio*, with or without *,stmt* , is valid.	/trace splits into multiple build descriptor options: • If sqlerr is included -- sqlErrorTrace="YES" • If sqlio is included --- sqlIOTrace="YES" • if stmt is included --- statementTrace="YES"	No special considerations.
`/transfertype=xxxx` *xxxx* is one of the following: • tcpip • sna	Not supported. **Note:** EGL only supports TCP/IP for transferring files to the host.	The migration tool includes this option as a comment.
`/transid=primaryID,restartID` In VisualAge Generator, */transid=,restart* is valid, with the primary transaction defaulting to the first 4 characters of the program name.	/transid splits into multiple build descriptor options: • If *primary* is included -- startTransactionID="*primaryID*" • If *,restart* is included --- restartTransactionID="*restartID*"	No special considerations.
/twaoff=nnnn	twaOffset="nnnn"	No special considerations.
`/unload` In VisualAge Generator /unload directed batch generation to unload all VisualAge Java projects or VisualAge Smalltalk configuration maps that contained VAGen parts before loading the projects or configuration maps being requested for the current generation process.	Not supported.	The migration tool does not include a comment for this option.
/validmix	validateMixedItems="YES" | "NO"	No special considerations.
/vmloadlib=xxxx	Not supported.	The migration tool includes this option as a comment.
/vselib=xxxx	vseLibrary="xxxx"	No special considerations.
`/workdb=xxxx` *xxxx* is one of the following: • aux • main • dli • sql	`workDBType="xxxx"` *xxxx* is one of the following: • AUX • MAIN • DLI • SQL	No special considerations.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Not used.	vagCompatibility=″YES″	Based on the VAGen Migration Preference *Do not set compatibility mode*, the migration tool adds or omits this option to every build descriptor part.
Not used.	itemsNullable=″NO″	The migration tool always adds this option to every build descriptor part. This technique is used to explicitly show that the default of NO must be used to preserve VAGen behavior.
In VisualAge Generator, *decimalSymbol* was a runtime property used when assigning or comparing CHA and NUM values in Java.	`decimalSymbol="x"` *x* is one of the following: • a period (.) • a comma (,) In EGL, you can specify this information at generation time or at runtime.	The migration tool does not set the *decimalSymbol.* You can add this property to your build descriptor part if you plan to generate Java source. If you do this, the decimalSymbol will be generated into any EGL properties files. Alternatively, you can add the property directly to the generated EGL properties file.
Not used.	`destPort="xxxx"` In EGL, *destPort* specifies the port to use when transferring generation outputs to a host system to prepare them for execution. The destPort build descriptor option is required for COBOL generation target environments.	The migration tool does not set *destPort*. The default value varies by target environment as follows: • For z/OS® environments, there is no default value for destPort. You must add the destPort build descriptor option and the value must match the value you use in the JCL that starts the z/OS build server. The sample JCL for starting a z/OS build server uses port 5555. • For iSeries environments, there is no default value for destPort. You must add the destPort build descriptor option. The value must match the value used by the iSeries build server. • For VSE environments, the default value for destPort is 21. You only need to specify the destPort build descriptor option if the value is different from 21.
Not used.	`genProject="xxxx"`	If you generate for Java, you might need to specify the genProject build descriptor option in addition to or instead of the genDirectory option. genProject is required in these cases: • If you generate for HP-UX or SOLARIS; or • If you generate VGWebTransactions or VGUI records.

Table 141. Generation options (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Not supported.	tempDirectory=″xxxx″	If you generate VGUI records, the tempDirectory option enables you to specify the directory where the generated JSP is placed if there is already a JSP by the same name in the genProject directory. If tempDirectory is not specified, the JSP is generated into the genProject, but with a name of new*xxxx*.JSP, where *xxxx* is the VGUI record name.
Not supported. In VisualAge Generator, even if your program checks the value of EZESYS, all the VAGen source code must be valid for every target environment for which you might generate the program.	`eliminateSystemDependentCode= "YES" | "NO"` In EGL, if your program checks the value of *systemType*, you can choose to omit source code that can never be run for your current target generation environment. This can make the resulting COBOL or Java source code smaller.	The migration tool does not set *eliminateSystemDependentCode*. The default value is ″YES″.
Not used.	sessionBeanID=″xxxx″	The migration tool does not set *sessionBeanID*. If you are generating Java or Java wrappers, see the EGL online helps to determine if you need to set the sessionBeanID build descriptor option.
In VisualAge Generator, you include the SQL JDBC driver class, JNDI name, and connection URL information in a properties file that is used at runtime.	`sqlJDBCDriverClass="xxxx"` `sqlValidationConnectionURL="xx"` In EGL, you can specify this information at generation time or at runtime.	The migration tool does not set the *sqlJDBCDriverClass* and *sqlValidationConnectionURL*. If you want to specify these values at generation time, you can do the following: • Specify workspace preferences. This technique only works if you are generating in the Eclipse environment. • Specify the build descriptor options in your build descriptor parts. This technique works when you generate in the Eclipse environment as well as when you generate in batch. In either case, you must also include the *genProperties=″GLOBAL″* or *″PROGRAM″* build descriptor option so that the properties file will be generated. If you want to specify the value at runtime, you can modify the runtime properties in the properties file.

Table 142. Generation options - conversion table values

Language	**Conversion Table VAGen** */contable* **value**	**EBCDIC Character Set EGL** *serverCodeSet*	**ASCII Character Set EGL** *clientCodeSet*
Arabic	ELACNARA	IBM-420	IBM-1256
Chinese, simplified	ELACNCHS	IBM-935	IBM-1381
Chinese, simplified	ELACNGBK	IBM-1388	IBM-1386
Chinese, traditional	ELACNCHT	IBM-937	IBM-950
Danish	ELACNDKN	IBM-277	IBM-1252
Eastern European	ELACN870	IBM-870	IBM-1250
English (UK)	ELACN285	IBM-285	IBM-1252
English (US)	ELACNENU	IBM-037	IBM-1252
Finnish	ELACNFIN	IBM-298	IBM-1252
French	ELACNFRA	IBM-297	IBM-1252
German	ELACNDEU	IBM-273	IBM-1252
Greek	ELACNGRE	IBM-875	IBM-1253
Hebrew	ELACNHEB	IBM-424	IBM-1255
Italian	ELACNITA	IBM-280	IBM-1252
Japanese, Katakana	ELACNJPN	IBM-930	IBM-943
Japanese, Latin	ELACNJPL	IBM-939	IBM-943
Korean	ELACNKOR	IBM-933	IBM-949
Norwegian	ELACNDKN	IBM-277	IBM-1252
Portuguese	ELACNPTB	IBM-037	IBM-1252
Russian	ELACNCYR	IBM-1025	IBM-1251
Spanish	ELACNESP	IBM-284	IBM-1252
Swedish	ELACNSWE	IBM-278	IBM-1252
Swiss German	ELACNDES	IBM-500	IBM-1252
Turkish	ELACNTUR	IBM-1026	IBM-1254
User–defined (not in the above list)	XXXXXXXX	XXXXXXXX	XXXXXXXX

Linkage table parts

The linkage table parts are Calllink, Filelink, Crtxlink, and Dxfrlink.

callLink

Table 143. Linkage table options for :calllink

VisualAge Generator 4.5	**EGL produced by the migration tool**	**Migration tool considerations**
:calllink	callLink	No special considerations.

Table 143. Linkage table options for :calllink (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`linktype=xxxx` *xxxx* is one of the following: • dynamic • static • cicslink • remote • csocall • sessionejb	Type of call, where the EGL equivalent options are the following: • localCall • localCall • localCall • remoteCall • remoteCall • ejbCall	If the VAGen linktype is omitted, the migration tool uses *localCall*. The migration tool also uses linktype in additional places to set other properties for the EGL CallLink information.
`applname=programName` *programName* is the name of the program being called. Wildcards are permitted.	pgmName="programName"	No special considerations.
externalname=applname	alias="applname"	If your VAGen program had to be renamed because the name was an EGL reserved word, you can use the *alias* property either on the program definition or in the linkage table to provide the original VAGen name for the program as the name of the generated program. Either technique can help you avoid having to modify non-VAGen programs that call the VAGen program.
package=packageName	package="packageName"	If you generate Java and the calling and called programs are in different packages, you can include the package name in the linkage entry for the called program. Alternatively, change the CALL statement to explicitly qualify the program with the package name or include an import statement for the package in the file that contains the CALL statement.
`library=libraryName` OR `dllname=libraryName` In VisualAge Generator, library and dllname are treated as synonyms.	library="libraryName"	The migration tool merges the VAGen library or dllname into the EGL library property.
`linktype=xxxx` *xxxx* is one of the following: • dynamic • static • cicslink	`linkType="xxxx"` *xxxx* is one of the following: • DYNAMIC • STATIC • CICSLINK	No special considerations.

Table 143. Linkage table options for :calllink (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`parmform=xxxx` *xxxx* is one of the following: • oslink • commptr • commdata • cicsoslink	`parmForm="xxxx"` *xxxx* is one of the following: • OSLINK • COMMPTR • COMMDATA • CICSOSLINK	No special considerations.
`contable=xxxx` *xxxx* is one of the following: • a conversionTableName • * • EZECONVT • BINARY • NONE	`conversionTable="xxxx"` *xxxx* is one of the following: • conversionTableName • * • PROGRAMCONTROLLED • not supported • not supported	The migration tool uses the same *conversionTableName* when creating the EGL CallLink information. The migration tool migrates the VAGen contable=BINARY to BINARY, which is an unsupported value in EGL. The migration tool also issues an error message. There will be an error in the Problems view. You must correct the error by editing the *.eglbld* file and selecting the supported value that you want to use. The migration tool omits the *conversionTable* property if the VAGen contable=NONE.
`location=xxxx` *xxxx* is one of the following: • systemName • EZELOC	`location="xxxx"` *xxxx* is one of the following: • systemName • PROGRAMCONTROLLED	No special considerations.

Table 143. Linkage table options for :calllink (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`remotecomtype=xxxx` *xxxx* is one of the following: • appcims • ca400 • cicsclient • dce • dcesecure • direct • exci • ipc • java400 • lu2 • tcpip	`remoteComType="xxxx"` *xxxx* is one of the following: • not supported • not supported • CICSECI • not supported • not supported • DIRECT • not supported • DISTINCT • JAVA400 • not supported • TCPIP	The migration tool converts cicsclient to CICSECI because that is the closest corresponding EGL value. If the VAGen :calllink entry did not already specify the ctgport and ctglocation, the migration tool issues an error message to remind you to specify these values. The migration tool migrates the values listed as not supported ″as is″ and issues a message. You must determine what communications protocol you want to use now and then update the EGL CallLink entry with the correct information. There will be an error in the Problems view until you correct the CallLink information. If you decide to use CICSSSL, you must add the *ctgPort*, *ctgLocation*, *ctgKeyStore*, and *ctgKeyStorePassword* properties to the EGL CallLink information. If you decide to use CICSJ2C, you must add the pgmName, conversionTable, remotePgmType, luwControl, remoteBind, location, and parmForm properties to the EGL CallLink information. The migration tool migrates APPCIMS ″as is″ because it is not supported and the values of other properties are quite different. The best replacement for APPCIMS is IMSTCP.
`remoteapptype=xxxx` *xxxx* is one of the following: • vg • nonvg • vgjava • itf	`remotePgmType="xxxx"` *xxxx* is one of the following: • EGL • EXTERNALLYDEFINED • not applicable • not supported	If the VisualAge Generator remoteapptype=vgjava, the migration tool migrates the :calllink entry, but omits the *remotePgmType* property. If remoteapptype=itf, the migration tool turns the entire :calllink entry into a comment.
serverid=serverName	serverID=″serverName″	No special considerations.
`luwcontrol=xxxx` *xxxx* is one of the following: • client • server	`luwControl="xxxx"` *xxxx* is one of the following: • CLIENT • SERVER	No special considerations.

Table 143. Linkage table options for :calllink (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`remotebind=xxxx` *xxxx* is one of the following: • generation • runtime	`remoteBind="xxxx"` *xxxx* is one of the following: • GENERATION • RUNTIME	No special considerations.
providerURL=URLName	providerURL=″URLName″	No special considerations.
ctglocation='tcpipInfo'	ctgLocation=″tcpipInfo″	No special considerations.
ctgport=portID	ctgPort=″portID″	No special considerations.
`bitmode=nn` *nn* is one of the following: • 16 • 32	Not supported.	The migration tool includes this option as a comment.
`binform=xxxx` *xxxx* is one of the following: • intel • host	Not supported.	The migration tool includes this option as a comment.
Not supported. In VisualAge Generator, you specify the NOMAPS option on a CALL statement to achieve better performance if the called program does not send any maps to the screen.	refreshScreen=″YES″ | ″NO″	The migration tool does not set this property. If you previously specified NOMAPS for a VAGen call statement, you can continue to use the *noRefresh* option on the EGL CALL statement if you use the *vagCompatibility="YES"* build descriptor option. Alternatively, you can obtain the same support by specifying *refreshScreen="NO"* on the CallLink entry for the called program.
Not used. None of the communication protocols supported by VisualAge Generator required this information.	`ctgKeyStore` `ctgKeyStorePassword`	The migration tool does not set this property. *ctgKeyStore* and *ctgKeyStorePassword* are required if you decide to use *remoteComType="CICSSSL"*.
Not used. In VisualAge Generator, you use the /system=JAVAWRAPPER generation option whenever you want to generate a Java wrapper for a called batch program.	javaWrapper=″YES″ | ″NO″	The migration tool does not set this property. You must specify *javaWrapper="YES"* if you want a Java wrapper to be generated whenever you generate the called program.

fileLink

Table 144. Linkage table options for :filelink

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
:filelink	fileLink	No special considerations.

Table 144. Linkage table options for :filelink (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`linktype=xxxx` *xxxx* is one of the following: • local • remote In VisualAge Generator, the default is local.	Type of file, where the EGL equivalent options are as follows: • localFile • remoteFile	If the VAGen linktype is not specified, the migration tool converts to *localFile*.
`filename=fileName` *fileName* is the name of a file in a VAGen record definition. Wildcards are permitted.	fileName="*fileName*"	No special considerations.
`contable=xxxx` *xxxx* is one of the following: • a conversionTableName • * • EZECONVT • BINARY	`conversionTable="xxxx"` *xxxx* is one of the following: • conversionTableName • * • PROGRAMCONTROLLED • not supported	The migration tool uses the same *conversionTableName* when creating the EGL FileLink information. The migration tool migrates the VAGen contable=BINARY to BINARY, which is an unsupported value in EGL. The migration tool also issues an error message. There will be an error in the Problems view. You must correct the error by editing the *.eglbld* file and selecting the supported value that you want to use.
`location=xxxx` *xxxx* is one of the following: • CICS • EZELOC	`locationSpec="xxxx"` *xxxx* is one of the following: • CICS • PROGRAMCONTROLLED	No special considerations.

Crtxlink

Table 145. Linkage table options for :crtxlink

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
:crtxlink	asynchLink	No special considerations.
`linktype=xxxx` *xxxx* is one of the following: • local • remote **Note:** In VisualAge Generator the default is local.	Type of invocation, where the EGL equivalent options are the following: • localAsynch • remoteAsynch	If the VAGen linktype is not specified, the migration tool converts to *localAsynch*.
`recdname=recordName` *recordName* is the name of a VAGen record definition. Wildcards are permitted.	recordName="*recordName*"	No special considerations.

Table 145. Linkage table options for :crtxlink (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`contable=xxxx` *xxxx* is one of the following: • a conversionTableName • * • EZECONVT • BINARY	`conversionTable="xxxx"` *xxxx* is one of the following: • conversionTableName • * • PROGRAMCONTROLLED • not supported	The migration tool uses the same *conversionTableName* when creating the EGL AsynchLink information. The migration tool converts the VAGen contable=BINARY to BINARY, which is an unsupported value in EGL. The migration tool also issues an error message. There will be an error in the Problems view. You must correct the error by editing the *.eglbld* file and selecting the supported value that you want to use.
`location=xxxx` *xxxx* is one of the following: • CICS • EZELOC	`locationSpec="xxxx"` *xxxx* is one of the following: • CICS • PROGRAMCONTROLLED	No special considerations.
package=packageName	package=″packageName″	No special considerations.

Dxfrlink

Table 146. Linkage table options for :dxfrlink

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
:dxfrlink	transferToProgram	No special considerations.
`fromappl=programName` *programName* is the name of the program that is transferring with a DXFR to another program. Wildcards are not permitted.	fromPgm=″*programName*″	No special considerations.
`toappl=programName2` *programName2* is the name of the program to which the transfer is occurring.	toPgm=″programName2″	No special considerations.
`linktype=xxxx` *xxxx* is one of the following: • dynamic • static • noncsp	`linkType="xxxx"` *xxxx* is one of the following: • DYNAMIC • STATIC • EXTERNALLYDEFINED	If you previously specified NONCSP for a VAGen DXFR statement, you can continue to use the *externallyDefined* option on the EGL transfer to program statement if you include *vagCompatibility=″YES″* in your build descriptor options. Alternatively, you can obtain the same support by specifying *linkType=″EXTERNALLYDEFINED″* on the *transferToProgram* entry for the program to which you are transferring.

Table 146. Linkage table options for :dxfrlink (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
Not supported.	alias="applname"	If your VAGen program had to be renamed because the name was an EGL reserved word, you can use the *alias* property either on the program definition or in the linkage table to provide the original VAGen name for the program as the name of the generated program. Either technique can help you avoid having to modify non-VAGen programs that transfer to the VAGen program.

Resource association part

Table 147. Resource association

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
In VisualAge Generator, a resource association part specifies how a file is to be implemented for a specific target environment. The file is the File Name specified in a VAGen record definition. The resource association part can also specify how print output is to be implemented for a specific target environment. When generating a program, the fileName for each indexed, serial, relative or print output is matched to the resource association part. The first entry that matches based on the fileName and generation target environment is the entry that is used for that file.	The EGL resource association part specifies how a file is to be implemented for a specific target environment. The file is the *fileName* property that is specified in an EGL record definition. The resource association part can also specify how print output is to be implemented for a specific target environment. When generating a program, the fileName for each indexed, serial, relative or print output is matched to the resource association part. The first entry that matches based on the fileName and generation target environment is the entry that is used for that file.	No special considerations.
For VisualAge Generator, if you generate C++, resource association files are also used at runtime.	For EGL, resource association information is stored in EGL parts.	The migration tool includes support for converting additional options that were only valid in VAGen resource association files.
file = fileName | EZEPRINT	fileName="fileName" | "printer"	No special considerations.

Table 147. Resource association (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`/system=targetSystem` *targetSystem* is one of the following: • AIX * • AIXCICS * • HP-UX * • IMSBMP • IMSVS • LINUX ** • MVSBATCH • MVSCICS • NTCICS * • OS2 * • OS2CICS • OS400 • SCO * • SOLACICS * • SOLARIS * • TSO • VMCMS • VMBATCH • VSEBATCH • VSECICS • WINNT ** **Note:** • * — Indicates environments used for C++ generation. • ** — Indicates environments used for Java generation. • /system is optional. • VisualAge Generator supports an * as a wildcard in the target system. (For example, MVS* or *CICS).	This is the EGL target environment. The corresponding environment values are as follows: • aix • not supported • hpux • imsbmp • imsvs • linux • zosbatch • zoscics • not supported • not supported • not supported • iseriesc • not supported • not supported • solaris • not supported • not supported • not supported • vsebatch • vsecics • win **Note:** Wildcards are not supported.	The migration tool processes the /system option as follows: • For a target system that is listed as not supported, the migration tool includes the information for the VAGen resource association entry as a comment in the EGL resource association part. This helps preserve as much of your information as possible. • If the /system option is omitted from the VAGen resource association entry, the migration tool uses *any* as the EGL resource association target environment. • If the /system option uses a wildcard, the migration tool migrates the option exactly as it is, including the wildcard (for example, mvs* or *cics). The migration tool also issues an error message.

Table 147. Resource association (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
`/filetype=fileType` *fileType* is one of the following: • BTRIEVE • GSAM • IBMCOBOL • MFCOBOL • MMSGQ • MQ • OS2COBOL • SEQ • SEQRS • SMSGQ • SPOOL • TEMPAUX • TEMPMAIN • TRANSIENT • VSAM • VSAMRS	The EGL file type, where the corresponding values are in the following list: • not supported • gsam • ibmcobol • not supported • mmsgq • mq • not supported • seq or seqws • seqrs • smsgq • spool • tempaux • tempmain • transient • vsam • vsamrs	The migration tool processes the /filetype option as follows: • If the /filetype option is omitted from the VAGen resource association entry, the migration tool uses *default* as the EGL file type. • If the /system option specifies a host target environment, the migration tool converts the VAGen SEQ file type to the EGL *seq* file type. • If the /system option is a workstaton environment, the migration tool converts the VAGen SEQ file type to the EGL *seqws* file type. • For unsupported file type values, if the resource association is for a /system that is supported, the migration tool creates an EGL resource association entry using the VAGen file type and issues an error message. There will also be an error in the Problems view. You must fix this error before you can use the EGL resource association part.
`/sysname=systemName`	`systemName="systemName"`	The migration tool converts any symbolic parameters that are used within the /sysname option to the corresponding EGL replacement symbolic parameter.
`/replace` `/noreplace`	`replace="YES"` `replace="NO"`	No special considerations.
`/dup` `/nodup`	`duplicates="YES"` `duplicates="NO"` **Note:** This is for ISERIESC.	No special considerations.
`/commit` `/nocommit` These options are only used for the OS/400 target environment.	`commit="YES"` `commit="NO"` **Note:** This is for ISERIESC.	No special considerations.
`/blksize=xxxx,yyyy,zzzz` In VisualAge Generator, this option is only used for VSE target environments.	`blockSize="xxxx,yyyy,zzzz"`	No special considerations.
`/sysnum=xxxx` In VisualAge Generator, this option is only used for VSE target environments.	`systemNumber="xxxx"`	No special considerations.

Table 147. Resource association (continued)

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
/label /nolabel In VisualAge Generator, this option is only used for VSE target environments.	standardLabel="YES" standardLabel="NO"	No special considerations.
/pcbno=n This is only valid for IMSVS or IMSBMP target environments or for MVS Batch if the file type is GSAM.	pcbName="pcb*n*"	The migration tool converts the PCB number to a name by concatenating the literal pcb and the number.
/noff There is no /FF option in VisualAge Generator. This option is only supported in VAGen resource association files.	FormFeedOnClose="NO" FormFeedOnClose="YES"	The migration tool converts /noff to *FormFeedOnClose="NO"*.
/text There is no /NOTEXT option in VisualAge Generator. This option is only supported in VAGen resource association files.	text="YES" text="NO"	The migration tool converts /text to *text="YES"*.
/contable=*xxxx* *xxxx* is one of the following: • a conversionTableName • EZECONVT This option is only supported in VAGen resource association files.	conversionTable="*xxxx*" *xxxx* is one of the following: • a conversionTableName • PROGRAMCONTROLLED	The migration tool uses the same *conversionTableName* when creating the EGL resource association entry.
/keys=*xxxx* In VisualAge Generator, this option is only used with /filetype=BTRIEVE. This option is only supported in VAGen resource association files.	KEYS="*xxxx*"	Because BTRIEVE is used in supported target environments, the migration tool migrates the /keys option to an EGL *keys* option.
/basename=xxxx In VisualAge Generator, this option is only used for the OS/2® target environment. This option is only supported in VAGen resource association files.	Not supported.	The migration tool comments out any entry for the OS/2 target environment.

Link edit part

Table 148. Link edit part

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
In VisualAge Generator, the link edit part is typically named *programName.suffix*, where the first part of the name is the same as the VAGen program name and the suffix is LKG. The VAGen /linkedit generation option specifies the value for the suffix.	By default, in EGL the link edit part name must be the same name as the program name. If this is the case you do not need to specify the linkedit build descriptor option. If you have multiple link edit parts for a program, then you must use different part names for the program's linkedit build descriptor option parts. In this case, you must specify the complete link edit part name in the linkedit build descriptor option.	If the suffix is .LKG, the migration tool removes the suffix when creating the new EGL link edit part. If the suffix is anything other than .LKG, the migration changes *.suffix* to *_suffix* because periods (.) are not valid characters in EGL part names.
A VAGen link edit part contains the link edit statements needed for linkediting a program during the preparation process in a host environment.	In EGL, a link edit part contains the link edit statements needed for linkediting a program during the build process in a host environment.	The migration tool does the following: • Converts any symbolic parameters that are used within the link edit part to the corresponding EGL replacement symbolic parameter. • Uses the same indentation as in the VAGen part.

Bind control part

Table 149. Bind control part

VisualAge Generator 4.5	EGL produced by the migration tool	Migration tool considerations
In VisualAge Generator, the bind control part is typically named *programName.suffix*, where the first part of the name is the same as the VAGen program name and the suffix is BND. The VAGen /bind generation option specifies the value for the suffix.	By default, in EGL the bind control part name must be the same name as the program name. If this is the case you do not need to specify the bind control build descriptor option. If you have multiple bind control parts for a program, then you must use different part names for the program's bind control parts. In this case, you must specify the complete bind control part name in the bind build descriptor option.	If the suffix is .BND, the migration tool removes the suffix when creating the new EGL bind control part. If the suffix is anything other than .BND, the migration changes *.suffix* to *_suffix* because periods (.) are not valid characters in EGL part names.
A VAGen bind control part contains the DB2 bind commands needed for binding the DB2 DataBase Resource Module (DBRM) for a program during the preparation process in an MVS host environment.	In EGL, a bind control part contains the bind commands needed for binding the DBRM for a program during the build process in a z/OS host environment.	The migration tool does the following: • Adds additional commands at the beginning of the bind control part. These commands are needed by the build server. • Converts any symbolic parameters that are used within the bind control part to the corresponding EGL replacement symbolic parameter. • Uses the same indentation as in the VAGen part.

Symbolic parameters

The following tables show the relation between VAGen symbolic parameters and EGL symbolic parameters.

Table 150. Part-related symbolic parameters

Part-related symbolic parameters	Corresponding EGL symbolic parameter
EZECOBOLTYPE	Not supported
EZEDATA	DATA
EZEDBCS	Not supported
EZEDESTLIB	Not supported
EZEDESTNAME	Not supported
EZEDLI	EZEDLI — DL/I only
EZEENTRY	Not supported
EZEENV	SYSTEM
EZEGDATE	EZEGDATE
EZEGENOUT	Not supported
EZEGMBR	EZEGMBR
EZEGTIME	EZEGTIME
EZEJOB	Not supported
EZEMBR	In a JCL script, linkedit, or bind part, EZEALIAS. Otherwise, EZEMBR
EZEMBRPATH	Not supported
EZEMSG	Not supported
EZENLS	EZENLS
EZEPID	EZEPID
EZEPREPDESTACCOUNT	Not supported
EZEPREPDESTHOST	Not supported
EZEPREPDESTDIR	Not supported
EZEPREPDESTPASSWORD	Not supported
EZEPREPDESTUID	EZEDESTUSERID
EZEPREPFTPCMDSBCS	Not supported
EZEPREPFTPCMDBCS	Not supported
EZEPREPSENDCMDDBCS	Not supported
EZEPREPSESSION	Not supported
EZEPREPSP	Not supported
EZEPREPSQLDB	Not supported
EZEPREPWORKDB	Not supported
EZEPSB	Not supported — DL/I and IMS only
EZEPTYPE	Not supported
EZESQL	EZESQL
EZETBLNAME	Not supported
EZETPROC	Not supported
EZETRAN	Not supported

Table 150. Part-related symbolic parameters (continued)

Part-related symbolic parameters	Corresponding EGL symbolic parameter
EZETRANSFERTYPE	Not supported
EZETRO	Not supported
EZETWASIZE	Not supported
EZEUSERID	Not supported
EZEVMLOADLIB	Not applicable — VM only
EZEVSELIB	EZEVSELIB — VSE only
EZEXAPP	Not supported.

Table 151. File-related symbolic parameters

File-related symbolic parameters	Corresponding EGL symbolic parameter
EZEBLK	EZEBLK
EZEDBD	Not supported
EZEDD	EZEDD
EZEDLBL	EZEDLBL — VSE only
EZEDSN	EZEDSN
EZELRECL	EZELRECL
EZERECFM	EZERECFM

Table 152. User-defined symbolic parameters

User-defined symbolic parameters	Corresponding EGL symbolic parameter
COB2LIB	COBCICS
COBLIST	Not supported
DBDLIB	DBDLIB — DL/I only
DSNLOAD	DSNLOAD
DSYS	DSYS
ELA	ELA
EZALTXTR	Special migration to normal build option—see Generation Options section, transferErrorTransaction=″xxx″
EZONEAS2	Special migration to normal build option -- See Generation Options section, oneFormItemCopybook=″YES″
EZUAUTH	EZUAUTH
EZUINST	EZUINST
PSBLIB	PSBLIB — DL/I only
PROCLIB	PROCLIB -- VSE only
PWRCLASS	PWRCLASS -- VSE only
RESLIB	RESLIB — DL/I and IMS only
SQLDBNAM	SQLDBNAM — VSE only
SQLPKGNM	SQLPKGNM — VSE only
SQLPROPT	SQLPROPT — VSE only
SQLSTMDE	SQLSTMDE — VSE only
SQLSTOPT	SQLSTOPT — VSE only

Table 152. User-defined symbolic parameters (continued)

User-defined symbolic parameters	Corresponding EGL symbolic parameter
SQLUSRPW	SQLUSRPW — VSE only
VMFMODE	Not applicable — VM only
VMDISKADDR	Not applicable — VM only
VUSERLIB	VUSERLIB — VSE only

Other generation information

This section is organized in the following tables:

- MVS preparation templates and procedures, Table 153 on page 348
- MVS runtime templates, Table 154 on page 350
- MVS file and database allocation templates, Table 155 on page 351
- MVS file and database allocation placeholder templates, Table 156 on page 351
- OS/400 runtime templates, Table 157 on page 351

Preparation templates and procedures

Table 153 shows the VAGen preparation templates and procedures used for preparing the outputs of COBOL generation for the MVS runtime environments. The table only includes the MVS runtime environments that have a corresponding EGL z/OS runtime environment. The template name is shown first, followed by the procedure name. For most of the procedure names, the first 3 characters are ELA and the remaining characters indicate the steps included in the procedure as follows: P (DB2 precompile), T (CICS translate), C (COBOL compile), L (link edit), and B (DB2 bind).

Note:

- For the MVS runtime environments, VisualAge Generator also uses bind control templates. See "Establishing a bind control part to use as a template" on page 190 for details of how to convert the bind control templates.
- VSE CICS and VSE Batch are not included in the following table because the VisualAge Generator EGL Plug-in for VSE, which provides COBOL generation for VSE, uses the same preparation process as VisualAge Generator. However, the template and procedure names have changed. Refer to the *VisualAge Generator EGL Plug-in for VSE Reference* for the correspondence between the VAGen and EGL template names.
- OS/400 is not included in the following table because the EGL build script FDAPREP replaces all of the VAGen OS/400 preparation templates. Comments in the FDAPREP build script indicate which VAGen preparation template formed the basis for that section of the build script.

Table 153. MVS preparation templates and procedures

Environment	Part type and database	VisualAge Generator template and procedure	EGL build script
MVS CICS	Program - without DB2	EFK2MPCB ELATCL	FDATCL
	Program - with DB2	EFK2MPCA ELAPTCLB	FDAPTCL followed by FDABIND

Table 153. MVS preparation templates and procedures (continued)

Environment	Part type and database	VisualAge Generator template and procedure	EGL build script
	Map Group - print services	EFK2MMCA ELACL	FDACL
	Map Group - format module	EFK2MMTF ELAL	FDALINK
MVS Batch	Program - without DB2	EFK2MPBA ELACL	FDABCL
	Program - with both DL/I and DB2	EFK2MPBB ELAPCLB	FDAPCL followed by FDABIND
	Program - with DB2 only	EFK2MPBC ELAPCLB	FDAPCL followed by FDABIND
	Map Group - print services	EFK2MMCA ELACL	FDACL
IMS/VS	Program - with DL/I only	EFK2MPIC ELACL	FDACL
	Program - with DL/I and a DB2 work database	EFK2MPID ELACLB	FDACL followed by FDABIND
	Program - with both DL/I and DB2	EFK2MPIE ELAPCLB	FDAPCL followed by FDABIND
	Map Group - print services for MFS	EFK2MMCB ELACL	FDACL
	Map Group - MFS, with /mfstest generation option	EFK2MMST MFSTEST	FDAMFS
	Map Group - MFS, with /nomfstest generation option	EFK2MMSU MFSUTL	FDAMFS
IMS BMP	Program - with DL/I only	EFK2MPIA ELACL	FDABCL
	Program - with both DL/I and DB2	EFK2MPIB ELAPCLB	FDAPCL followed by FDABIND
	Map Group - print services for SEQ and GSAM	EFK2MMCA ELACL	FDACL
	Map Group - print services for MFS	EFK2MMCB ELACL	FDACL
	Map Group - MFS, with /mfstest generation option	EFK2MMST MFSTEST	FDAMFS
	Map Group - MFS, with /nomfstest generation option	EFK2MMSU MFSUTL	FDAMFS

Table 153. MVS preparation templates and procedures (continued)

Environment	Part type and database	VisualAge Generator template and procedure	EGL build script
All MVS environments	Relink program	EFK2MPRE ELARLINK	FDALINK
	Table	EFK2MMCA ELACL	FDACL

Runtime templates

Table 154 shows the VAGen runtime templates that are used to generate the basic runtime JCL for the MVS Batch and IMS BMP environments. Table 155 shows the file and database allocation templates that are used to create DD statements within the generated runtime JCL. Table 156 shows the file and database allocation placeholder templates that are used to indicate that additional DD statements might be required for another program that is called or transferred to with an XFER or DXFR statement or for a program that uses EZEDEST or EZEDESTP. Table 157 shows the VAGen runtime templates that are used to generate the control language (CL) for the OS/400 environment. All 4 tables include the corresponding VAGen and EGL information.

Note: VSE Batch is not included in the tables because the VisualAge Generator EGL Plug-in for VSE, which provides COBOL generation for VSE, uses similar templates to VisualAge Generator. However, the template names have changed. Refer to the *VisualAge Generator EGL Plug-in for VSE Reference* for the correspondence between the VAGen and EGL template names.

Table 154. MVS runtime templates

Environment	Program type and database	VisualAge Generator runtime JCL template	EGL runtime JCL template
MVS Batch	Called program	EFK2MEBA	fda2meba.tpl
	Main program - No databases	EFK2MEBE	fda2mebe.tpl
	Main program - DL/I only	EFK2MEBC	fda2mebc.tpl
	Main program - DB2 only	EFK2MEBD	fda2mebd.tpl
	Main program - DL/I and DB2	EKF2MEBB	fda2mebb.tpl
IMS BMP	Called program	EFK2MEBA	fda2meba.tpl
	Main program - DL/I only	EFK2MEIB	fda2meib.tpl
	Main program - DL/I and DB2	EFK2MEIA	fda2meia.tpl

Table 155. MVS file and database allocation templates

Environment	File or database type	VisualAge Generator runtime JCL template	EGL runtime JCL template
MVS Batch and IMS BMP	DL/I database in MVS Batch	EFK2MDLI	fda2mdli.tpl
	VSAM or VSAMRS input for serial, indexed, or relative files	EFK2MVSI	fda2mvsi.tpl
	VSAM or VSAMRS output for serial, indexed, or relative files	EFK2MVSO	fda2mvso.tpl
	SEQ or SEQRS input for serial files	EFK2MSDI	fda2msdi.tpl
	SEQ or SEQRS output for serial files	EFK2MSDO	fda2msdo.tpl
	GSAM input for serial files	EFK2MGSI	fda2mgsi.tpl
	GSAM output for serial files	EFK2MGSO	fda2mgso.tpl
	GSAM file in an IMS BMP	EFK2MIMS	fda2mims.tpl

Table 156. MVS file and database allocation placeholder templates

Environment	File and database allocation placeholder type	VisualAge Generator runtime JCL template	EGL runtime JCL template
MVS Batch and IMS BMP	XFER or DXFR to EZEAPP	EFK2MEZA	fda2meza.tpl
	CALL, XFER or DXFR to a specific application or RT generation option transfers to a specific application	EFK2MCAL	fda2mcal.tpl
	Application uses EZEDEST or EZEDESTP	EFK2MEZD	fda2mezd.tpl

Table 157. OS/400 runtime templates

Environment	Purpose of template	VisualAge Generator runtime template	EGL runtime JCL template
OS/400	Provides the CL to add libraries to the client/server job and to start commitment control if this is the first server program called by a client	EFK24EBC	fda24ebc.tpl

Table 157. OS/400 runtime templates (continued)

Environment	Purpose of template	VisualAge Generator runtime template	EGL runtime JCL template
	Provides epilogue to the runtime CL to handle errors that occur	EFK24EEC	fda24eec.tpl

Other runtime information

This section is organized in the following tables:

- Runtime environment variables, Table 158 on page 352
- vgj.properties, Table 159 on page 354

Runtime environment variables

The VAGen runtime environment variables are used for generated COBOL for CICS OS/2 and for generated C++ for the workstation environments. Most VAGen runtime environment variables do not have a corresponding EGL runtime property. Even when there is a correspondence, the values for the EGL runtime properties have different values or slightly different meanings. In addition, there are numerous new EGL runtime properties. Therefore, use the material in this section as an aid in creating your EGL runtime properties, but be sure to carefully review all the EGL runtime properties in the online helps to determine if there are additional properties you need to set.

Table 158. Runtime environment variables

VAGen runtime environment variables	EGL runtime properties
BTRINTF	Not used -- CICS OS/2 only
CICSCOBCOPY	Not used -- CICS OS/2 only
CICSRGRP	Not used -- CICS OS/2 only
CICSCOBOL	Not used -- CICS OS/2 only
CICSRD	Not used -- CICS OS/2 only
CICSWRK	Not used -- CICS OS/2 only
COBPATH	Not used -- CICS OS/2 only
CSODIR	Not used
CSO_DUMP_CONV	Not used
CSO_DUMP_DATA	Not used
CSOTIMEOUT (time in seconds)	cso.cicsj2c.timeout (time in milliseconds)
CSOTROPT	tcpiplistener.trace.flag or vgj.trace.type, depending on what you need to trace
CSOTROUT	tcpiplistener.trace.file or vgj.trace.device.spec, depending on what you need to trace
DB2INSTANCE	Not used
DLITROPT	Not supported -- remote DL/I only
DLITROUT	Not supported -- remote DL/I only
DPATH	Not used
ELAPATH	Not used

Table 158. Runtime environment variables (continued)

VAGen runtime environment variables	EGL runtime properties
ELARTRDB_*tttt* where *tttt* is the CICS transaction code	Not used -- CICS OS/2 only
EZERGRGL_*xxx* where *xxx* is the NLS language code	vgj.datemask.gregorian.long.*locale*
EZERGRGS_*xxx* where *xxx* is the NLS language code	vgj.datemask.gregorian.short.*locale*
EZERJULL_*xxx* where *xxx* is the NLS language code	vgj.datemask.julian.long.*locale*
EZERJULS_*xxx* where *xxx* is the NLS language code	vgj.datemask.julian.short.*locale*
EZERNLS	vgj.nls.code
EZERSQLDATE	Not supported -- EGL uses JDBC
EZERSQLDB	vgj.jdbc.database.*SN*, where *SN* is the server name; format of the value differs from EZERSQLDB
EZERSQLM1	Not supported -- EGL uses JDBC
EZERSQLM2	Not used -- EGL uses JDBC
EZERSQLMF	Not used -- EGL uses JDBC
EZERSQLUS	Not supported -- EGL uses JDBC
FCEOPT	Not used -- C++ generation only
FCETROPT	Not used -- C++ generation only
FCWCOMP	Not used -- C++ generation only
FCWDB2DIR	Not used -- EGL uses JDBC
FCWDBNAME_*programName*	vgj.jdbc.default.database.*programName*; format of the value differs from FCWDBNAME
FCWDBNOOP	Not used -- distributed CICS only
FCWDBPASSWORD	vgj.jdbc.default.password
FCWDBUSER	vgj.jdbc.default.userid
FCWDBVERSION (Oracle version)	Not used -- EGL uses JDBC
FCWDPATH (directory for tables and resource association)	Not used. Tables must be in the classpath. Resource association becomes vgj.ra.* properties
FCWFIODB	Not used -- distributed CICS only
FCWLIBPATH	Not used -- C++ generation only
FCWMAKE	Not used -- C++ generation only
FCWRSC (raf file name)	Not used. Resource association becomes vgj.ra.* properties
FCWOPT (map field with date mask)	Not supported
FCWTRDB_*tttt* where *tttt* is the CICS transaction code	Not used -- distributed CICS only
FCWTROPT	vgj.trace.type; values and meanings differ from FCWTROPT

Table 158. Runtime environment variables (continued)

VAGen runtime environment variables	EGL runtime properties
FCWTROUT	vgj.trace.device.spec; must also specify vg.trace.device.option=2
INFORMIXDIR	Not supported -- ODBC only
MDLROOT	Not supported -- VAGen Templates only
ORACLE_HOME	Not used -- EGL uses JDBC
RMTDLI_PARTNER_LU	Not supported -- remote DL/I on MVS only
RMTDLI_PARTNER_TP	Not supported -- remote DL/I on MVS only
RMTDLI_SERVER_ENV	Not supported -- remote DL/I on MVS only
VSEDLI_CFG	Not supported -- remote DL/I on VSE only
VSEDLI_TRACE	Not supported -- remote DL/I on VSE only

vgj.properties

The VAGen vgj.properties file is used for Java generation for the workstation environments. Most VAGen vgj.properties variables have a corresponding EGL runtime property. However, in some cases, the values for the EGL runtime properties have different values or slightly different meanings. In addition, there are numerous new EGL runtime properties. Therefore, use the material in this section as an aid in creating your EGL runtime properties, but be sure to carefully review all the EGL runtime properties in the online helps to determine if there are additional properties you need to set.

Table 159. vgj.properties

VAGen vgj.properties	EGL runtime properties
cso.application.*xxx* where *xxx* is the server group	Not used -- EGL uses a linkage properties file
cso.linkagetable.*xxx* where *xxx* is the linkage table name	cso.linkageOptions.*LO*, where *LO* is the linkage options part name and the corresponding linkage properties file is named *LO*.properties
cso.serverLinkage.*xxx.yyy* where *xxx* is the server group and *yyy* is the attribute name.	Not used -- EGL uses a linkage properties file
vgj.datemask.gregorian.long.*xxx* where *xxx* is the NLS language code	vgj.datemask.gregorian.long.locale
vgj.datemask.julian.long.*xxx* where *xxx* is the NLS language code	vgj.datemask.julian.long.locale
vgj.java.command	vgj.java.command
vgj.jdbc.database.*SN* where *SN* is the server name	vgj.jdbc.database.*SN* where *SN* is the server name; format of the value differs from EZERSQLDB
vgj.jdbc.default.database	vgj.jdbc.default.database or vgj.jdbc.default.database.*programName*
vgj.jdbc.default.database.user.id	vgj.jdbc.default.userid
vgj.jdbc.default.database.user.password	vgj.jdbc.default.password
vgj.jdbc.drivers	vgj.jdbc.drivers
vgj.nls.code	vgj.nls.code

Table 159. vgj.properties (continued)

vgj.nls.number.decimal	vgj.nls.number.decimal
vgj.powerserver.location	Not used
vgj.ra.*FN*.contable where *FN* is the logical file name	vgj.ra.*QN*.conversionTable, where *QN* is the *MQ* Series message queue name; not all of the VAGen values are valid
vgj.ra.*FN*.filetype	vgj.ra.*FN*.fileType
vgj.ra.*FN*.replace	vgj.ra.*FN*.replace
vgj.ra.*FN*.sysname	vgj.ra.*FN*.sysname
vgj.ra.*FN*.text	vgj.ra.*FN*.text
vgj.trace.device.option	vgj.trace.device.option
vgj.trace.device.spec	vgj.trace.device.spec
vgj.trace.type	vgj.trace.type; values and meanings differ from FCWTROPT

Appendix C. Messages from the migration tools

This section contains the messages that are issued by the migration tools. You can find the messages based on their prefix in the following sections:

- HPT.EGL.00xxx - Stage 1 Common Messages
- HPT.EGL.01xxx - Stage 1 on VisualAge for Java
- HPT.EGL.02xxx - Stage 1 on VisualAge Smalltalk
- IWN.MIG - Stages 2 and 3 in EGL

The character in the last position of each message number is a suffix that indicates the severity of the message:

- *i* — Informational message to indicate status or that the migration tool eliminated information during migration due to the differences between the VisualAge Generator and EGL languages. No user action is required.
- *w* — Warning message to indicate a possible problem. For example, the migration tool made a best guess for the EGL syntax. User action is only required if validation or generation detects an error.
- *e* — Error message. The migration tool was unable to make a reasonable guess for the EGL syntax. User action is required to provide missing or incomplete information.
- *t* - Trace message to indicate more detailed status than is provided by the informational messages. The trace message include details about when commit points are taken. The trace messages are self-explanatory and are not included in this migration guide.

Messages from the VisualAge Generator to EGL migration tool—Stage 1

The Stage 1 migration tools are shipped as samples. The messages are not translated within the sample tool itself. However, the messages **as shipped with the samples** are translated here in the Migration Guide.

Stage 1 common messages

The following messages are common to the VAGen migration tool on both VisualAge for Java and VisualAge Smalltalk

HPT.CM.215.e File *filename* cannot be opened. The return code is *returnCode* (*returnCodeText*).

Explanation: The specified file cannot be opened. The *returnCode* and *returnCodeText* indicate the reason why. *returnCode* 2 indicates the file cannot be found.

User response: Provide a valid file for the migration tool.

HPT.EGL.0001.w Table name *tableName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename tables for you.

User response: You must change the name of the table and all references to it, including references in any program's table and additional records list, logic statements, data item edit routines, map edit routines, and UI edit tables. Be sure to change any non-VAGen references to the dataTable name, including CICS program definitions. Alternatively, you can wait until you have migrated, rename the dataTable in EGL, and use the EGL *alias* property to specify the original table name.

HPT.EGL.0002.w Map group name *mapGroupName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename map groups for you.

User response: You must change the name of the map group, the names of all maps in the map group, and all references to the map group, including references as any program's map group or help map group. Be sure to change any non-VAGen references to the map group name, including CICS program definitions. Alternatively, you can wait until you have migrated, rename the formGroup in EGL, and use the EGL *alias* property to specify the original map group name.

HPT.EGL.0003.w Program name *programName* **is a reserved word. It must be renamed.**

Explanation: The migration tool does not rename programs for you.

User response: You must change the name of the program and all references to it, including references on CALL, DXFR, and XFER statements and references in linkage table parts. Also change the names of any bind control or linkedit parts that correspond to this program. Be sure to change any non-VAGen references to the program name, including CICS program definitions. Alternatively, you can wait until you have migrated, rename the program in EGL, and use the EGL *alias* property to specify the original program name.

HPT.EGL.0004.w Control part name *partName* **is a reserved word. It must be renamed.**

Explanation: The specified control part name uses dot notation, where the name before the dot is a reserved word. The migration tool assumes that the name before the dot is a program name and that this control part is closely tied to a program. Because the migration tool does not rename programs, it also does not rename control parts that are in dot notation.

User response: You must change the name of the program and all references to it, including references on CALL, DXFR, and XFER statements and references in linkage table parts. Also change the names of any bind control or linkedit parts that correspond to this program. Be sure to change any non-VAGen references to the program name, including CICS program definitions. Alternatively, you can wait until you have migrated, rename the program in EGL, and use the EGL *alias* property to specify the original program name. Refer to Appendix Appendix A, "Reserved words," on page 221 that lists the EGL reserved words.

HPT.EGL.0005.w UI Record *recordName* **is a reserved word or starts with the # or @ symbol. It must be renamed.**

Explanation: The Stage 1 migration tool does not rename UI records for you. However, the Stage 2 tool renames the record using your Stage 2 Renaming prefix. The Stage 2 tool also includes the *alias* property for the VGUI record so that the names in the EGL generated outputs are identical to those in VisualAge Generator. The Stage 3 tool also renames the file that contains the VGUI record. If you migrate in single file mode, the migration tool makes the same changes.

User response: None. The recommended approach is to allow the Stage 2 migration tool to rename the record for you. This also changes all references to the record and the file name.

HPT.EGL.0006.i Migration of *preferenceFile* **will produce** *outputList***.**

Explanation: Migration of *preferenceFile* will produce *outputList*. Possible outputs are migration plans, report, and database updates.

User response: None.

HPT.EGL.0007.w No migration files were created based on the current filters.

Explanation: No migration files were created based on the current filters.

User response: Change the filter preferences.

HPT.EGL.0008.e *PreferenceValue* **is an invalid value for preference option** *preferenceOption***.**

Explanation: The value is invalid for the preference option.

User response: Changes the preference option value in the preferences file.

HPT.EGL.0009.e Migration set *migrationSetName* **requires the preferences for the spanning maps suffixes be specified.**

Explanation: The specified migration set contains one or more map groups that span multiple projects or multiple packages. The migration tool requires you to specify the spanning maps suffix preferences so that it can create the project or package necessary for the map group.

User response: Edit the Stage 1 migration preferences file. On the Mapping page, in the Spanning Maps section, specify values for the Project suffix and Package suffix fields. See "Mapping page" on page 119 for Java or "Mapping page" on page 139 for Smalltalk for more details.

HPT.EGL.0010.w No migration action was requested.

Explanation: You have not selected any output options for the Stage 1 migration tool.

User response: Select one or more options. The options enable you to create a migration plan file,

create a report, or update the database.

HPT.EGL.0011.i Starting the database clean up of migration set *migrationSetName***.**

Explanation: The migration database already contained information for the specified migration set. The migration tool deleted the migration set information in preparation for running Stage 1 with a new set of preferences.

User response: None.

HPT.EGL.0012.i Completed the database clean up of migration set *migrationSetName***.**

Explanation: The migration database already contained information for the specified migration set. The migration tool deleted the migration set information in preparation for running Stage 1 with a new set of preferences.

User response: None.

HPT.EGL.0013.e Each renaming rule must have a unique order value.

Explanation: Two or more renaming rules have the same order number.

User response: Edit the Stage 1 migration preferences file and change the renaming rules so that each rule has a unique order number.

HPT.EGL.0014.i Migration set *migrationSetName-migrationSetVersion* **produced** *n* **error messages,** *n* **warning messages, and** *n* **informational messages.**

Explanation: *n* is the number of messages issued by the Stage 1 migration tool for the specified migration set. The count for the informational messages includes message HPT.EGL.0014.i.

User response: None.

HPT.EGL.0015.e Derived EGL project name *eglProjectName* **contains invalid character(s):** *characterList***. Modify the renaming rules.**

Explanation: Using the renaming rules that you specified, the Stage 1 migration tool has created a proposed EGL project name that does not meet the EGL project naming conventions. The characters that are invalid shown in the *characterList*.

User response: Edit the Stage 1 migration preferences file and modify the project renaming rules so that they result in valid EGL project names. When you modify the renaming rules, be sure to consider the effect of any renaming rules that specify a Mapping Context of *both*.

HPT.EGL.0016.e Derived EGL package name *eglPackageName* **contains invalid character(s):** *characterList***. Modify the renaming rules.**

Explanation: Using the renaming rules that you specified, the migration tool has created a proposed EGL package name that does not meet the EGL package naming conventions. The characters that are invalid shown in the *characterList*.

User response: Edit the Stage 1 migration preferences file and modify your package renaming rules so that they result in valid EGL package names. When you modify the renaming rules, be sure to consider the effect of any renaming rules that specify a Mapping Context of *both*.

HPT.EGL.0017.e Derived EGL project name *eglProjectName* **cannot end with a period (.). Modify the renaming rules.**

Explanation: Using the renaming rules that you specified, the migration tool has created a proposed EGL project name that ends in a period. This name does not meet the EGL project naming conventions.

User response: Edit the Stage 1 migration preferences file and modify your project renaming rules so that they result in valid EGL project names. When you modify the renaming rules, be sure to consider the effect of any renaming rules that specify a Mapping Context of *both*. Also consider the effect of any renaming rules that specify a String Context of *any*, *back* or *token*.

HPT.EGL.0018.e Derived EGL package name *eglPackageName* **cannot begin with a digit or end with a period (.). Modify the renaming rules.**

Explanation: Using the renaming rules that you specified, the migration tool has created a proposed EGL package name that ends in a period or begins with a digit. This name does not meet the EGL package naming conventions.

User response: Edit the Stage 1 migration preferences file and modify your package renaming rules so that they result in valid EGL package names. When you modify the renaming rules, be sure to consider the effect of any renaming rules that specify a Mapping Context of *both*.

HPT.EGL.0019.i The Migration Feature *featureName versionName* **is loaded.**

Explanation: This informational message provides the migration feature name and version that is currently loaded into your Java workspace or Smalltalk image. For VAGen on Java, the message is repeated to provide information about the VAGen Utilities feature. For both

VAGen on Java and VAGen on Smalltalk, the message is repeated to provide the version of the reserved word list that is loaded

User response: None.

HPT.EGL.0020.i The Migration Feature *featureName versionName* **is not loaded.** *listOfNames* **are not loaded.**

Explanation: This informational message provides the migration feature name and version that should be added to your Java workspace or loaded into your Smalltalk image. However, one or more Java packages or Smalltalk applications are not at the version expected for the migration feature. The *listOfNames* provides the list of Java packages or Smalltalk applications that are currently loaded but which are not at the expected version.

User response: If you have not modified the Stage 1 migration tool, try adding the migration feature again for Java or loading the migration feature again for Smalltalk. If you have modified the Stage 1 migration tool, then this message serves as a reminder of the Java packages or Smalltalk applications that you have modified.

HPT.EGL.0021.e The Externalized EGL Reserved Word List cannot be loaded. Verify *fileName***.**

Explanation: The specified *fileName* cannot be found. The *fileName* is the full path name of the file. The file should have the correct name and location if you installed the Stage 1 migration tool as described in Chapter 4, "Stage 1 — Extracting from Java," on page 115 or Chapter 5, "Stage 1 — Extracting from Smalltalk," on page 135.

User response: Verify that the EGL Reserved Word file is located in the correct path and has the correct file name. If not, check your installation steps for the Stage 1 migration tool.

HPT.EGL.0022.e Part *partName* **has invalid External Source Format.**

Explanation: The Stage 1 migration tool has made 3 attempts to extract the External Source Format from the repository. However, the opening tag and ending tag for the part are not a valid pair (for example, :record and :erecord). The Stage 1 migration tool continues processing. However, the migration database does not contain correct External Source Format for the specified *partName*.

User response: Try looking at the External Source Format in the repository to see if there are any obvious errors in the part. If you are using a remote repository, try copying it to a local drive and running the Stage 1 migration tool again. If you are unable to resolve the problem, contact IBM support.

HPT.EGL.0023.e Part *partName* **has invalid External Source Format due to duplicate parts.**

Explanation: One or more parts of the same part type have the same part name. The migration tool cannot determine which External Source Format to store in the migration database.

User response: Modify your migration set so that there are no duplicate part names in the migration set.

HPT.EGL.0024.e Derived map group name *mapGroupName* **is the same as the name of another part.**

Explanation: VisualAge Generator only requires a map group part if there is a floating area specification. EGL always requires a form group part. The Stage 1 migration tool attempted to create a map group part using the map group portion of the map names. However, the map group name is the same as one of the other parts in the migration set. The Stage 1 migration tool ends the processing without modifying the migration database.

User response: Change the names of the maps so that the map group portion of the name does not conflict with any of the other parts in the migration set. Also change any programs that use the map group to specify the new map group name. Run Stage 1 again.

Stage 1 on VisualAge for Java

The following messages occur only in the VisualAge for Java version of the VisualAge Generator to EGL migration tool.

HPT.EGL.0101.e Current package name *vagenPackageName* **- results in EGL package name** *eglPackageName*, **which starts with # or @ or uses reserved word(s)** *reservedWordList*. **It must be renamed.**

Explanation: EGL reserved words cannot be used as any word in the dot notation for EGL package names.

User response: Use the Stage 1 renaming rules to create an EGL package name that does not violate the EGL naming restrictions. Refer to Appendix Appendix A, "Reserved words," on page 221 that lists the EGL reserved words. Be sure that the resulting EGL package name does not start with the # or @ symbol.

HPT.EGL.0102.e Migration Set *migrationSetName* **-** *migrationSetVersion* **references version** *projectVersion1* **and** *projectVersion2* **of project** *projectName***. The migration set was not created.**

Explanation: The migration tool expanded the high-level PLP project for the specified migration set version. The expanded high-level PLP project contains multiple versions of the same project name. Migration cannot continue.

User response: If you are using PLP projects, modify the high-level PLP project and any lower-level PLP projects that it references so that only one version of each project is included in the PLP chain. If you created the migration plan file by hand, modify the migration plan file so that only one version of each project is specified for the migration set.

HPT.EGL.0103.e An error occurred while loading the database driver. driver: *driverName***. Please check to ensure that the db2java.zip file is in the classpath.**

Explanation: The database driver that is specified in the Stage 1 preferences file could not be found.

User response: Modify the Stage 1 preferences file to point to the correct driver name and location.

HPT.EGL.0104.e An error occurred while connecting to the database. database: *databaseName***.**

Explanation: The Stage 1 migration tool was not able to connect to the migration database.

User response: Make sure that the specified database has been created. Also review your user ID and password settings in the Stage 1 preferences file to ensure that they are correct.

HPT.EGL.0105.e Error occurred when closing the database connection.

Explanation: The Stage 1 migration tool was not able to close the connection to the migration database.

User response: The Stage 1 migration tool does any commits before it tries to close the database connection. You should be able to shut down VisualAge Generator to force the connection to close.

HPT.EGL.0106.e Error accessing repository in method *methodName***.**

Explanation: The specified method for the Stage 1 migration tool was not able to access the repository.

User response: Verify that your repository is accessible and that there are no network problems if you are using a remote repository. Then try migrating again.

HPT.EGL.0107.e Error occurred while writing out XML file *fileName***.**

Explanation: The Stage1 migration tool was not able to write the specified file name.

User response: Verify that there is sufficient space available for the file. Then try migrating again.

HPT.EGL.0108.w *partType* **part was excluded from migration due to invalid whitespace in the name** *partName***. The part is in package** *packageName*, *versionName***.**

Explanation: In VisualAge Generator, it is possible to create a part that contains blanks at the end of the part name. Frequently when this occurs, there are 2 parts with the same name, except that one part has blanks at the end of its name. These are not duplicate parts because the names differ slightly. However, the part name in the External Source Format file is identical, even though the rest of the source code for the parts might differ. The Stage 1 migration tool omits any part name that contains blanks from the migration set. This is because the part name that ends with blanks cannot be referenced by any other VAGen part. In the case where there is no similarly named part, this technique ensures that a part that cannot be referenced by other parts is not migrated. In the case where there is a similarly named part, this technique ensures that the Stage 2 migration tool converts the correct part definition to EGL.

User response: None. However, you might want to review the part in VisualAge Generator to determine if there were similarly named parts. Use the VAGen Parts Browser, and search all parts in the migration set for *partName**.

HPT.EGL.0109.e An unexpected exception occurred: *javaExceptionStackTrace*

Explanation: An unexpected error occurred during the Stage 1 migration tool.

User response: Review the *javaExceptionStackTrace*. Depending on the error it might be something you can ignore or correct. For example:

- You can ignore a message that indicates a character that could not be converted was replaced by a substitute character. This message occurs if an invalid character occurs in the External Source Format. The character is replaced by a blank in the migration database. The Stage 1 migration tool continues processing. You can use your migration database for Stage 2 and 3.
- You can correct the problem if the message indicates that an SQL column is too short to contain the EGL file name. In this case, the Stage 1 migration tool stops processing because the information in the migration database is invalid. You can correct the problem by modifying the SQL table definition to

increase the length of the column and then running Stage 1 again. However, before you increase the length of the SQL column, consider whether you will want to scroll these long names after migration and whether a longer name might exceed the EGL limits. After you have modified your renaming rules or the SQL column, run Stage 1 migration again.

If you are not able to resolve the problem, contact IBM support for assistance.

HPT.EGL.0110.e Project *projectName* **version** *versionName* **is not defined in the repository.**

Explanation: The Stage 1 migration tool expanded the high-level PLP for the migration set, including the chain of PLP projects. The specified project version is referenced in the PLP chain, but is not available in the repository.

User response: Determine whether the project and version should be included in the migration set. If so, check to see whether the requested version of the project has been purged from the repository. If so, restore the project version and then migrate again. If you are not able to resolve the problem, contact IBM support for assistance.

HPT.EGL.0111.e Original VAGen project name *projectName* **- results in a derived empty EGL project name. Modify the renaming rules.**

Explanation: Using the renaming rules that you specified, the migration tool has created a proposed EGL project name that does not contain any characters.

User response: Edit the Stage 1 migration preferences file and modify your project renaming rules so that they result in valid EGL project names. When you modify the renaming rules, be sure to consider the effect of any renaming rules that specify a Mapping Context of *both*.

HPT.EGL.0112.e Original VAGen package name *packageName* **- results in a derived empty EGL package name. Modify the renaming rules.**

Explanation: Using the renaming rules that you specified, the migration tool has created a proposed EGL package name that does not contain any characters.

User response: Edit the Stage 1 migration preferences file and modify your package renaming rules so that they result in valid EGL package names. When you modify the renaming rules, be sure to consider the effect of any renaming rules that specify a Mapping Context of *both*.

HPT.EGL.0113.e Migration Set *migrationSetName - migrationSetVersion* **contains** *number* **duplicate parts. Duplicates are not permitted.**

Explanation: The Stage 1 migration tool requires unique part names so that it can associate the correct source code with the part edition. The specified migration set contains duplicate part names. *Number* specifies the number of pairs of duplicate part names. Message HPT.EGL.0115.e provides the part names and the package names in which the parts occur. There is one message for each pair of part names.

User response: The project versions from the migration set are still in the workspace. From the VAGen Parts Browser, select **Tools > Show Duplicate Parts** to determine which parts have duplicate names. Correct the problem, version the projects, update your migration set definition, and then run the Stage 1 tool again.

HPT.EGL.0114.e Package *packageName* **version** *packageVersionName* **in project** *projectName* **version** *projectVersionName* **is not defined in the repository.**

Explanation: The Stage 1 migration tool expanded the high-level PLP for the migration set, including the chain of PLP projects. The specified package version is referenced by the specified project version in the PLP chain, but is not available in the repository. The *packageVersionName* might be in the format: Missing - (*versionDateTimeStamp*).

User response: Determine whether the package version should be included in the project. If so, check to see whether the requested version of the package has been purged from the repository. If so, restore the package version and then migrate again. If you are not able to resolve the problem, contact IBM support for assistance.

HPT.EGL.0115.e Duplicate part *partName* **was found in** *packageName1* **with type** *partType1* **and in** *packageName2* **with type** *partType2***.**

Explanation: The Stage 1 migration tool requires unique part names so that it can associate the correct source code with the part edition. The specified part name occurs in one or more packages, possibly with different part types. Message HPT.EGL.0115.e is repeated for each pair of part names.

User response: The project versions from the migration set are still in the workspace. From the VAGen Parts Browser, select **Tools > Show Duplicate Parts** to determine which parts have duplicate names. Correct the problem, version the projects, update your migration set definition, and then run the Stage 1 tool again.

Stage 1 on VisualAge Smalltalk

The following messages occur only in the VisualAge Smalltalk version of the VisualAge Generator to EGL migration tool.

HPT.EGL.0201.e Current application name *vagenApplicationName* **- results in EGL package name** *eglPackageName*, **which starts with # or @ or uses reserved word(s)** *reservedWordList*. **It must be renamed.**

Explanation: EGL reserved words cannot be used as any word in the dot notation for EGL package names.

User response: Use the Stage 1 renaming rules to create an EGL package name that does not violate the EGL naming restrictions. Refer to Appendix Appendix A, "Reserved words," on page 221 that lists the EGL reserved words. Be sure that the resulting EGL package name does not start with the # or @ symbol.

HPT.EGL.0202.e Migration set *migrationSetName* **references Configuration map** *configurationMapName*, **which is not defined in the repository.**

Explanation: The Stage 1 migration tool expanded the high-level configuration map for the specified migration set. However, when the tool expanded the high-level configuration map and the chain of required maps and applications, one or more required maps was not available in the library.

User response: Determine whether the required map should be included in the migration set. If so, check to see whether the requested version of the configuration map has been purged from the library. If so, salvage the requested configuration map and then migrate again.

HPT.EGL.0203.e *ProgramContext* **encountered a database error** *errorMessage*.

Explanation: A database error occurred. Possible problems are invalid schema name, user authority restrictions, or missing SQL tables.

User response: Correct the migration preferences file. If the problem persists, contact IBM support for assistance.

HPT.EGL.0204.e An error occurred while connecting to the database. *ErrorMessage*.

Explanation: A database error occurred on connect. Possible problems are invalid userid or password name or invalid database name.

User response: Correct the migration preferences file. If the problem persists, contact IBM support for assistance.

HPT.EGL.0205.i Migration produced *n* **migration sets from the** *v* **versions of configuration map** *configMapName*. **The preference file specified the version depth as** *d*.

Explanation: The Stage 1 migration preferences file specified that you wanted to migrate the number of versions specified by *d*. The Stage 1 migration tool should have produced *d* migration sets -- one for each version of the specified configuration map. However, the migration tool only created the number of migration sets specified by *n*. The number specified by *v* is the number of versions of the specified configuration map that the migration tool found in the library. If *v* is less than *d*, this means that there were not as many versions of the configuration map as you anticipated. In this case, *n* and *v* should be equal, indicating that all the configuration map versions resulted in migration sets. If *v* is greater than *d*, this means that there are more versions of the configuration map in the library. In this case, *n* and *d* should be equal, indicating that your version depth preference was met.

User response: None.

HPT.EGL.0206.e Migration set *migrationSetName* **encountered a load error.**

Explanation: The migration set could not be loaded into your image. This could occur because there are duplicate part names in the migration set.

User response: Review the **System Transcript** to determine the cause of the error. Correct the problem and then run Stage 1 migration again.

HPT.EGL.0207.w *partType* **part was excluded from migration due to invalid whitespace in the name** *partName*. **The part is in application** *applicationName*, *versionName*.

Explanation: In VisualAge Generator, it is possible to create a part that contains blanks at the end of the part name. Frequently when this occurs, there are 2 parts with the same name, except that one part has blanks at the end of its name. These are not duplicate parts because the names differ slightly. However, the part name in the External Source Format file is identical, even though the rest of the source code for the parts might differ. The Stage 1 migration tool omits any part name that contains blanks from the migration set. This is because the part name that ends with blanks cannot be referenced by any other VAGen part. In the case where there is no similarly named part, this technique ensures that a part that cannot be referenced by other parts is not migrated. In the case where there is a

similarly named part, this technique ensures that the Stage 2 migration tool converts the correct part definition to EGL.

User response: None. However, you might want to review the part in VisualAge Generator to determine if there were similarly named parts. Use the VAGen Parts Browser, and search all parts in the migration set for *partName**.

HPT.EGL.0208.e Database column *schemaName.tableName.columnName* has truncated data.

Explanation: One or more of your renaming rules resulted in an EGL project, package, or version name that is longer than fits in the corresponding SQL columns.

User response: Modify your renaming rules so that they result in shorter EGL project, package, or version names. Alternatively, you can modify the DB2 table to increase the length of the SQL column. However, before you increase the length of the SQL column, consider whether you will want to scroll these long names after migration and whether a longer name might exceed the EGL limits. After you have modified your renaming rules or the SQL column, run Stage 1 migration again.

HPT.EGL.0211.e Original VAGen configuration map name *configurationMapName* - results in a derived empty EGL project name. Modify the renaming rules.

Explanation: Using the renaming rules that you specified, the migration tool has created a proposed EGL project name that does not contain any characters.

User response: Edit the Stage 1 migration preferences file and modify your configuration map renaming rules so that they result in valid EGL project names. When you modify the renaming rules, be sure to consider the effect of any renaming rules that specify a Mapping Context of *both*.

HPT.EGL.0212.e Original VAGen application name *applicationName* - results in a derived empty EGL package name. Modify the renaming rules.

Explanation: Using the renaming rules that you specified, the migration tool has created a proposed EGL package name that does not contain any characters.

User response: Edit the Stage 1 migration preferences file and modify your application renaming rules so that they result in valid EGL project names. When you modify the renaming rules, be sure to consider the effect of any renaming rules that specify a Mapping Context of *both*.

Messages from the VisualAge Generator to EGL migration tool— Stage 2

The message inserts are always the VAGen part name, before any required renaming for EGL reserved words.

IWN.MIG.0001.e Exception parsing External Source Format file *fileName* - invalid External Source Format header.

Explanation: The migration tool only processes External Source Format that is exported from VisualAge Generator 4.5. The first line of the specified External Source Format file does not have the proper header for a VisualAge Generator 4.5 External Source Format file.

User response: Import the External Source Format file into VisualAge Generator 4.5. This converts your current parts to VisualAge Generator 4.5 format. Then export the parts using VisualAge Generator 4.5 and run migration again.

IWN.MIG.0002.e Exception parsing External Source Format file *fileName*, *partType*, *partName* - *exceptionText*

Explanation: A problem occurred parsing the External Source Format syntax from VisualAge Generator. Possible causes of this problem are:

- Mismatched quote marks, including the following: currency field for a data item
- Mismatched comment delimiters in a control part.
- National language characters that are not valid for your locale. For example, attempting to migrate VAGen source code that uses double-byte characters such as Chinese on a workstation that is not set for a double-byte locale.

User response: Correct the part in VisualAge Generator and export the External Source Format again. Then run the Stage 2 migration tool to process the file. If you are unable to correct the part in VisualAge Generator, contact IBM support for assistance. Be prepared to provide the External Source Format source for the file.

IWN.MIG.0003.e Exception converting to EGL for file *fileName*, *partType*, *partName* **-** *exceptionText*

Explanation: A problem occurred during the creation of the EGL source. The *exceptionText* identifies the specific problem that occurred.

User response: Contact IBM support for assistance. Be prepared to provide the External Source Format source for the file.

IWN.MIG.0004.e Output file *fileName1* **and UI record have the same name - UI record placed in file** *fileName2***.**

Explanation: During single file migration, *fileName1* is the specified output file. The external source format file contains a UI record that has the same name as the specified output file. The file also contains some other parts. The migration tool placed the other parts in the specified output file before it processed the UI record. The tool then placed the UI record into an EGL file named *fileName2*. There will be an error in the Problems view.

User response: Give *fileName1* a different name. Give *fileName2* the same name as that of the VGUI record.

IWN.MIG.0047.i Migration set *Name_version* **— migration started.**

Explanation: This is an informational message to indicate status from the migration tool.

User response: None.

IWN.MIG.0048.i Migration set *Name_version* **- migration completed.**

Explanation: This is an informational message to indicate status from the migration tool.

User response: None.

IWN.MIG.0049.i *partType partName* **for EGL** *projectName*, *packageName*, *fileName* **- Migration started**

Explanation: This is an informational message to indicate status from the migration tool. The *partType* is one of the following: Program, Map Group, or Table. The associates for the specified *partName* will be migrated at the same time. The associates might be in the same file as the *partName* or in different projects, packages, or files based on information in the migration database. When migration of a program starts, each associated map group is migrated, followed by each associated table. Finally, any remaining associates (records, shared items, and functions) are migrated.

User response: None.

IWN.MIG.0050.i Program *programName* **- Migration of other associates started**

Explanation: This is an informational message to indicate status from the migration tool. When migration of a program starts, each associated map group is migrated, followed by each associated table. Finally, any remaining associates (records, shared items, and functions) are migrated. Message IWN.MIG.0050.i is issued when the migration of the remaining associates for the program starts.

User response: None.

IWN.MIG.0051.e Exception parsing migration set *planName*, *partType*, *partName* **- invalid External Source Format header.**

Explanation: The migration tool only processes External Source Format that is exported from VisualAge Generator 4.5. The first line of the External Source Format for the specified part does not have the proper header for a VisualAge Generator 4.5 External Source Format file. This might occur if you modified the sample Stage 1 migration tool or if you wrote your own Stage 1 migration tool to load the migration database.

User response: Import the External Source Format file into VisualAge Generator 4.5. This converts your current parts to VisualAge Generator 4.5 format. Then use the Stage 1 migration tool to export the migration set.

IWN.MIG.0052.e Exception parsing migration set *planName*, *partType*, *partName* **-** *exceptionText***.**

Explanation: A problem occurred parsing the External Source Format syntax from VisualAge Generator. Possible causes of this problem are:

- Mismatched quote marks, including the following:
  - currency field for a data item
- Mismatched comment delimiters in a control part.
- National language characters that are not valid for your locale. For example, attempting to migrate VAGen source code that uses double-byte characters such as Chinese on a workstation that is not set for a double-byte locale.

User response: Correct the part in VisualAge Generator and run Stage 1 migration again to correct the database. Then run the Stage 2 migration tool again to process the updated parts. If you are unable to correct the part in VisualAge Generator, contact IBM support for assistance. Be prepared to provide a small repository (.dat file) containing the parts that have problems.

IWN.MIG.0053.e Exception converting to EGL for migration set *planName*, *partType*, *partName* - *exceptionText*.

Explanation: A problem occurred during the creation of the EGL source. The *exceptionText* identifies the specific problem that occurred.

User response: Contact IBM support for assistance. Be prepared to provide the External Source Format source for the part.

IWN.MIG.0054.e Invalid External Source Format for migration set *migrationSetName*, *partType*, *partName*.

Explanation: The External Source Format stored for the specified part is not valid. The migration tool continues processing other parts in the specified migration set. For the purposes of migrating with associated parts, the migration tool considers the specified part to be unavailable. The migration tool stores intentionally invalid EGL in the migration database for the specified part. The EGL that is stored is EZE_UNKNOWN_PARTTYPE *partName*; This ensures that there will be an error in the Problems view.

User response: Review the specified part in VisualAge Generator. Try exporting External Source Format for the part and migrating the part in single file mode. If you are unable to resolve the problem, contact IBM support for assistance. Be prepared to provide a small repository (.dat file) or External Source File containing the parts that have problems.

IWN.MIG.0055.e Migration halted - error limit exceeded.

Explanation: The error threshold has been exceeded for parts with invalid External Source Format. The migration tool stops processing.

User response: Review all occurrences of message IWN.MIG.0054.e. If you created your own tool to load the migration database, there might be a problem with the way the tool is loading External Source Format code into the migration database. See Appendix G, "Migration Database," on page 413 for some queries that might be useful in determining what is causing the problem.

IWN.MIG.0060.e An error occurred while loading the database driver. driver: *driverName*

Explanation: The specified database driver cannot be located.

User response: Correct the database driver name. Also confirm that your database driver location is correct.

IWN.MIG.0061.e An error occurred while connecting to the database. database: *databaseName.errorText*

Explanation: The migration tool cannot connect to the specified database using the specified schema name. The *errorText* field provides additional details of why the connection failed.

User response: Correct the database name. If you are connecting to a remote database, be sure that you have cataloged the database locally.

IWN.MIG.0063.e Error occurred when closing the database connection.

Explanation: Migration completed successfully, but the migration tool was not able to close the database connection.

User response: Shut down the EGL development environment before attempting to backup your database.

IWN.MIG.0070.e The user exit method *renameUserExitName* **[***partName***] does not exist.**

Explanation: The JAR file that you specified for your Rename user exit or the package and class within the JAR file could not be found.

User response: Check the JAR file location, Package name, and Class name that you specified for your Rename user exit in the VAGen Migration Preferences.

IWN.MIG.0071.e The user exit method *renameUserExitName* **[***partName***] does not have the required method signature.**

Explanation: The Rename user exit requires that you include a method with the signature *renameUserExit(String s, Connection c)*. This method did not exist in the JAR file, package, and class that you specified for your Rename user exit in the VAGen Migration Preferences.

User response: Review your class definition and ensure that you included the required method signature. Also ensure that you specified the correct the JAR file location, Package name, and Class name for your Rename user exit in the VAGen Migration Preferences.

IWN.MIG.0072.e The user exit method *renameUserExitName* **[***partName***] enforces Java language access control and the underlying method is inaccessible.**

Explanation: The migration application does not have access to the definition of the specified user exit class.

User response: Verify that Rename user exit class is

defined as public and it is in the specified package.

IWN.MIG.0073.e The user exit method *renameUserExitName* [*partName*] abruptly terminated by throwing an exception.

Explanation: The method *renameUserExit(String s, Connection c)* returned a null value. Migration continues. The migration tool uses the original VAGen part name.

User response: Use a try ... catch block around the code in your Rename user exit. If there is an exception, return the original VAGen part name to avoid getting this message.

IWN.MIG.0080.i VAGen Migration Preferences file pref_store.ini not found; defaults assumed.

Explanation: There is no VAGen migration preferences file. The migration tool uses the default values for the preferences (for example, the renaming suffix and help map suffix). This might be because you specified a new workspace during migration so that preferences do not exist. The preferences file is located in

```
workspace-directory\.metadata\.plugins
  \org.eclipse.core.runtime\.settings
  \com.ibm.etools.egl.vagenmigration.prefs
```

User response: See "VAGen Migration Preferences" on page 157 for information about the default values for the migration preferences.

IWN.MIG.0081.i File *fileName* - migration completed.

Explanation: The migration tool has completed processing for the specified file.

User response: Review the log messages to see the results of the migration.

IWN.MIG.0082.e File *fileName* - required parameters are not specified.

Explanation: One or more required parameters have not been specified. The *-importFile* parameter is always required. If the *-importFile* parameter specifies an External Source Format file, then the *-eglFile* and *-package* parameters are also required.

User response: Review the batch command file to determine which parameters were not specified. Add the parameters and then run the batch command file again.

IWN.MIG.0083.e File *fileName* - parameter *parmName* has not been assigned a value.

Explanation: *parmName* is one of the following: -importFile, -eglFile, -package.

User response: Correct the batch command file and then run it again.

IWN.MIG.0084.e File *fileName* - parameter *parmName*, value *value* is not valid.

Explanation: *parmName* is one of the following: -importFile, -eglFile, -package. The parameter names are case sensitive.

User response: Correct the batch command file and then run it again.

IWN.MIG.0085.e File *fileName* - invalid parameters are passed in the parameter list.

Explanation: There is a problem with the batch command file. One or more of the parameters is entered incorrectly. The only valid parameters are: -importFile, -eglFile, -package, and -overwrite.

User response: Correct the batch command file and then run it again.

IWN.MIG.0095.e Function *functionName* - EZESCRPT is not supported for migration.

Explanation: The specified function contains statements that use the EZESCRPT special function word. EZESCRPT is not currently supported by the VAGen migration tool. The migration tool migrates the function, but comments out the statement that uses EZESCRPT.

User response: Review the EGL function. You will not be able to generate or run programs that use this function in this release.

IWN.MIG.0101.e Data item *dataItemName* - Unable to determine edit routine type for *editRoutineName*; function assumed.

Explanation: VisualAge Generator supports EZEC10, EZEC11, a function or a table as the map edit routine for a data item. EGL supports both a *validatorFunction* and a *validatorDataTable* property for a dataItem. The migration tool converts the map edit routine as follows:

- EZEC10 and EZEC11 migrate to the *validatorFunction* property.
- If the part specified by *editRoutineName* is available during migration and is a function, the *editRoutineName* migrates to the *validatorFunction* property. The migration tool also migrates the edit routine to the *validatorFunction* property if the *editRoutineName* is longer than 7 characters because table names are limited to 7 characters in VisualAge Generator.
- If the part specified by *editRoutineName* is available and is a table, the *editRoutineName* migrates to the *validatorDataTable* property. The migration tool also migrates the edit routine to the *validatorDataTable*

property if an edit message is specified for the item because VisualAge Generator only uses the edit message in conjunction with EZEC10, EZEC11, or a table.

- If the part specified by the *editRoutineName* is not available during migration and the *editRoutineName* is 7 or fewer characters and an edit message is not specified, the migration tool assumes that *editRoutineName* is a function and migrates to the *validatorFunction* property. Message IWN.MIG.0101.e is only issued in this situation.

User response: If the specified edit routine is not a function, modify the EGL dataItem definition and change the *validatorFunction* property to the *validatorDataTable* property. For additional considerations, see the information on edit routines in "Map edit routine for shared data items" on page 64.

IWN.MIG.0102.w Part *partName* **uses shared data item** *dataItemName* **- Unable to migrate to a primitive definition; using a type definition**

Explanation: You selected the preference that migrates VAGen shared data items to EGL primitive definitions whenever a shared data item is used in a record, table, called parameter list, function parameter list, or function local storage. The item specified by *dataItemName* is used in the part specified by *partName*. However, the data item definition is not available during migration. The migration tool uses the data item name as a type definition so that the migrated code will be valid.

User response: No action is required if you want to use the type definition. If you want to use a primitive definition, modify the specified part to use the correct item characteristics. Alternatively, include the shared data item in your migration set (or the External Source Format file if you are migrating in single file mode) and migrate again.

IWN.MIG.0103.w Data item *dataItemName* **-- preferences caused evensql=y to be ignored.**

Explanation: The specified data item part is a VAGen PACK (EGL decimal) item with evensql=y. Your VAGen Migration Preferences specified that evensql=y is not to be honored. Based on your preferences, the migration tool converted the PACK item to the next higher odd precision, with a maximum length of 18. The difference in the EGL precision is as follows:

- If evensql=n is specified for an item, the EGL precision is always calculated as (VAGen bytes * 2) - 1 with a maximum value of 18.
- If evensql=y is specified for an item, the EGL precision is calculated based on the preference:
  - If the preference is selected (do not honor evensql=y), the EGL precision is calculated as: (VAGen bytes * 2) - 1 with a maximum value of 18. Message IWN.MIG.0103.w is only issued in this situation.
  - If the preference is not selected (honor evensql=y), the EGL precision is calculated as (VAGen bytes * 2) - 2 with a maximum value of 18. Message IWN.MIG.0103.w is not issued.

User response: None. However, you might want to review the use of this item in any SQL WHERE clauses or EGL prepare statement. There might be an impact on performance if the definition of this item does not exactly match the SQL table definition. For details, see information about EVENSQL in "Eliminating the use of VisualAge Generator Compatibility mode" on page 201 and "PACK data items with even length" on page 61.

IWN.MIG.0201.i Record *recordName* **contains level 77 items; creating additional record named** *level77RecordName***.**

Explanation: VisualAge Generator supports level 77 items in working storage records. EGL does not support level 77 items. EGL does permit the definition of independent data items. The migration tool splits working storage records that contain level 77 items into 2 separate basicRecords -- one containing the non-level 77 items and one containing the level 77 items. If the working storage record contains only level 77 items, then the migration tool only creates the level 77 basicRecord. If a program specifies a primary working storage record that contains level 77 items, the migration tool includes declarations for both the original basicRecord and the level 77 basicRecord in the program definition.

User response: None. For additional considerations, including the effect if *recordName* is not available during the migration of programs and statements, see the information on level 77 items in records in "Level 77 items in records" on page 67.

IWN.MIG.0202.i Record *recordName* **redefines** *redefinedRecordName***.**

Explanation: *recordName* is a VAGen Redefined record that specifies *redefinedRecordName* as the record being redefined. *recordName* provides a different item layout for the same physical storage that is used by the *redefinedRecordName*. EGL does not retain redefinition information in the record parts. That information is kept only in the programs. The migration tool includes a comment in *recordName* to provide the original VAGen *redefinedRecordName* information. When migrating programs, if *recordName* is available and results in an overlay definition in VisualAge Generator, the migration tool includes the *redefines* property for the *recordName* declaration.

User response: None. For additional considerations, including the effect if *recordName* is not available during migration of a program, see the information on

redefined records in "Redefined records" on page 66.

IWN.MIG.0203.e Record *recordName* **— Does not contain any items.**

Explanation: VisualAge Generator permits you to save a record part that does not contain any items. However, the record cannot be used in any programs because it is invalid. EGL does not permit record parts that do not contain any items. The migration tool migrates the record.

User response: Determine whether you still need to have the record. If so, edit the record and add one or more data items. If not, delete the record.

IWN.MIG.0204.e Record *recordName* **- alternate specification record** *altspecRecord* **is not available; SQL table names cannot be determined.**

Explanation: The record *recordName* specifies an alternate specification record named *altspecRecord*, which provides the item structure for *recordName*. In VisualAge Generator, for SQL records, the alternate specification record also provides the SQL table names. In EGL, the alternate specification record only provides the structure by using the *embed* statement. The table names must be specified in each SQL record part definition. When migrating *recordName*, the record specified as the alternate specification record is not available during migration. The migration tool cannot determine the correct table names and sets the *tableNames* property to ###TABLES_NOT_FOUND###. The definition for *recordName* is invalid.

User response: Edit *recordName* and copy in the *tableNames* and/or *tableNameVariables* properties from the VAGen alternate specification record (*altspecRecord*). The *tableNames* property provides the actual SQL table names. The *tableNameVariables* property provides table name host variables. Both the tableNames and the tableNameVariables properties can be used if the *recordName* references a mixture of actual SQL table names and SQL table name host variables. For additional considerations, see the information in "Alternate specification records" on page 68.

IWN.MIG.0205.e Record *recordName* **- alternate specification record** *altspecRecord* **is not available; SQL key items cannot be determined.**

Explanation: The record *recordName* specifies an alternate specification record named *altspecRecord*, which provides the item structure for *recordName*. When VisualAge Generator determines the default selection condition for an SQL record, VisualAge Generator merges any items that specify key=yes in the alternate specification record with the key item, if any, specified in *recordName*. The keys are merged based on the order in which the items are listed in the record structure. In EGL, the alternate specification record only provides the structure by using the *embed* statement. All key items must be specified in each SQL record part definition. When migrating *recordName*, the record specified as the alternate specification record is not available during migration. The migration tool cannot determine the correct key items and sets the *keyItems* property to ###KEYS_NOT_FOUND###, followed by the key item, if any, from *recordName*. The definition for *recordName* is invalid.

User response: Edit *recordName* and change the *keyItems* property to replace ###KEYS_NOT_FOUND### with the list of item names that specified key=yes in the VAGen alternate specification record (*altspecRecord*). Be sure to merge the key items from the alternate specification record with the key item specified in the VAGen definition for *recordName* so that the *keyItems* property lists the items in the same order they appear in the record structure. If an item is specified as key=yes in the alternate specification record and as the key item in *recordName*, only include the item once in the merged list of *keyItems* in *recordName*. For additional considerations, see the information on "Alternate specification records" on page 68.

IWN.MIG.0206.i SQL Record *recordName* **— Contains a key item** *keyItem* **without specifying an alternate specification record.**

Explanation: VisualAge Generator permits you to save an SQL record that specifies a key item even if you do not specify an alternate specification record. However, in this situation, VisualAge Generator ignores the key item during test and generation. The key item only has meaning when there is also an alternate specification record.

User response: None. The key item was ignored in VisualAge Generator. The migration tool eliminates it during migration.

IWN.MIG.0207.i Record *recordName* **- Specifies alternate specification record** *altspecRecord* **with only level 77 items; embed statement omitted.**

Explanation: The record specified by *altspecRecord* is a working storage record that only contains level 77 items. When *recordName* specifies a working storage record as the alternate specification, VisualAge Generator uses only the structure (the non-level 77 items) from *altspecRecord*. The migration tool omits the embed statement because there are no items in the structure of *altspecRecord*.

User response: None. However, you might want to delete *recordName* because it is an empty record. Be sure to delete all references to *recordName* in your programs.

IWN.MIG.0208.e Record *recordName* **- alternate specification record** *altspecRecord* **is not available; cannot determine SQL column name for !itemColumnName variables.**

Explanation: The record *recordName* specifies an alternate specification record named *altspecRecord*, which provides the item structure for *recordName*. When VisualAge Generator determines the default selection condition for an SQL record, VisualAge Generator converts any !itemColumnName variables to the corresponding SQL column name. In EGL, !itemColumnName variables are not supported. The SQL columns must be explicitly named in the default selection condition for each SQL record part definition. When migrating *recordName*, the record specified as the alternate specification record is not available during migration. The migration tool cannot determine the correct SQL column name that corresponds to one or more !itemColumnName variables in the default selection condition. The migration tool uses !itemColumnName in the EGL default selection condition. The definition for *recordName* is invalid.

User response: Edit *recordName* and change the *defaultSelectCondition* property to replace the !itemColumnName variables with the corresponding SQL column names from the VAGen alternate specification record (*altspecRecord*). For additional considerations, see the information on !itemColumnName variables in "Alternate specification records" on page 68.

IWN.MIG.0209.e Record *recordName* **- alternate specification record** *altspecRecord* **has no items; embed statement omitted.**

Explanation: The record *recordName* specifies an alternate specification record named *altspecRecord*, which provides the item structure for *recordName*. However, the alternate specification record does not have any data items. The migration tool omits the embed statement from the definition for *recordName*.

User response: None. However, you should review *recordName* and *altspecRecord* to determine whether you need to include data items or whether the two records can be deleted. Be sure to delete all references to these records in your programs.

IWN.MIG.0210.e Record *recordName* **- Unable to determine column names for !itemColumnName variables.**

Explanation: The default select condition for the specified record uses one or more VAGen !itemColumnName variables. A VAGen !itemColumnName variable specifies the name of an item in the SQL record definition which corresponds to the actual SQL column name. VisualAge Generator determines the actual SQL column names for any !itemColumnName variables from the SQL record at test and generation time. EGL does not support !itemColumnName variables. Instead, EGL requires that the actual SQL column names be used in any modified SQL statement. Message IWN.MIG.0210.e is issued when the record specified by *recordName* is invalid in VisualAge Generator. In this case, the record uses one or more !itemColumnName variables that are not defined within the record or its alternate specification record. The migration tool is unable to substitute the actual SQL column name.

User response: Edit the record and change the !itemColumnName variables to the correct SQL column names.

IWN.MIG.0211.w Record *recordName*, **data item** *dataItemName* **- preferences caused evensql=y to be ignored.**

Explanation: The specified record contains the specified nonshared data item. The record definition specifies that this nonshared data item is a VAGen PACK (EGL decimal) item with evensql=y. Your VAGen Migration Preferences specified that evensql=y is not to be honored. Based on your preferences, the migration tool converted the PACK item to the next higher odd precision, with a maximum length of 18. The difference in the EGL precision is as follows:

- If evensql=n is specified for an item, the EGL precision is always calculated as (VAGen bytes * 2) - 1 with a maximum value of 18.
- If evensql=y is specified for an item, the EGL precision is calculated based on the preference:
  - If the preference is selected (do not honor evensql=y), the EGL precision is calculated as: (VAGen bytes * 2) - 1 with a maximum value of 18. Message IWN.MIG.0211.w is only issued in this situation.
  - If the preference is not selected (honor evensql=y), the EGL precision is calculated as (VAGen bytes * 2) - 2 with a maximum value of 18. Message IWN.MIG.0211.w is not issued.

User response: None. However, you might want to review the use of this item in any SQL WHERE clauses or EGL prepare statement. There might be an impact on performance if the definition of this item does not exactly match the SQL table definition. For details, see information about EVENSQL in "Eliminating the use of VisualAge Generator Compatibility mode" on page 201 and "PACK data items with even length" on page 61.

IWN.MIG.0212.e Record *recordName* **- alternate specification record** *altspecRecord* **is not available; cannot determine whether any item names require an override for the dliFieldName property.**

Explanation: The record *recordName* specifies an alternate specification record named *altspecRecord*, which provides the item structure for *recordName*. In

VisualAge Generator, the field names in a DL/I segment record must match the names in the DL/I PSB. In EGL, field names cannot be reserved words or start with the # or @ symbol. EGL also permits the field names in a DL/I segment record to be longer than the 8-character limitation imposed for the DL/I PSB. If the field name in a DL/I PSB does not match the EGL field name, EGL uses the *dliFieldName* property to provide the name used in the DL/I PSB for the corresponding EGL field name. Because the alternate specification record is not available, the migration tool cannot determine whether any of the field names are renamed due to the EGL naming conventions.

User response: Review the record definition for *altspecRecord* to determine if any field names in the record must be renamed due to the EGL naming conventions. If any field name was renamed, edit *recordName* and add overrides to the embed statement for each renamed field to specify its corresponding *dliFieldName* property. The value for the *dliFieldName* property must be the original VAGen field name.

For an example of how to code the embed statement with an override for a field, see Table 80 on page 243.

IWN.MIG.0251.w UI record *recordName* is a reserved word or starts with the # or @ symbol. It was renamed to *newRecordName*.

Explanation: The UI record *recordName* conflicts with an EGL reserved word or starts with the # or @ symbol. The Stage 2 migration tool renamed the UI record to *newRecordName*, based on the Renaming prefix you specified in your migration preferences. The Stage 2 tool also includes the *alias* property for the VGUI record so that the names in the EGL generated outputs are identical to those in VisualAge Generator. The Stage 3 migration tool changed the file name for the VGUI record to newRecordName.egl because EGL requires that the VGUI record name and its file name must match. If you migrate in single file mode, the migration tool makes the same changes.

User response: None.

IWN.MIG.0301.e Table name *tableName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename tables for you.

User response: You must change the name of the table and all references to it. This includes references in the following places:

- Program use declaration statements
- Logic statements in programs and functions
- Data item validatorDataTable properties
- Form field validatorDataTable properties
- VGUI record field validatorDataTable properties

If you want to keep the original table name as the name for the generated dataTable, set the *alias* property to the original dataTable name. If you do not specify the *alias* property, be sure to change any non-EGL references to the dataTable name, including CICS program definitions.

IWN.MIG.0401.e Map group (formGroup) name *mapGroupName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename map groups (formGroups) for you.

User response: You must change the name of the formGroup and all references to it, including references in program use declaration statements. If you want to keep the original map group name as the name for the generated formGroup, set the *alias* property to the original map group (formGroup) name. If you do not specify the *alias* property, be sure to change any non-EGL references to the formGroup name, including CICS program definitions.

IWN.MIG.0402.e Map group *mapGroupName* -- Multiple devices have the same depth and width, but different floating areas; devices are: *devicesList*

Explanation: VisualAge Generator permits, but does not recommend, different floating area sizes for device types that have the same device size. EGL only permits one floating area for each device size. The migration tool migrates the floating area size for each device type. If two or more VAGen devices convert to identical EGL device size and margin specifications, the migration tool only includes one entry for EGL. The formGroup definition is invalid. This message is repeated for each group of same-size device types that specified different floating area information in VisualAge Generator.

User response: Edit the formGroup and delete all except one floating area specification for each group of same-size devices.

IWN.MIG.0403.e FormGroup *formGroupName* - Requires editing to nest forms within the formGroup.

Explanation: When you migrate in single file mode, the migration tool does not nest forms within the formGroup. Instead, the migration tool inserts an EGL *use* statement to indicate the name of the forms that belong to the formGroup. The migration tool includes comments at the beginning and end of each form to indicate its formGroup.

User response: Edit the file containing the formGroup and move the forms so that they are nested within the formGroup. The *use* statements in the formGroup indicate where the forms should be moved. After you have nested the form within the formGroup, remove

the *use* declaration statement.

IWN.MIG.0404.w Map Group *mapGroupName* **- Uses device** *deviceName* **and size** *depth,width* **which is no longer supported. It must be changed.**

Explanation: VisualAge Generator permits some device types which EGL COBOL generation no longer supports for floating areas and text forms. The migration tool includes the original depth and width in the *screenSize* property within the *ScreenFloatingArea* property. However, this *screenSize* is no longer supported in EGL COBOL generation. If you generate for COBOL, there will be an error message from generation.

User response: If you plan to generate for COBOL, edit the formGroup in EGL and either remove the *ScreenFloatingArea* property for this depth and width or change the depth and width to a size that is supported. You might also need to modify the textForms within the formGroup to reposition the variables and constants to better fit the new depth and width.

IWN.MIG.0501.e Help map group *mapGroupName* **contains map** *mapName* **with variable fields —** *mapName* **conflicts with the same map name in the program's main map group.**

Explanation: VisualAge Generator permits the same map name to be used in a program's main map group and its help map group. EGL does not permit any duplicate form names in the program's two formGroups. This restriction applies even if the forms with duplicate names are not used by the program. The migration tool renames maps in a program's help map group if they conflict with maps in the program's main map group and only contain constant fields. The migration tool does not rename a map in the program's help map group if it contains variable fields, even if the name conflicts with a map name in the program's main map group. This is because the map could be used by some other program that specifies the help map group as that program's main map group.

User response: Edit the help formGroup and change the name of the form. Also be sure to change the form definition and all references to this form in all programs that use the formGroup. For additional considerations, see the information on map names in "Map names and help map names" on page 75.

IWN.MIG.0502.e Map group *mapGroupName*, **map** *mapName* **and variable field** *mapItemName* **- Unable to determine edit routine type for** *editRoutineName*; **function assumed.**

Explanation: VisualAge Generator supports EZEC10, EZEC11, a function or a table as the map edit routine for a map variable. EGL supports both a *validatorFunction* function and a *validatorDataTable* property for a form field. The migration tool converts the map edit routine as follows:

- EZEC10 and EZEC11 migrate to the *validatorFunction* property.
- If the part specified by *editRoutineName* is available during migration and is a function, the *editRoutineName* migrates to the *validatorFunction* property. The migration tool also migrates the edit routine to the *validatorFunction* property if the *editRoutineName* is longer than 7 characters because table names are limited to 7 characters in VisualAge Generator.
- If the part specified by *editRoutineName* is available and is a table, the *editRoutineName* migrates to the *validatorDataTable* property. The migration tool also migrates the edit routine to the *validatorDataTable* property if an edit message is specified for the form field because VisualAge Generator only uses the edit message in conjunction with EZEC10, EZEC11, or a table.
- If the part specified by the *editRoutineName* is not available during migration and the *editRoutineName* is 7 or fewer characters and an edit message is not specified, the migration tool assumes that *editRoutineName* is a function and migrates to the *validatorFunction* property. Message IWN.MIG.0502.e is only issued in this situation.

User response: If the specified edit routine is not a function, modify the form field and change the *validatorFunction* property to the *validatorDataTable* property. For additional considerations, see the information on edit routines in "Map variable fields and edit routines" on page 78.

IWN.MIG.0503.w Map group *mapGroupName*, **map** *mapName* **- Unnamed variable field converted to constant field at position(***row,column***).**

Explanation: VisualAge Generator permits, but does not recommend, unnamed variable fields on maps. The program cannot access these unnamed variable fields. At test and generation, unnamed variable fields are converted to constants. The migration tool converted this unnamed variable field to a constant because one or more properties are non-default values.

User response: Review the form definition and ensure that a constant field is the correct migration for this field. For additional considerations, see the information on unnamed variable fields in "Unnamed map variable fields" on page 81.

IWN.MIG.0504.w Map group *mapGroupName*, **map** *mapName* **- Unnamed variable field removed from position(***row,column***).**

Explanation: VisualAge Generator permits, but does not recommend, unnamed variable fields on maps. The

program cannot access these unnamed variable fields. At test and generation, unnamed variable fields are converted to constants. The migration tool removed this unnamed variable field because all of its properties specify the default values for a constant field. EGL does not require that constants with default properties be explicitly defined for the form.

User response: Review the form definition and ensure removing this field is the correct migration. For additional considerations, see the information on unnamed variable fields in "Unnamed map variable fields" on page 81.

IWN.MIG.0505.w Map Group *mapGroupName*, **map** *mapName* **- Uses device** *deviceName* **and size** *depth,width* **which is no longer supported. It must be changed.**

Explanation: VisualAge Generator permits some device types which EGL COBOL generation no longer supports for textForms. The migration tool includes the original depth and width in the *screenSizes* property for the migrated textForm. However, this screen size is no longer supported in EGL COBOL generation. If you generate for COBOL, there will be an error message from generation.

User response: If you plan to generate for COBOL, edit the textForm in EGL and remove the depth and width from the *screenSizes* property or change the depth and width to a size that is supported. You might also need to modify the textForm to reposition the variables and constants to better fit the new depth and width.

IWN.MIG.0506.e Map Group *mapGroupName*, **map** *mapName* **- Unprotected constant at row, column; changed to protect=skip.**

Explanation: VisualAge Generator permits unprotected constants on both display and printer maps. EGL requires that constants be specified as either protect=skip or protect=no. The migration tool sets protect=skip for the field.

User response: No action is required if protect=skip is acceptable. With protect=skip, the end user can continue typing at the end of any immediately preceding variable field and the additional characters will be placed in the next unprotected variable field. Protect=no prevents the end user for continuing to type at the end of any immediately preceding variable field. The end user must tab to the next variable field to continue typing.

IWN.MIG.0507.w Map Group *mapGroupName*, **map** *mapName* **- constant at row=0, column=0 changed to row=1, column=1.**

Explanation: VisualAge Generator tolerates, but does not fully support, a constant at position row=0, column=0 on a map. Fields at row=0, column=0 cannot specify any attribute information. EGL does not support any field at row=0, column=0. The field at row=0, column=0 is a constant and the first byte is initialized to blank. The migration tool changes the position to row=1, column=1 and deletes the first byte of the constant value. The migration tool does not include any field presentation properties such as color or highlighting for the field because this information was not recorded in the External Source Format file.

User response: Test any programs that use this form to determine if there is a change in the appearance of the display. If there is, edit the form and set the field presentation properties to obtain the desired appearance.

IWN.MIG.0508.e Map Group *mapGroupName*, **map** *mapName* **- constant at row=0, column=0 cannot be changed.**

Explanation: VisualAge Generator tolerates, but does not fully support, a constant at position row=0, column=0 on a map. Fields at row=0, column=0 cannot specify any attribute information. EGL does not support any field at row=0, column=0. The field at row=0, column=0 is a constant and the first byte is **not** initialized to blank. The migration tool does not change the position for the field because this could cause the constant to be moved or eliminated from the form and change the appearance. The migration tool does not include any field presentation properties such as color or highlighting for the field because this information was not recorded in the External Source Format file. There will be an error in the Problems view.

User response: Edit the form and change the constant field to position the field at row=1, column = 1. If necessary, modify the constant field to eliminate one byte to compenstate for the attribute byte that now occupies row=1, column=1. Be sure to test any programs that use this form to determine if there is a change in the appearance of the display. If there is, edit the form and set the field presentation properties to obtain the desired appearance.

IWN.MIG.0509.e Map Group *mapGroupName*, **map** *mapName* **- variable at row=0, column=0 cannot be changed.**

Explanation: This map might be from an older version of Cross System Product or VisualAge Generator. VisualAge Generator 4.5 does not support variables at row=0, column=0. Fields at row=0, column=0 cannot specify any attribute information. EGL does not support any field at row=0, column=0. The field at row=0, column=0 is a variable field. The migration tool does not change the position for the field because this would either cause the field to be moved or result in the loss of the first byte of data. The migration tool does not include any presentation properties such as color or highlighting for the field because this information was not recorded in the External Source

Format file. There will be an error in the Problems view.

User response: Edit the form and change the field to position the field at row=1, column=1. If necessary, modify other fields around the variable field to avoid the loss of any data due to the attribute byte that now occupies row=1, column=1. Be sure to test any programs that use this form to determine if there is a change in the appearance of the display. If there is, edit the form and set the field presentation properties to obtain the desired appearance.

IWN.MIG.0510.e Map Group *mapGroupName*, **map** *mapName* **-** *mapName* **conflicts with program name.**

Explanation: The program uses a map group or help map group that contains a map that is named the same as the program. VisualAge Generator permits the map name to be the same as the program name. EGL does not permit the form name to be the same as the program name. The migration tool renames a map in the program's help map group if the map name is the same as the program name and the map does not have any variable fields. However, the migration tool does not rename a map in the following situations:

- The map is a map with variable fields in the program's help map group.
- The map is any map in the program's main map group.

User response: Edit the formGroup and change the name of the form. Also be sure to change the form definition and all references to this form in all programs that use the formGroup. For additional considerations, see the information on map names in "Map names and help map names" on page 75.

IWN.MIG.0511.e Map Group *mapGroupName*, **map** *mapName* **- contains non-standard array for field** *fieldName*.

Explanation: VisualAge Generator permits elements of an array to have random placements on the map. EGL provides the same support for forms. However, the EGL Form Editor only supports standard arrays. A standard array is one in which the position of all the elements can be defined using the **columns**, **linesBetweenRows**, **spacesBetweenColumns**, and **indexOrientation** properties.

User response: The form is a valid EGL form. However, you cannot modify the form using the EGL Form Editor. If you need to change the form, you can do one of the following:

- Maintain the source code for the form using the EGL Editor. You can use the EGL Form Editor for other forms in the same formGroup provided that they do not have arrays or only have standard arrays.
- Use the EGL Editor to change the form so that all arrays specify the element position using the **columns**, **linesBetweenRows**, **spacesBetweenColumns**, and **indexOrientation** properties and remove the position information from the ***this*** notation.

IWN.MIG.0512.e Map Group *mapGroupName*, **map** *mapName* **- duplicate cursor removed from field** *fieldName*.

Explanation: In some customizations of VisualAge Generator Templates (VAGT), multiple cursors are specified on a map. In this case, VisualAge Generator tolerates the duplicate cursor. For test facility and generation, VisualAge Generator places the cursor on the first field that specifies the cursor and ignores all the other fields. The first field in this case is the first in row and column order, not first in the edit order. EGL does not tolerate a duplicate cursor. The migration tool removes the cursor specification from all fields except the first field that specifies the cursor. If multiple cursors are specified on array elements, the migration tool removes the cursor specification from all elements of the array except the first element that specifies the cursor.

User response: No action is required if the cursor position on the first field that specifies the cursor is acceptable.

IWN.MIG.0601.w Function *functionName*, **I/O object** *recordName* **- Unable to determine record type for UPDATE option; non-SQL record assumed.**

Explanation: For SQL, if there are multiple UPDATE or SETUPD statements in a program, VisualAge Generator requires that the REPLACE function specifies the name of the corresponding UPDATE or SETUPD statement. EGL uses the resultSetID for SQL statements to specify the relationship between a replace statement and its corresponding get or open statement. The record specified by *recordName* is not available during migration. The migration tool assumes that the UPDATE function is for a non-SQL record and does not include the resultSetID.

User response: If validation or generation flags an error because there are multiple get or open statements for the same record in the program, edit the function and add a resultSetID to the get forUpdate statement. The resultSetID must be unique within the program. The recommended resultSetID is the function name followed by the Result Set suffix preference you used during migration. For additional considerations, see the information in "SQL I/O with multiple updates" on page 96.

IWN.MIG.0602.w Function *functionName* - Unable to determine map type for I/O object *mapName*; display map assumed.

Explanation: VisualAge Generator uses the DISPLAY I/O option for both display and printer maps. EGL uses the display statement only for text forms and the print statement for print forms. In VisualAge Generator Compatibility mode, the display statement can also be used for print forms. The map specified as *mapName* is not available during migration. The migration tool assumes that the map is a display map and migrates to the EGL display statement.

User response: No action is required as long as you continue to use VisualAge Generator Compatibility mode or if the map is a display map. If the map is a print map and you want to discontinue use of VisualAge Generator Compatibility mode, you must change the function to use the print statement. For additional considerations, see "DISPLAY statement for maps" on page 89.

IWN.MIG.0603.e Function *functionName*, SQL I/O object *recordName* - Unable to determine SQL table name(s).

Explanation: VisualAge Generator determines the SQL table names from the SQL record at test and generation time. EGL requires that the table names be included in any modified SQL statement. The record specified by *recordName* is not available during migration. The migration tool uses EZE_UNKNOWN_SQLTABLE for the table name to insure that validation and generation will flag an error. The migration tool also sets the table label for the statement to T1.

User response: Edit the function and specify the correct table name(s) and table label(s) based on the record definition. The table names are in either or both of the *tableNames* and *tableNameVariables* properties in the EGL record definition. For additional considerations, see the information on EZE_UNKNOWN_TABLE in Appendix D, "Messages in the Problems view," on page 385.

IWN.MIG.0604.e Function *functionName*, SQL I/O object *recordName* - Unable to determine column names for !itemColumnName variable(s).

Explanation: The modified SQL statement used one or more VAGen !itemColumnName variables. A VAGen !itemColumnName variable specifies the name of an item in the SQL record definition which corresponds to the actual SQL column name. VisualAge Generator determines the actual SQL column names for any !itemColumnName variables from the SQL record at test and generation time. EGL does not support !itemColumnName variables. Instead, EGL requires that the actual SQL column names be used in any modified SQL statement. The record specified by *recordName*, or its alternate specification record, is not available during migration. The migration tool uses the !itemColumnNames in the modified SQL statement to provide as much information as possible.

User response: Edit the function and specify the SQL column names based on the record definition. For each !itemColumnName, locate the corresponding item in the SQL record definition. The column name for that item is the column name you need to use in the EGL I/O statement. For additional considerations, see the information in "SQL I/O and !itemColumnName" on page 95.

IWN.MIG.0605.w Function *functionName*, SQL I/O object *recordName* - SQLEXEC with model=none and no SQL clauses.

Explanation: The SQLEXEC statement specifies a model type of none, but does not contain any SQL clauses. VisualAge Generator in effect generates a no op for this statement. The migration tool generates an EGL no op statement (just a semi-colon) and includes a VAGen Info comment to indicate that the model type was none. If the VAGen function specifies an error routine, the migration tool includes the *try*, *onException*, and *end* statements appropriate for that error routine.

User response: Review the function to determine whether the I/O statement should be eliminated or expanded.

IWN.MIG.0607.e Function *functionName*, SQL I/O object *recordName* - Unable to determine SQL I/O clause *clauseName*.

Explanation: In VisualAge Generator, at some points in time, only the SQL clause that was modified was saved with the function. In this situation, VisualAge Generator creates the remaining clauses from the record definition that is specified as the I/O object for the function. The specified *recordName* is not available during migration. The migration tool is unable to create the SQL clause. The *clauseNames* that might be listed in this message include: SELECT, INTO, INSERTCOLNAME, VALUES, and FORUPDATEOF. The migration tool builds a skelton clause and includes EZE_UNKNOWN_SQL_*CLAUSENAME*.

User response: Locate the record specified in the message. Edit the function to include the missing SQL clauses. To determine what the missing SQL clauses need to be, use the VAGen SQL Statement Editor to view the SQL clauses. See "SQL I/O and missing required SQL clauses" on page 93 for more details and potential problems. See the information on EZE_UNKOWN_SQL_*CLAUSENAME* in Appendix D, "Messages in the Problems view," on page 385.

IWN.MIG.0608.e Function *functionName*, **SQL I/O object** *recordName* **- Unable to determine SQL I/O clause** *clauseName* **for alternate specification** *altspecRecordName*.

Explanation: In VisualAge Generator, at some points in time, only the SQL clause that was modified was saved with the function. In this situation, VisualAge Generator creates the remaining clauses from the record definition that is specified as the I/O object for the function. The specified *recordName* is available during migration. However, recordName specifies an alternate specification record *altspecRecordName* which is not available during migration. The migration tool is unable to create the SQL clause. The *clauseNames* that might be listed in this message include: SELECT, INTO, INSERTCOLNAME, VALUES, and FORUPDATEOF. The migration tool builds a skelton clause and includes EZE_UNKNOWN_SQL_*CLAUSENAME*.

User response: Locate the alternate specification record specified in the message. Edit the function to include the missing SQL clauses. To determine what the missing SQL clauses need to be, use the VAGen SQL Statement Editor to view the SQL clauses. See "SQL I/O and missing required SQL clauses" on page 93 for more details and potential problems. See "SQL I/O and missing required SQL clauses" on page 93 for more details and potential problems. See the information on EZE_UNKOWN_SQL_*CLAUSENAME* in Appendix D, "Messages in the Problems view," on page 385.

IWN.MIG.0609.e Function *functionName* **- record** *recordName* **in SSAs is not available; qualification of comparison value item** *itemName* **cannot be determined.**

Explanation: The modified DL/I statement used an unqualified comparison value item. By default, VisualAge Generator searches first for the item in the DL/I segment record associated with the current SSA. The specified DL/I segment record *recordName* associated with the current SSA is not available. Therefore, the migration tool is not able to determine the qualification for the comparison value item.

User response: Locate and review the record specified in the message. If the item is in the record, edit the function to include the missing qualification for the comparison value item. If the item is not in the record, review your program logic to determine the correct qualification to use. You can also review the generated COBOL source code from the last time you generated the program. In VisualAge Generator, at some points in time, the rules for qualification of the comparison value item varied. Therefore, due to the variations in the qualification of the comparison value item, do not regenerate the program using your current release of VisualAge Generator unless you are certain that the release has not changed since the last time you generated the program.

IWN.MIG.0610.e Function *functionName* **- record** *recordName* **in SSAs has alternate specification record** *altspecRecordName* **that is not available; qualification of comparison value item** *itemName* **cannot be determined.**

Explanation: The modified DL/I statement used an unqualified comparison value item. By default, VisualAge Generator searches first for the item in the DL/I segment record associated with the current SSA. The specified DL/I segment record *recordName* associated with the current SSA is available during migration. However, *recordName* specifies an alternate specification record *altspecName* which is not available during migration. Therefore, the migration tool is not able to determine the qualification for the comparison value item.

User response: Locate and review the records specified in the message. If the item is in the alternate specification record, edit the function to include the missing qualification for the comparison value item. If the item is not in the record, review your program logic to determine the correct qualification to use. You can also review the generated COBOL source code from the last time you generated the program. In VisualAge Generator, at some points in time, the rules for qualification of the comparison value item varied. Therefore, due to the variations in the qualification of the comparison value item, do not regenerate the program using your current release of VisualAge Generator unless you are certain that the release has not changed since the last time you generated the program.

IWN.MIG.0611.e Function *functionName* **- comparison value item** *itemName* **is not in record** *recordName*; **qualification cannot be determined.**

Explanation: The modified DL/I statement used an unqualified comparison value item. By default, VisualAge Generator searches first for the item in the DL/I segment record associated with the current SSA. The migration tool searched the DL/I segment record associated with the current SSA, but could not find the item. In VisualAge Generator, at some points in time, the rules for qualification of the comparison value item varied. The migration tool is not able to determine which record should be used to qualify the comparison.

User response: Review your program logic to determine the correct qualification to use. You can also review the generated COBOL source code from the last time you generated the program. Due to the variations in the qualification of the comparison value item, do not regenerate the program using your current release of VisualAge Generator unless you are certain that the release has not changed since the last time you generated the program.

IWN.MIG.0612.e Function *functionName* **- invalid relational operator for SSA; correct operator cannot be determined.**

Explanation: The modified DL/I statement used a relational operator that is invalid. This can occur due to a problem in VisualAge Generator that caused it to store an incorrect value for the relational operator. The migration tool is not able to determine the correct relational operator. The migration tool uses EZE_UNKNOWN_RELOP as the relational operator.

User response: Use the DL/I Call Editor in VisualAge Generator to review the SSAs for the specified function. The correct operator is shown in the DL/I Call Editor even though it is stored incorrectly in the External Format File for the function. Edit the function in EGL and change EZE_UNKNOWN_RELOP to the correct value.

Note: The most likely operators to cause the problem are the symbols used for *not equal*. The symbol for *not equal* in an EGL SSA is !=.

IWN.MIG.0701.e Function *functionName* **- Unable to determine map type for** *mapName* **used in SET map PAGE statement; used converseLib.EZE_SETPAGE();**

Explanation: VisualAge Generator uses SET map PAGE to indicate that the screen is to be cleared for a display map or that a page eject is to occur for a printer map. EGL uses the *converseLib.clearScreen()* statement only for text forms and the *converseLib.pageEject* statement for print forms. The map specified as *mapName* is not available during migration. The migration tool does not make an assumption about the map type. Instead, the migration tool uses the converseLib.EZE_SETPAGE() statement to insure that validation and generation will flag an error. The migration tool includes the original map name as a comment.

User response: Review the function and determine whether *clearScreen()* or *pageEject()* is the correct choice. For additional considerations, see the information in "SET map PAGE statement" on page 100.

IWN.MIG.0702.e Function *functionName* **- Unable to determine return column name for RETR statement due to missing table** *tableName***.**

Explanation: If the return column is not specified on a RETR statement, VisualAge Generator automatically determines the return column name based on the second column of the specified table. The EGL replacement for RETR is an *if* statement, followed by an assignment statement. The return column name must be explicitly specified in the assignment statement. The table specified by *tableName* is not available during migration. The migration tool uses EZE_UNKNOWN_RETURN_COLUMN to insure that validation and generation will flag an error. If this problem occurs in program flow statements, the program name appears in the message instead of a function name.

User response: Edit the function and specify the correct return column based on the table definition. The second column in the table is the default return column that is used in VisualAge Generator. For additional considerations, see the information in "RETR statement" on page 100.

IWN.MIG.0703.e Function *functionName* **- Unable to determine search column name for RETR statement due to missing table** *tableName***.**

Explanation: If the search column is not specified on a RETR statement, VisualAge Generator automatically determines the search column name based on the first column of the specified table. The EGL replacement for RETR is an *if* statement, followed by an assignment statement. The search column name must be explicitly specified in the *if* statement. The table specified by *tableName* is not available during migration. The migration tool uses EZE_UNKNOWN_SEARCH_COLUMN to insure that validation and generation will flag an error. If this problem occurs in program flow statements, the program name appears in the message instead of a function name.

User response: Edit the function and specify the correct search column based on the table definition. The first column in the table is the default search column that is used in VisualAge Generator. For additional considerations, see the information in "RETR statement" on page 100.

IWN.MIG.0704.e Function *functionName* **- Unable to determine search column name for FIND statement due to missing table** *tableName***.**

Explanation: If the search column is not specified on a FIND statement, VisualAge Generator automatically determines the search column name based on the first column of the specified table. The EGL replacement for FIND is an *if* statement, followed by a function invocation statement. The search column name must be explicitly specified in the *if* statement. The table specified by *tableName* is not available during migration. The migration tool uses EZE_UNKNOWN_SEARCH_COLUMN to insure that validation and generation will flag an error. If this problem occurs in program flow statements, the program name appears in the message instead of a function name.

User response: Edit the function and specify the correct search column based on the table definition. The

first column in the table is the default search column that is used in VisualAge Generator. For additional considerations, see the information in "FIND statement" on page 99.

IWN.MIG.0706.e Function *functionName* **- Unable to determine record type for** *recordName* **used in IF, WHILE, or TEST DUP statement; used EZE_DUPLICATE.**

Explanation: VisualAge Generator supports checking both DUP and UNQ for both non-SQL and SQL records. For SQL records, DUP and UNQ are identical. EGL supports both duplicate and unique for non-SQL records. EGL only supports unique for SQL records. The record specified by *recordName* is not available during migration. The migration tool migrates DUP to EZE_DUPLICATE to insure that validation and generation will flag an error.

Note: The migration tool migrates the TEST statement to an *if* statement.

User response: Edit the function and change EZE_DUPLICATE to one of the following:

- *unique* for an SQL record
- *duplicate* for a non-SQL record

For additional considerations, see the information in "I/O error values UNQ and DUP" on page 104.

IWN.MIG.0707.e Function *functionName* **- Unable to determine if item** *itemName* **is in a record or map when used in IF, WHILE, or TEST NULL statement; used EZE_NULL.**

Explanation: VisualAge Generator supports checking for NULL for both a map item and an SQL item. Checking a map item for NULL is equivalent to checking it for blanks. Checking an SQL item for NULL checks the null indicator variable to determine if the column is null in the database. The equivalent EGL statement is to check a form field for blanks and an SQL field for null. The item specified in *itemName* is not available during migration. The migration tool migrates NULL to EZE_NULL to insure that validation and generation will flag an error.

Note: The migration tool migrates the TEST statement to an *if* statement.

User response: Edit the function and change EZE_NULL to one of the following:

- *blanks* for a form field
- *null* for an SQL field

For additional considerations, see the information in "Checking SQL and map items for NULL" on page 103.

IWN.MIG.0708.w Function *functionName* **- Uses EZESYS in statement other than IF, WHILE, or TEST; old VAGen values will be used.**

Explanation: VisualAge Generator supports the use of EZESYS in statements other than IF, WHILE, and TEST. The migration tool migrates EZESYS based on the statement type. In IF, WHILE, and TEST statements, the migration tool converts EZESYS to sysVar.systemType and also converts the values to the new EGL values. For statements other than IF, WHILE, or TEST, the migration tool converts to *custPrefix*EZESYS, where *custPrefix* is the Renaming Prefix preference you set for migration. When migrating programs, if the VAGen Migration Preference *Do not initialize old EZESYS values* is not selected, the migration tool includes a declaration for *custPrefix*EZESYS and a statement to initialize *custPrefix*EZESYS to the original VAGen values. The original VAGen values will be used in this statement.

User response: Review the function and determine whether you want to use the original VAGen values or the new EGL values. If you want to use the new EGL values, change *custPrefix*EZESYS to sysVar.systemType.

If you want to use the original VAGen values and you selected the VAGen Migration Preference *Do not initialize old EZESYS values* during migration, you must add a declaration and an initialization statement for *custPrefix*EZESYS to any program that uses the specified function. If you want to use the original VAGen values and you did not select the VAGen Migration Preference *Do not initialize old EZESYS values*, no change is necessary. The declaration and initialization statements for *custPrefix*EZESYS are already included in all the migrated programs.

IWN.MIG.0801.e Program name *programName* **is a reserved word. It must be renamed.**

Explanation: The migration tool does not rename programs for you.

User response: You must change the name of the program and all references to it, including references on call, transfer, and show statements and references in linkage option parts. Also change the names of any bind control or linkedit parts that correspond to this program. If you want to keep the original program name as the name for the generated program, you can specify the *alias* property. If you do not specify the *alias* property, be sure to change any non-EGL references to the program name, including CICS program definitions.

IWN.MIG.0802.w Program *programName* **— Allows implicit items. Migration does not create definitions for implicit items.**

Explanation: In VisualAge Generator, a program can specify that it allows implicit data items. If a program that allows implicit data items actually uses an item

without defining it, VisualAge Generator automatically creates the definition for you at test and generation time. EGL does not allow implicit items. The migration tool does not create implicit definitions for you.

User response: Validate the program in VisualAge Generator to determine if any implicit items are being used. If so, VisualAge Generator provides the definitions for the implicit items in the validation messages. In EGL, edit the program definition and add the corresponding EGL primitive field declarations. You do not need to create a record to contain the fields. You can add the primitive field declarations directly to the program.

IWN.MIG.0804.w Program *programName* **- Unable to determine part type for I/O object** *partName* **used with CLOSE I/O option; record assumed.**

Explanation: In VisualAge Generator, the I/O objects are automatically included at test or generation time. The CLOSE I/O option can be used for both records and print maps. In EGL, records used in I/O statements must be explicitly declared in the program. Forms are not explicitly declared, but there must be a *use* declaration for the formGroup. The CLOSE I/O option is used in the specified program and the specified *partName* is used as the I/O object for the CLOSE. However, the specified *partName* is not available during migration. The migration tool assumes that the part is a record and includes the data declaration.

User response: If the migration tool guesses incorrectly, there will be an error in the Problems view. Edit the program and remove the declaration for the printForm.

IWN.MIG.0805.w Program *programName* **- execution mode not specified; nonsegmented assumed.**

Explanation: In VisualAge Generator, at some points in time, the execution mode was not saved with the program part. Execution mode only applies to main transaction programs. The specified *programName* is a main transaction program, but does not include the execution mode in the external source format. The migration tool assumes that the execution mode is nonsegmented and includes the segmented=no property in the EGL source.

User response: No action is required if the program should run in nonsegmented mode. If the program should run in segmented mode, edit the program and change the segmented property to segmented=yes.

IWN.MIG.0806.w Program *programName*, **use declaration for** *tableName* **- preferences caused deleteAfterUse=yes to be omitted.**

Explanation: The specified program contains a use declaration for the specified table. In Cross System Product and some releases of VisualAge Generator, the keep after use flag determined when memory for a table was freed by a program. The VisualAge Generator keep after use flag is normally migrated to the EGL deleteAfterUse property on the use declaration for the table. However, your VAGen Migration Preferences specified that the migration tool should not include the deleteAfterUse property.

User response: None. If your VAGen programs were generated using VisualAge Generator 4.5 FixPak 4, then there should not be any difference in behavior. For details, see information about deleteAfterUse in "Eliminating the use of VisualAge Generator Compatibility mode" on page 201.

IWN.MIG.0807.e Program *programName* **- PSB** *psbName* **is not available; DLI segment records for the PSB cannot be determined.**

Explanation: In VisualAge Generator, all the DL/I segment records specified in the program's PSB are automatically included at test or generation time because they might be used in creating a default SSA or explicitly used in a modified SSA. In EGL, the DL/I segment records must be explicitly declared in the program if they are used in a default SSA or explicitly used in a modified SSA. The specified *psbName* is not available during migration. Therefore, the migration tool cannot determine whether any DL/I segment records need to be added to the list of data declarations for the program.

User response: Check the EGL Problems list for a message about an ambiguous or unresolved DL/I segment records for this function or a program. If there is no message, this indicates that a declaration for the DL/I segment record is already included for the program (most likely as the result of I/O directly against the DL/I segment record). If there is a message, edit the program and add the declaration for the DL/I segment record.

IWN.MIG.0808.e Called program *programName* **- PSB** *psbName* **is not available; PCB types cannot be determined.**

Explanation: In VisualAge Generator, EZEDLPCB[*n*] where *n* is a numeric literal, is used to indicate a PCB that is passed to a program as a parameter. VisualAge Generator uses the PCB without regard to whether the PCB is an I/O, alternate, database, or GSAM PCB. EZEDLPCB[0] is always the I/O PCB and is not explicitly listed in the VAGen PSB part. An error occurs

if the DL/I PCB is not of the correct type when the PCB is used at runtime. In EGL, the PCB name from the program's PSB is used as the parameter name. The PCB type must be explicitly specified for each program parameter by giving the appropriate type definition using a record name (IO_PCBRecord, ALT_PCBRecord, DB_PCBRecord, or GSAM_PCBRecord). The migration tool always uses IO_PCBRecord as the type definition for EZEDLPCB[0]. The program *programName* specifies one or more EZEDLPCB[*n*] parameters where *n* is greater than 0. However, the specified *psbName* is not available during migration. Therefore, the migration tool cannot determine the type to include for the PCB in the parameter list. The migration tool uses EZE_UNKNOWN_PCB_TYPE for all the PCBs in the parameter list.

User response: Locate the specified PSB. Edit the program and change the type definitions to specify the correct xxxx_PCBRecord based on the corresponding PCB type in the specified EGL PSB part.

IWN.MIG.0809.e Called program *programName* **- PSB** *psbName* **is not available; PCB mapping cannot be determined.**

Explanation: In VisualAge Generator, EZEDLPCB[*n*] where *n* is a numeric literal, is used to indicate a PCB that is passed to a program as a parameter. VisualAge Generator automatically associates EZEDLPCB[*n*] with the corresponding PCB in the VAGen PSB part. EZEDLPCB[0] is always the I/O PCB and is not explicitly listed in the VAGen PSB part. An error occurs if the DL/I PSB does not have the expected number of PCBs at runtime. In EGL, the PCB name from the program's PSB is used as the parameter name. The *pcbParms* property is used to explicitly associate each PCB in the parameter list with the corresponding position within the EGL PSB part. The program *programName* specifies one or more EZEDLPCB[*n*] parameters, but the specified *psbName* is not available during migration. Therefore, the migration tool cannot determine the number of PCBs to include in the *pcbParms* property. The migration tool uses EZE_UNKNOWN_PCB_MAPPING for the value of the *pcbParms* property.

User response: Locate the specified PSB. Edit the program and change the *pcbParms* property to provide the mapping between the PCB parameters and the PCBs in the specified EGL PSB part.

IWN.MIG.0810.e Called program *programName* **- parameter list references higher PCB numbers than exist in PSB** *psbName***; PCB types and PCB mapping are not complete.**

Explanation: In VisualAge Generator, EZEDLPCB[*n*] where *n* is a numeric literal, is used to indicate a PCB that is passed to a program as a parameter. VisualAge Generator automatically associates EZEDLPCB[*n*] with the corresponding PCB in the VAGen PSB part. The association is done without regard to whether the PCB is an I/O, alternate, database, or GSAM PCB. EZEDLPCB[0] is always the I/O PCB and is not explicitly listed in the VAGen PSB part. A runtime error occurs if the DL/I PSB does not have the expected number of PCBs or if the DL/I PCB is not of the correct type. In EGL, the PCB name from the program's PSB is used as the parameter name. The PCB type must be explicitly specified for each program parameter by giving the appropriate type definition using a record name (IO_PCBRecord, ALT_PCBRecord, DB_PCBRecord, or GSAM_PCBRecord). The migration tool always uses IO_PCBRecord as the type definition for EZEDLPCB[0]. In addition, the *pcbParms* property is used to explicitly associate each PCB in the parameter list with the corresponding position within the EGL PSB part. The program *programName* specifies one or more EZEDLPCB[*n*] parameters, but some of the values for *n* are greater than the number of PCBs in the specified *psbName*. Therefore, the migration tool cannot determine the type definition to include for some of the PCBs in the parameter list. The migration tool uses EZE_UNKNOWN_PCB_TYPE for any PCB in the parameter list that does not correspond to a PCB in the specified *psbName*. In addition, the migration tool cannot determine the number of PCBs to include in the *pcbParms* property. The migration tool creates PCB mapping information for all EZEDLPCB[*n*] parameters, up to and including the highest value of n. However, this list does not match the available PCBs in the specified *psbName*.

User response: Locate the specified PSB. Review the PSB and the program logic to determine which is correct. Add any additional PCBs to the PSBRecord. Edit the program and change the parameter type definitions to specify the correct xxxx_PCBRecord based on the corresponding PCB type in the specified EGL PSB part. Also change the *pcbParms* property to provide the correct mapping between the PCB parameters and the PCBs in the specified EGL PSB part.

IWN.MIG.0811.w Program *programName* **- does not appear to use any maps; use statement for formGroup** *formGroupName* **commented out.**

Explanation: VisualAge Generator requires that a main transaction or called transaction program always specify map group, even if the program does not use any maps. In this situation, the map group part did not have to exist. EGL does not require that a program specify a formGroup unless the program actually uses a form. The migration tool determined that the program specifies a map group, but does not appear to use a map as an I/O object, in an XFER with a map statement, as a called parameter, or as the First Map of the program. Therefore, the migration tool commented out the use statement for the formGroup in the EGL program. The migration tool also commented out the

use statement for the help formGroup if one was present.

User response: None. However, if there are additional functions for this program that were not included in the migration set or in the external source file, these functions might use maps from the specified map group. If you need to use forms within the formGroup, change the EGL program to uncomment the use statement for the formGroup and help formGroup.

IWN.MIG.1001.e Generation options part *partName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename programs for you. Because a program might have a special generation options part named as programName.opt, the migration tool also does not rename generation options parts.

User response: When you change the program name, be sure to change the name of the corresponding generation options part.

IWN.MIG.1002.w Generation options part *partName* - /dbms=odbc is migrated to dbms="DB2".

Explanation: The specified generation options part includes the VAGen generation option /dbms=odbc. EGL only supports DB2 or Oracle. The migration tool converts /dbms=odbc to dbms="DB2" in the EGL build descriptor part. EGL provides DB2 support by using a JDBC driver. If you have a JDBC driver for your database, you might be able to use the build descriptor option dbms="DB2" as the database type.

Note: In EGL, Oracle is supported only if you use Java generation.

User response: Be sure to migrate, generate, and test a variety of VAGen programs that used ODBC support to ensure that all the functions you require work correctly with your JDBC driver.

IWN.MIG.1003.e Generation options part *partName* - /system=*systemType* is not supported.

Explanation: The specified generation options part includes the VAGen /system generation option and specifies a runtime environment that is not supported by EGL. The migration tool converts the /system generation option to a comment in the EGL build descriptor part.

User response: Determine whether this build descriptor part is used by other build descriptor parts. If not, you can delete the build descriptor part. Alternatively, you might want to keep the build descriptor part for reference if EGL supports this runtime environment at sometime in the future.

IWN.MIG.1004.w Generation options part *partName* - /system=*systemType* requires that destPort be set.

Explanation: The specified generation options part includes the /system generation option and specifies a COBOL runtime environment. The EGL build process requires you to specify a destination port using the destPort build descriptor option.

User response: Modify the build descriptor part that corresponds to the generation options part and include the destPort build descriptor option. Consider the following when specifying the value of destPort:

- For z/OS environments, there is no default value for destPort. You must add the destPort build descriptor option and the value must match the value you are use in the JCL that starts the z/OS build server. The sample JCL for starting a z/OS build server uses port 5555.
- For iSeries environments, there is no default value for destPort. You must add the destPort build descriptor option. The value must match the value used by the iSeries build server.
- For VSE environments, the default value for destPort is 21. You only need to specify the destPort build descriptor option if the value is different from 21.

IWN.MIG.1005.e Generation options part *partName* - /system=*systemType* is not currently supported.

Explanation: The specified generation options part includes the VAGen /system generation option and specifies a runtime environment that is not currently supported by EGL. The migration tool converts the /system generation option to the EGL build descriptor option for future use. However, because the runtime environment is not currently supported by EGL, the value will not appear in the Build Descriptor Parts Editor. You can see the value by using a text editor.

User response: None. You should keep this build descriptor part for possible use in future releases of EGL.

IWN.MIG.1099.e Control part *partName* - symparm *symparmName* is not supported.

Explanation: The specified control part uses or sets a symparm which is not supported in EGL. The migration tool migrates the symparm "as is" using the original VAGen symparm name. However, this symparm is not set during generation.

User response: Modify the control part to set a default value for the symparm. Alternatively, modify the control part so that it no longer uses the specified symparm.

IWN.MIG.1101.e Linkage table part *partName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename control parts for you.

User response: Modify the linkage options part name so that it is not a reserved word. When you change the linkage options part name, be sure to change all the build descriptor parts that reference the linkage options part.

IWN.MIG.1102.e Linkage table *partName* - /contable=BINARY is not supported. It must be changed.

Explanation: VisualAge Generator supports /contable=BINARY in the linkage table part. EGL does not support this value. The migration tool includes the conversionTable="BINARY" value in the EGL linkage options part. This value is invalid, but will not be detected until generation.

User response: You must change the conversionTable value to a value that is supported by EGL. Refer to the information about linkage options parts in the online helps for details about the EGL conversionTable attribute and the options that are available.

IWN.MIG.1103.e Linkage table part *partName* - /remotecomtype=CICSCLIENT is not supported. Defaulted to CICSECI.

Explanation: VisualAge Generator supports /remotecomtype=CICSCLIENT in the linkage table part. EGL does not support this value. The migration tool includes the remoteComType="CICSECI" in the EGL linkage options part. This value is valid, but might not be what you plan to use. If you want to use CICSECI, you need to set the ctgPort and ctgLocation.

User response: If you plan to use CICSECI, modify the linkage options part and set the values of ctgPort and ctgLocation for the entry that specifies CICSECI as the remoteComType. If you do not plan to use CICSECI, refer to the information about linkage options parts in the online helps for details about the EGL remoteComType attribute and the options that are available in EGL.

IWN.MIG.1104.e Linkage table part *partName* - /remotecomtype=*communicationType* is not supported. It must be changed.

Explanation: VisualAge Generator supports /remotecomtype=*communicationType* in the linkage table part. EGL does not support this communications protocol. The migration tool includes the remoteComType="*communicationType*" in the EGL linkage options part. This value is not valid and must be changed.

User response: Determine the communication protocol that you plan to use. Then edit the part and change the remoteComType to a value that is supported by EGL. Refer to the information about linkage options parts in the online helps for details about the EGL remoteComType attribute and the options that are available in EGL.

IWN.MIG.1201.e Resource association part *partName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename control parts for you.

User response: Modify the resource association part name so that it is not a reserved word. When you change the resource associations part name, be sure to change all the build descriptor parts that reference the resource association part.

IWN.MIG.1202.e Resource association part *partName* - /filetype=*fileType* is not supported. It must be changed.

Explanation: VisualAge Generator supports /filetype=BTRIEVE and /filetype=MFCOBOL for some workstation environments. EGL does not support these file types. The migration tool includes the filetype information in the EGL resource association part. The value is invalid and will cause an error in the Problems view.

User response: You must change the filetype value to a value that is supported by EGL. Refer to the information about resource association parts in the online helps for details about the EGL filetype attribute and the options that are available.

IWN.MIG.1203.e Resource association part *partName* - /system is *targetSystem*, which is not supported; migrated based on /filetype *fileType* information.

Explanation: The resource association part contains an entry that uses the specified *targetSystem*. This target system is not supported in EGL. The migration tool migrates the resource association entry based on the *fileType*. For example, if the targetSystem is mvs* and the fileType is transient, the migration tool creates an EGL resource association entry and sets the EGL system to mvs*. This will be invalid and result in an error in the Problems view. You can correct the entry by specifying a valid EGL system (zoscics for this example).

User response: If there is an error in the Problems view, correct the entry in the resource associations part by specifying a valid target system.

IWN.MIG.1301.e Linkedit part *partName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename programs for you. Because the program name must match its corresponding linkedit part, the migration tool also does not rename the linkedit part.

User response: When you change the program name, be sure to change the name of the corresponding linkedit part.

IWN.MIG.1401.e Bind control part *partName* is a reserved word. It must be renamed.

Explanation: The migration tool does not rename programs for you. Because the program name must match its corresponding bind control part, the migration tool also does not rename the bind control part.

User response: When you change the program name, be sure to change the name of the corresponding bind control part.

Messages from the VisualAge Generator to EGL migration tool—Stage 3

The only messages produced by Stage 3 are trace and information messages.

IWN.MIG.0030.i Migration set *Name_version* -- import analysis started.

Explanation: This is an information message to indicate status from the migration tool.

User response: None.

IWN.MIG.0031.i Migration set *Name_version* -- import analysis completed.

Explanation: This is an information message to indicate status from the migration tool.

User response: None.

IWN.MIG.0032.i Migration set *Name_version* -- not processed for Stage 3.

Explanation: This is an information message to indicate status from the migration tool. The specified migration set version was not processed during Stage 3. This is because another version of the migration set is imported into the workspace. For example, you requested to import the latest version of the migration sets and the specified version is not the latest version of the specified migration set.

User response: None.

Appendix D. Messages in the Problems view

In an ambiguous situation, the migration tool is not always able to determine the correct EGL syntax to build during migration. This typically occurs when an associated part is not available during migration. In these cases, the migration tool sometimes creates intentionally invalid EGL syntax so that an error will appear in the Problems view. The table below lists the specific text string that will cause an error in EGL validation. The specific EGL error message might vary, but the text string listed in the left column will appear near the EGL statement that is flagged as an error. Whenever the migration tool includes these text strings, the tool also issues a message to the migration log.

Table 160. VAGen migration text that causes EGL syntax or validation errors

VAGen migration text in EGL syntax	Problem and Solution
###KEYS_NOT_FOUND###	**Problem:** The current SQL record embeds another record's structure. During migration the record named on the embed statement was not available. Any key item specified for the current SQL record in VAGen is included in the *keyItems* property, but the keys from the embedded record are missing. **Solution:** Find the EGL record named on the embed statement. Replace the ###KEYS_NOT_FOUND### text with the keys listed in the embedded SQL record. Be sure to merge the embedded record keys with the current record's key item in the order that the fields appear in the record structure of the embedded record. If the current record's key item is also specified in the keyItems property of the embedded record, only include the field once in the EGL *keyItems* property.
###TABLES_NOT_FOUND###	**Problem:** The current SQL record embeds another record's structure. During migration the record named on the embed statement was not available. **Solution:** Find the EGL record named on the embed statement and copy the *tableNames* and *tableNameVariables* properties into the current SQL record.
EZE_DUPLICATE	**Problem:** The record named on a VAGen IF, WHILE, or TEST statement was not available during migration. **Solution:** Find the EGL record named on the EGL *if* or *while* statement. Change EZE_DUPLICATE to one of the following: • *duplicate* for a non-SQL record • *unique* for an SQL record
EZE_NULL	**Problem:** The migration tool could not determine whether the item named on a VAGen IF, WHILE, or TEST statement is in an SQL record or on a map. **Solution:** Review the program and determine whether the field is in an SQL record or on a form. Replace EZE_NULL with *null* for an SQL field or *blanks* for a form field.

Table 160. VAGen migration text that causes EGL syntax or validation errors (continued)

VAGen migration text in EGL syntax	Problem and Solution
EZE_SETPAGE();	**Problem:** The map named on a VAGen SET map PAGE statement was not available during migration. **Solution:** Find the form named on the // VAGen Info comment that accompanies the EZE_SETPAGE() statement. Change EZE_SETPAGE to one of the following: • *clearScreen()* for a text form • *pageEject()* for a print form
EZE_UNKNOWN_PARTTYPE	**Problem:** The External Source Format stored in the migration database was not valid. The migration tool was not able to determine the part type and was not able to convert the part to EGL syntax. **Solution:** The part named on the EZE_UNKNOWN_PARTTYPE statement is not valid. If this problem only occurs for a few parts, try exporting External Source Format from VisualAge Generator and migrating these parts in single file mode. If you created your own tool to load the migration database, there might be a problem with the way the tool is loading External Source Format code into the migration database. See Appendix G, "Migration Database," on page 413 for some queries that might be useful in determining what is causing the problem.
EZE_UNKNOWN_PCB_MAPPING	**Problem:** The PSB part specified for the program was not available during migration. The migration tool was not able to determine the values to specify for the pcbParms property. **Solution:** Find the data declaration in the program for the variable named *psb*. The type definition that is specified for *psb* is the name of the EGL PSBRecord part for the program. Change the pcbParms property for the program to map the input PCB parameters to the corresponding PCBs within the EGL PSBRecord part. For additional details, see message IWN.MIG.0809.e (on page 380).
EZE_UNKNOWN_PCB_TYPE	**Problem:** The PSB part specified for the program was not available during migration or contained fewer PCBs than specified by the program's parameter list. The migration tool was not able to determine the type definitions to use for the PCB parameters for the program. Each PCB in the parameter list is pcb*n*, where *n* is a numeric literal that corresponds to a PCB in the PSB part. **Solution:** Find the data declaration in the program for the variable named *psb*. The type definition that is specified for *psb* is the name of the EGL PSBRecord part for the program. Change the PCB parameters for the program to specify the correct type definition record (IO_PCBRecord, ALT_PCBRecord, DB_PCBRecord, or GSAM_PCBRecord) based on the type definition for the corresponding PCB in the PSB part. For additional details, see message IWN.MIG.0808.e (on page 379).

Table 160. VAGen migration text that causes EGL syntax or validation errors (continued)

VAGen migration text in EGL syntax	Problem and Solution
EZE_UNKNOWN_QUALIFIER	**Problem:** The current Segment Search Argument (SSA), contains an EGL host variable (VAGen comparison value item) that is not qualified. The DL/I segment record or its alternate specification record for the SSA was not available during migration. Alternatively, the record was available but did not contain the comparison value item. The migration tool was not able to determine the qualifier for the EGL host variable. **Solution:** Find the DL/I segment record or its alternate specification record for the current SSA. Determine whether the host variable is an item in the record. If so, change the qualifier for the host variable to the DL/I segment record name. If not, determine the correct qualifier to use. For additional details on how to determine the correct qualifier, see message IWN.MIG.0611.e (on page 376)
EZE_UNKNOWN_RELOP	**Problem:** The modified DL/I statement used a relational operator that is invalid. This can occur due to a problem in VisualAge Generator that caused it to store an incorrect value for the relational operator. The migration tool was not able to determine the correct relational operator. **Solution:** Use the DL/I Call Editor in VisualAge Generator to review the SSAs for the specified function. The correct operator is shown in the DL/I Call Editor even though it is stored incorrectly in the External Format File for the function. Edit the function in EGL and change EZE_UNKNOWN_RELOP to the correct value. **Note:** The most likely operators to cause the problem are the symbols used for *not equal*. The symbol for *not equal* in an EGL SSA is !=.
EZE_UNKNOWN_RETURN_COLUMN	**Problem:** The VAGen table named on the VAGen RETR statement was not available during migration. **Solution:** Find the EGL dataTable named on the assignment statement and replace EZE_UNKNOWN_RETURN_COLUMN with the name of the second column in the dataTable.
EZE_UNKNOWN_SEARCH_COLUMN	**Problem:** The VAGen table named on the VAGen FIND or RETR statement was not available during migration. **Solution:** Find the EGL dataTable named on the *if* statement and replace EZE_UNKNOWN_SEARCH_COLUMN with the name of the first column in the dataTable.
EZE_UNKNOWN_SQLTABLE	**Problem:** The SQL record named as the I/O object was not available during migration. The migration tool was not able to determine the correct tables clause for the EGL I/O statement. **Solution:** Find the record named on the I/O statement and determine the correct tables clause from the record's *tableNames* and / or *tableNameVariables* properties.

Table 160. VAGen migration text that causes EGL syntax or validation errors (continued)

VAGen migration text in EGL syntax	Problem and Solution
EZE_UNKNOWN_SQL_FORUPDATEOF	**Problem:** VisualAge Generator created a default *for update of* clause for the SQL UPDATE or SETUPD I/O option. The SQL record named as the I/O object was not available during migration. Therefore, the migration tool was not able to determine the correct *for update of* clause for the EGL I/O statement. **Solution:** Find the record named on the I/O statement and determine the correct *for update of* clause from the record's list of fields. The default *for update of* clause in VisualAge Generator is the list of column names from the record in the same order as the fields are listed in the record, but omitting the following: • Any column name that is listed in the EGL keyItems property for the record. • Any column name that is specified with the EGL isReadOnly=yes property. If the record named on the I/O statement embeds another SQL record, do the following: • Use the record named on the *embed* statement to determine the order of the columns and the isReadOnly=yes property. • Use the record named on the I/O statement (the embedding record) to determine the keyItems property. If the *for update of* clause is used in an EGL *prepare* statement, enclose the list of column names within double-quotes.
EZE_UNKNOWN_SQL_INSERTCOLNAME	**Problem:** VisualAge Generator created a default list of columns for the SQL ADD I/O option. The SQL record named as the I/O object was not available during migration. Therefore, the migration tool was not able to determine the correct list of column names for the EGL *add* statement. **Solution:** Find the record named on the I/O statement and determine the correct list of columns from the record's list of fields. The default list of column names in VisualAge Generator is the list of column names from the record in the same order as the fields are listed in the record, but omitting any column name that is specified with the EGL isReadOnly=yes property. If the record named on the I/O statement embeds another record, use the record named on the embed statement to determine the order of the columns and the isReadOnly=yes property. This list of column names is never used in an EGL *prepare* statement.
EZE_UNKNOWN_SQL_INTO	**Problem:** VisualAge Generator created a default list of data items for the *into* clause for the SQL INQUIRY, SETINQ, UPDATE, or SETUPD I/O option. The SQL record named as the I/O object was not available during migration. Therefore, the migration tool was not able to determine the correct *into* clause for the EGL I/O statement. **Solution:** Find the record named on the I/O statement and determine the correct list of fields for the *into* clause. The default list of fields in VisualAge Generator is the list of fields from the record in the same order as the fields are listed in the record. If the record named on the I/O statement embeds another record, use the record named on the *embed* statement to determine the order of the fields. The *into* clause is never used in an EGL *prepare* statement.

Table 160. VAGen migration text that causes EGL syntax or validation errors (continued)

VAGen migration text in EGL syntax	Problem and Solution
EZE_UNKNOWN_SQL_SELECT	**Problem:** VisualAge Generator created a default list of columns for the *select* clause for the SQL INQUIRY, SETINQ, UPDATE, or SETUPD I/O option. The SQL record named as the I/O object was not available during migration. Therefore, the migration tool was not able to determine the correct *select* clause for the EGL I/O statement. **Solution:** Find the record named on the I/O statement and determine the correct list of column names for the *select* clause. The default list of column names in VisualAge Generator is the list of column names from the record in the same order as the fields are listed in the record. If the record named on the I/O statement embeds another record, use the record named on the *embed* statement to determine the order of the columns. If the *select* clause is used in an EGL *prepare* statement, enclose the list of column names within double-quotes.
EZE_UNKNOWN_SQL_VALUES	**Problem:** VisualAge Generator created a default list of data items to provide the values for the SQL ADD I/O option. The SQL record named as the I/O object was not available during migration. Therefore, the migration tool was not able to determine the correct list of field names for the values clause of the EGL *add* statement. **Solution:** Find the record named on the I/O statement and determine the correct list of fields from the record's list of fields. The default list of field names in VisualAge Generator is the list of fields from the record in the same order as the fields are listed in the record, but omitting any field that is specified with the EGL isReadOnly=yes property. If the record named on the I/O statement embeds another record, use the record named on the *embed* statement to determine the order of the fields and the isReadOnly=yes property. The *values* clause is never used in an EGL *prepare* statement.

Appendix E. IWN.xxx messages in the Problems view

Some IWN.SYN, IWN.VAL, and IWN.XML messages are more likely to occur for EGL source code that was migrated from VisualAge Generator than for code that you develop completely within EGL. This section lists messages that have a special meaning for migrated code.

If there are numerous errors in a file, it is best to resolve the errors in the following order:

- IWN.SYN messages for invalid syntax. These messages are typically the result of one of the following:
  - An EGL reserved word used as the name of a program, formGroup, form, or dataTable that cannot be renamed by the migration tool.
  - Deliberately invalid syntax used by the migration tool. See Appendix D, "Messages in the Problems view," on page 385 for details on resolving these errors.
- IWN.VAL messages for a part that cannot be resolved or is ambiguous, including messages such as IWN.VAL.3260.e, IWN.VAL.6619.e, and IWN.VAL.6620.e.
- IWN.VAL warning messages for a statement that indicate there is a field with the same name as another record, form, or dataTable, including messages such as IWN.VAL.6570.w, IWN.VAL.6571.w, and IWN.VAL.6621.w.
- Other messages.

Note: EGL produces a maximum of 40 messages per file. Therefore, you might need to clear some messages, save the file, and rebuild the workspace before you can see additional messages.

IWN.VAL messages

IWN.VAL.3012.e The same name *recordName* also appears as variable, parameter, use or constant declaration in Function, Program, or Library *programName*.

Explanation: VisualAge Generator tolerated specifying the same record name in the parameter list and in the Tables and Additional Records list. In this situation, VisualAge Generator ignored the record in the Tables and Additional Records list.

User response: Edit the program and remove the record declaration.

IWN.VAL.3260.e The type *partName* cannot be resolved.

Explanation: The specified part cannot be found. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: The meaning varies based on context as follows:

- *partName* is a record used as a type definition in the program's record declarations list. Check to see if there is a record named *partName_level77Suffix*, where *_level77Suffix* is preference you specified during Stage 2 of migration. VisualAge Generator tolerates working storage records that contain only level 77 items on the program's Tables and Additional Records list. However, these level 77 items cannot be referenced in the program. Only level 77 items in the program's primary working storage record can be referenced in the program. Because the record only contained level 77 items, the migration tool only created a level 77 item when it migrated the record. If this is the case, edit the program and delete the declaration for the original record name. Do not add the corresponding level 77 record because none of its items were referenced in the VAGen program.
- *partName* is used as the help formGroup. The VAGen program specified a help map group, but none of the maps that the program converses specifies a help map. Edit the program. Either remove the use

statement for the help formGroup or add an import statement for the package containing the help formGroup.

- *partName* is used as the **segmentRecord** or **parentSegment** property in a PSBRecord. VisualAge Generator does not issue an error message for a missing DL/I segment record in the PSB unless the segment is actually used in a program for DL/I I/O or to build a default SSA for a lower level segment. In EGL, all DL/I segment records referenced in the PSB must be defined. Review the PSBRecord and the logic for all the programs that use the PSB. If the PCB that specifies the missing DL/I segment record is only used as a place holder to pass through to a non-EGL program, consider changing the PCB to remove the hierarchy information. Alternatively, create or import the missing DLISegment record definition.

IWN.VAL.4300.e The part named *partName* could not be resolved or did not resolve to one of the following types: *partTypeList*

Explanation: The meaning for migrated VAGen code varies based on the context as described under User response.

User response: The meaning varies based on the context as follows:

- The specified control part does not exist. Create the part or remove the reference to it.
- The specified control part is in a different project or package from the control part that has the error. The migration tool does not create import statements for control parts because control parts do not have associates in VisualAge Generator. If the specified control part is in a different project, update the EGL Build Path in the current project's properties to include the project where the specified control part resides. If the specified control part is in a different package, edit the current .eglbld file to add an import statement for the package where the specified control part resides.
- The XML parser was not able to completely process the .eglbld file. In this case, the specified control part might exist in the same file as the control part that has the error. Check for message *IWN.XML.3999.e XML Validation Error - Attribute "xxxxx" was already specified for element "yyyyy"*. This message indicates that the attribute *xxxxx* is specified multiple times in the same control part. Edit the current .eglbld file so that there is only one specification for *xxxxx* in the control part. Assuming that you have Build Automatically selected, when you save the .eglbld file, the message in the Problems view should be updated. Because the XML parser stops processing at the first duplicate attribute in the .eglbld file, you might have to resolve several errors before the entire file can be parsed. When all the IWN.XML.3999.e messages have been resolved, the specified control part should be available if it is in the same .eglbld file as the referencing control part.

IWN.VAL.4925.e The variable declaration *recordName* for *programName* could not be resolved.

Explanation: If the program uses DL/I, the specified *recordName* might be the name of a DL/I segment specified in the program's PSBRecord. In VisualAge Generator, all DL/I segments specified in the program's PSB are considered to be associates of the program. This ensures that any DL/I segment that might be used in a default SSA is available to the program. However, VisualAge Generator does not issue an error message for a missing DL/I segment record unless the segment is actually used for DL/I I/O or to build a default SSA for a lower level segment. The migration tool automatically adds a declaration to the program for each DL/I segment record in the program's PSB.

User response: Review the program to determine whether the DL/I segment record is needed. If the record is not used and is not required to build default SSAs for lower level segments, then edit the program and remove the record declaration.

IWN.VAL.5004.e The data table *tableName* is defined with *n1* column(s), but the contents are defined with *n2* column(s).

Explanation: The number of validly defined columns in the dataTable does not match the list of contents. One of the following might have occurred:

- One or more of the fields is defined with a type definition, but the type definition cannot be resolved.
- In VisualAge Generator, you used a comma as the decimal separator for numeric fields. EGL always uses the period. The migration tool converts the comma to decimal if you select the VAGen Migration Syntax Preference *Change decimal comma to decimal point*.

User response: If one of the fields has a type definition that cannot be resolved, correct that problem first and rebuild the project containing the dataTable. If there are still problems and you used a comma as the decimal separator in VisualAge Generator, review the preference setting. Save the import statements from the file containing the dataTable, then migrate the table again using Single File Mode to correct the table contents, then add the import statements to the file.

IWN.VAL.5052.e *programName* - Fixed records are not allowed in comparisons.

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable with the same name as a record. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field. In EGL, the name resolves to the record, but a fixed record is not permitted for this type of

comparison. Note that all VAGen records migrate to EGL fixed records.

User response: If the problem is caused by name resolution, qualify the field name with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5085.e *programName* **- The element** *operandName* **is not valid for use in the expression.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for an arithmetic expression. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted for an arithmetic expression.

User response: If the problem is caused by name resolution, qualify *operandName* with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5089.e *programName* **-** *operandName1* **is not valid for compare to** *operandName2***.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for this type of comparison. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted for this type of comparison. The name resolution problem can occur due a name conflict for either *operandName1* or *operandName2*.

User response: If the problem is caused by name resolution, qualify *operandName1* or *operandName2* with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5090.e *programName* **- The operand** *operandName* **in the in condition must be an item or a literal.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for the FIND, RETR, IF *x* IN *array*, or WHILE *x* IN *array* statements. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted for an **if** *x* **in** or **while** *x* **in** statement. Note that both the VAGen FIND and RETR statements migrate to an EGL **if** *x* **in** *structuredFieldArray* statement.

User response: If the problem is caused by name resolution, qualify *operandName* with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5093.e *programName* **- The operand** *operandName* **in the is/not condition must be a text form field.**

Explanation: In general, this error occurs when there is a field in a form with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the map field for statements such as IF *x* IS CURSOR or IF *x* NOT DATA. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted for this type of **if** statement.

User response: If the problem is caused by name resolution, qualify *operandName* with the name of the form that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5094.e *programName* **-** *operandName* **is invalid for the current is/not expression. Variable Text Form fields, CHAR, MBCHAR, DBCHAR and UNICODE are valid types for use with the mnemonic blanks.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for the IF *x* IS BLANKS statement. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted for the **if** *x* **is blanks** statement. Note that the VAGen mnemonics BLANK, BLANKS, and NULLS migrate to the EGL mnemonic **blanks**. The VAGen mnemonic NULL migrates to the EGL mnemonic **blanks** if the comparison is for a map field and to **null** if the comparison is for an SQL field. See "Checking SQL and map items for NULL" on page 103 for details.

User response: If the problem is caused by name resolution, qualify *operandName* with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for

information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5095.e *programName* **- The operand** *operandName* **in the is/not condition is not valid for use with the mnemonic null.**

Explanation: In general, this error occurs when there is a field in an SQL record with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for the IF *x* IS NULL statement. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted for the **if** *x* **is null** statement. Note that the VAGen mnemonic NULL migrates to the EGL mnemonic **blanks** if the comparison is for a map field and to **null** if the comparison is for an SQL field. See "Checking SQL and map items for NULL" on page 103 for details.

User response: If the problem is caused by name resolution, qualify *operandName* with the name of the record or form that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5100.e *xxxxx* **is an invalid qualifier for the** *yyyyy* **system word.**

Explanation: An EZE word that was valid in VisualAge Generator is not currently supported by EGL. The migration tool migrates the EZE word, making a "best guess" as to what the EGL replacement might be in the future. This preserves your program logic.

User response: Edit the function and make logic changes so that this system word is no longer used. Alternatively, create a new project to preserve migrated functions that cannot currently be used. Move all functions that contain VAGen values that are not currently supported to this new project.

IWN.VAL.5101.e *mainFunctionName* **It is invalid to use the** *xxxxx* **system word in this statement location.**

Explanation: The program that uses that uses the specified main function in turn invokes other functions. One of the functions in the function invocation chain uses the specified system word in a statement. The migration tool always qualifies the EGL system words that are replacements for the VAGen EZE words. If the *xxxxx* system word is not qualified with sysLib, sysVar, mathLib, strLib, VGLib, VGVar, converseLib, converseVar, dliLib, dliVar, or javaLib, the most likely causes are as follows:

- The VAGen program permitted implicit data items and the definition of *xxxxx* was automatically created during generation. EGL does not permit implicit data items. The migration tool also does not create implicit data item definitions for you.
- The record, map, or table was not included in the migration set so the migration tool could not include the necessary import statement in the program.

User response: Check whether the VAGen program allowed implicit items. If so, validate the program in VisualAge Generator. There will be a message on the VAGen View Messages list that provides the correct definition of the implicit data item. Add the definition for the data item to the declarations section of the program.

If the VAGen program did not allow implicit items, create an associates list for the program in VisualAge Generator. From the associates list, use the VAGen References tool to search for the specified data item. The results of the References tool provide a clue to which record, map, or table might be missing from the migration set.

IWN.VAL.5143.e *programName* **-** *operandName* **is invalid for the current is/not expression. CHAR, MBCHAR, and STRING are the only valid types for use with the mnemonic numeric.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for the IF *x* IS NUMERIC statement. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted for the **if** *x* **is numeric** statement.

User response: If the problem is caused by name resolution, qualify *operandName* with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5168.e *xxxxx* **is not valid for use within an Is/Not expression.**

Explanation: The specified value is not valid. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: The meaning varies based on context as follows:

- If the value is a system type such as AIXCICS or TSO, the value was a valid value for EZESYS in VisualAge Generator. This value has no corresponding value in EGL. The migration tool migrates the VAGen values to preserve your

program logic. Edit the function and make logic changes so that this value is no longer used. Alternatively, create a new project to preserve migrated functions that cannot currently be used. Move all functions that contain VAGen values that are not currently supported to this new project.

- If the value is EZE_DUPLICATE or EZE_NULL, the migration tool was not able to determine how to migrate the statement because the associated part was not included in the migration set. See Appendix D, "Messages in the Problems view," on page 385 for details and solutions.

IWN.VAL.5177.e *programName* **- The operand** *operandName* **in the is/not condition must be an item in a SQLRecord.**

Explanation: In general, this error occurs when there is a field in an SQL record with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for statements such as IF *x* IS TRUNC. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted for statements such as **if** *x* **is trunc**.

User response: If the problem is caused by name resolution, qualify *operandName* with the name of the SQL record that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5196.e *programName* **- Invalid for count** *countName***. The for count must be an integer item or literal.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for the count in a MOVEA statement. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted as the for count in a **move** statement.

User response: If the problem is caused by name resolution, qualify *countName* with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.5340.e Property: position. The value for this property for field *fieldName* **in** *formName* **is invalid. The value must be in the format [row, column], where row and column are positive integers.**

Explanation: VisualAge Generator tolerates map fields at row=0, column=0. The field cannot specify any attributes and uses the same attributes as the previous field on the map. EGL requires that every field have an attribute byte. If a constant field at row=0, column=0 begins with a blank, the migration tool adjusts the field position by removing the first character and changing the position to row=1, column=1. This field is either a constant field (*fieldName* is *) does not contain a blank as the first character or is a variable field.

User response: Use the EGL Editor to change the form. Adjust the length, position, value, and other properties of the field as necessary so the field fits on the form. Add presentation properties to achieve the same appearance for the field as it had in VisualAge Generator. After you have made these changes, you can use the EGL Form Editor to make future changes to the form.

IWN.VAL.6503.e The *xxxxx* **SQL I/O statement has clauses that are out of order.** *yyyyy* **must appear before the** *zzzzz* **clause.**

Explanation: See message IWN.VAL.6506.e.

User response: See message IWN.VAL.6506.e.

IWN.VAL.6506.e The *xxxxx* **SQL I/O statement allows only one** *yyyyy* **clause.**

Explanation: There are several situations in which this message can occur:

- In VisualAge Generator, SQL keywords are permitted as column names. In EGL, certain SQL keywords are not permitted.
- In VisualAge Generator, certain SQL clauses do not have to be parenthesized. In EGL, these clauses must be parenthesized. For example, a subselect and its related FROM, WHERE, GROUP BY, and ORDER BY clauses must be enclosed in parentheses.

User response: If you are not using subselects, see "SQL reserved words requiring special treatment" on page 225 for the list of SQL keywords and techniques you can use to resolve the problem with the column names.

If you are using subselects, add parentheses around the subselect and its related FROM, WHERE, GROUP BY, and ORDER BY clauses. Consider the following SQL statement, for example:

```
with #sql{
  SELECT EMPNO, COUNT(*) WORKDEPT
   FROM EMPLOYEE T1
     WHERE WORKDEPT LIKE '%E%'
     GROUP BY WORKDEPT
  UNION ALL
  SELECT EMPNO
   FROM EMP_ACT
   WHERE PROJNO IN('MA2100', 'MA2112')
}
```

Change the SQL statement to add parentheses around the second SELECT, as follows:

```
with #sql{
  SELECT EMPNO, COUNT(*) WORKDEPT
   FROM EMPLOYEE T1
     WHERE WORKDEPT LIKE '%E%'
     GROUP BY WORKDEPT
  UNION ALL
  ( SELECT EMPNO
    FROM EMP_ACT
    WHERE PROJNO IN('MA2100', 'MA2112'))
}
```

IWN.VAL.6507.e The *xxxxx* SQL I/O statement does not allow the *yyyyy* clause.

Explanation: See message IWN.VAL.6506.e.

User response: See message IWN.VAL.6506.e.

IWN.VAL.6541.e *programName* - The passing record identifier *operandName* must be a record variable.

Explanation: In general, this error occurs when there is a field in the I/O object for the function that has the same name as another record in the program. In VisualAge Generator, the name resolution is context sensitive so that *operandName* resolves to the record for an XFER or DXFR statement. In EGL, the fields in the I/O object have a higher precedence than records used elsewhere in the program. In addition, the **show** statement (VAGen XFER with map or UI record) is an I/O statement in EGL.

Note that the VAGen statements migrate as follows:

- XFER without a map or a UI record migrates to an EGL **transfer to transaction** statement.
- XFER with map and XFER with a UI record migrate to an EGL **show** statement.
- DXFR migrates to an EGL **transfer to program** statement.

User response: If the problem is caused by name resolution, specify the EGL keyword **this** as the qualifier (for example, **this**.*operandName*) so that the name resolves to the record. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6570.w *programName* - The item access *fieldName* resolved to a record, form, or dataTable. There is an item called *fieldName* in record, form, or dataTable *containerName*.

Explanation: In general, this warning occurs when there is a field (*fieldName*) in a record, form, or dataTable (*containerName*) with the same name as another record, form, or dataTable. The warning also occurs when there is a field in the function's parameter list or function's local storage with the same name as a field in another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to a field, record, map, or table, depending on the statement. In EGL, the name resolves to a function parameter item, function local storage item, record, form, or dataTable, which is valid, but not necessarily the same resolution as in VisualAge Generator.

User response: The meaning varies based on the context as listed below.

- If the message is issued for a **call** statement or function invocation and *fieldName* is the name of a variable in the function parameter list or function local storage, you can ignore the warning message because both VAGen and EGL resolve first to the function parameter or function local storage. Alternatively, if you want to eliminate the warning message, consider changing the name of the variable in the function parameter list or function local storage. Do not change the record or item type definition. This technique limits the change to just the function in which the error is occurring. Be sure to change all references to the variable within the function.
- See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6571.w *programName* - The item access *fieldName* resolved to an item in record, form, or dataTable *containerName*. There is a record, form, or dataTable called *fieldName* that is known to the program.

Explanation: In general, this warning occurs when there is a field (*fieldName*) in the I/O object (*containerName*) with the same name as another record, form, or dataTable in the program. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field, record, map, or table, depending on the statement. In EGL, the name resolves to the field in the I/O object, which is valid, but not necessarily the same resolution as in VisualAge Generator.

User response: The meaning varies based on the context. Be sure to consider name resolution differences first, before considering other possibilities. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6583.e *programName* - The subscript *subscriptName* in array reference *arrayName*[*subscriptName*] must be an integer item or integer literal.

Explanation: In general, this error occurs when there

is a field in a record, form, or dataTable with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field for the subscript. In EGL, the name resolves to a record, form, or dataTable, but these are not permitted as a subscript.

User response: If the problem is caused by name resolution, qualify *subscriptName* with the name of the record, form, or dataTable that contains the field (for example, *containerName.fieldName*). See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6619.e *programName* **-** *variableName* **cannot be resolved.**

Explanation: The *variableName* might be a record name, form name, or a field in a record, form or dataTable. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: The meaning varies based on the context as follows:

- Determine if the VAGen program permits implicit item definitions and *variableName* is an unqualified field name. If so, validate the program in VisualAge Generator. The VAGen validation messages provide the definition of the implicit items used in the program. Edit the EGL program to add variable definitions for the implicit items using the VAGen validation messages as a guide to the necessary primitive type definition.
- Determine if the program uses DL/I and the specified *variableName* is the name of a DL/I segment specified in the program's PSBRecord. If the message points to a DL/I I/O statement such as an add or get, the DL/I segment record is required to build the default SSA for a lower level segment. Review the program logic to determine whether the DL/I segment record is required to build a default SSA. If so, edit the program and add a declaration for the specified record.
- Determine if the program uses DL/I and the specified *variableName* is **dliVar.***name*. VisualAge Generator permits the use of EZE DL/I status words (EZEDL* words) even if the program does not specify a PSB. EGL only permits the use of the variables in **dliVar** if the program declares a PSB. Edit the program to add a declaration for the PSB or to remove the use of the variables in the **dliVar** library.
- If you did not migrate all the parts in your migration set, the migration tool cannot include the appropriate import statements. If the part exists in the workspace, you might need to add an import statement to the file containing the error.
- If *variableName* is a qualified name (for example, X.Z), the qualifier (X) is ambiguous. In VisualAge Generator, the only permitted qualifier is a record, table, or map name because a field name can only occur once within a record, table, or map. In EGL, a qualifier can also be a field within a record or dataTable because the same field name is permitted in multiple substructures within a record or dataTable. Determine if the program has a record, dataTable, or form name that is the same as a field within one of the records or dataTables. For example, you might have a form named X that contains a field named Z and a record named Y that contains a field named X, where field X has a subfield named A. In VAGen X.Z is a valid reference because X can only mean form X. In EGL, X.Z is ambiguous because X can be either form X or the field X within record Y. X is ambiguous and until X is resolved X.Z cannot be resolved even if Z only occurs within the form named X. Try using the EGL keyword **this** as a qualifier (for example, **this**.X.Z). Alternatively, either change the name of the form or change the name of the field (X) within the record (Y). A similar situation occurs if a dataTable has the same name as a field within a record.
- If *variableName* is not qualified, see message IWN.VAL.6621.w for additional possibilities.

IWN.VAL.6620.e *programName* **- The variable access** *xxxxx* **is ambiguous.**

Explanation: The *variableName* might be a field in a record, form or dataTable. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: The meaning varies based on the context as follows:

- If *variableName* is an unqualified item name, determine if the problem occurs for a call statement or system function invocation. VisualAge Generator gives precedence to Level 77 items in the program's primary working storage record if an unqualified item name is used for a CALL statement or EZE function invocation. EGL does not provide the same precedence. If the field specified by *variableName* exists in the Level 77 record that corresponds to the EGL program's *inputRecord* property, change the call statement or system function invocation to qualify the item with the Level 77 record name. However, you must be sure that all programs that invoke this function use the same Level 77 record.
- Check the function that has the error to determine if there is an EGL **show** statement (VAGen XFER with a map or XFER with a UI record). The VAGen XFER with map and XFER with UI Record statements are not considered to be I/O statements. The EGL **show** statement is an I/O statement. The presence of an EGL **show** statement changes the name resolution rules **for all the statements in the function** and can result in causing the name resolution to be ambiguous. Consider the following situations:

– A field in the original I/O object for the function is named the same as a field in the form or VGUIRecord used in the EGL **show** statement. In VAGen, the name resolves to the field in the original I/O object. In EGL, both the field in the original I/O object and the field I/O object for the **show** statement are now in the same category for name resolution. If the name should resolve to a field in the original I/O object, then qualify the field name with the name of the original I/O object (for example, *recordName.xxxxx*).
– A field in the original I/O object for the function is named the same as the form or the VGUIRecord used in the EGL **show** statement. In VAGen, the name resolves to the field in the original I/O object. In EGL, the field name and the form or VGUIRecord used in the **show** statement are in the same category for name resolution so the name is ambiguous. If the name should resolve to a field in the original I/O object, then qualify the field name with the name of the original I/O object (for example, *recordName.xxxxx*).

IWN.VAL.6621.w *programName* **- The operand** *operandName1* **resolved to a form, record, or dataTable, and the operand** *operandName2* **resolved to a primitive item. In VAGen, both operands might have resolved to an item.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable with the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that *operandName1* resolves to a field. In EGL, the name resolves to the record, form, or dataTable. See "Reference information for messages - name resolution and qualification rules" on page 404 for details on the differences in the resolution rules. A variety of EGL messages can result from this difference in name resolution, depending on the statement context. The name resolution problem can occur due a name conflict for either *operandName1* or *operandName2*.

User response: Specific messages and meanings vary depending on the statement context and whether the field is named the same as a record, form, or dataTable. In general, the following apply:

- Check the function that has the error to determine if there is an EGL **show** statement (VAGen XFER with a map or XFER with a UI record). The VAGen XFER with map and XFER with UI Record statements are not considered to be I/O statements. The EGL **show** statement is an I/O statement. The presence of an EGL **show** statement changes the name resolution rules **for all the statements in the function** and can result in changing the resolution in either of the following ways:
  – A record, form or table in VisualAge Generator now resolves to a field within the I/O object for the **show** statement in EGL
  – A field in the original I/O object in VisualAge Generator now resolves to the form or VGUIRecord used in the **show** statement.
- Confirm that the problem is due to a field in a record, form, or dataTable having the same name as another record, form, or dataTable. In VisualAge Generator, do the following:
  – Generate the program to ensure that it is a valid program.
  – Use the Associates tool to find all the associates for the program.
  – Run the References tool against the Associates list. Specify the following for the References tool:
    - Set **Search for** to a **Text** search.
    - Set the **Text** string to *operandName1*.
    - Set the **Search scope** to **All Parts in List**.
  – The results from the References tool can help you determine whether *operandName1* is the name of an item and also the name of a record, map, or table. The results can also help you determine the possible qualifiers for *operandName1*. Repeat the process for *operandName2*.
  – If there are multiple possible qualifiers, review the VAGen qualification rules in "Reference information for messages - name resolution and qualification rules" on page 404 to determine the correct qualifier. If the statement in error is a **call** statement or a function invocation, you might need to check the VAGen-generated COBOL program to determine how VisualAge Generator resolved the name.
- Change the EGL source code as follows:
  – If the name should resolve to a record or item variable in the function's parameter list or local storage, consider changing the name of the variable in the function parameter list or local storage. Do not change the record or item type definition. This technique limits the change to just the function in which the error is occurring. Be sure to change all references to the variable within the function.
  – If the name should resolve to a VAGen level 77 item, qualify the EGL field name with the name of the record, including the level 77 suffix that you specified during migration (for example, *recordName_level77Suffix.operandName1*).
  – If the name should resolve to any other field, qualify the field name with the name of the record, form, or dataTable that contains the field (for example, *recordName.operandName1*).
  – If the name should resolve to a record or form and the statement is in a function in which the I/O object contains a field with the same name as the record or form, specify the EGL keyword **this** as the qualifier (for example, **this**.*operandName1*).

IWN.VAL.6650.e *programName* **-** *targetName* **is a record, so the assignment source must be a record, or evaluate to CHA, HEX or MBCHAR.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable that has the same name as a record. In VisualAge Generator, the name resolution is context sensitive so that *targetName* resolves to the field when the source is a numeric literal or numeric field. In EGL, the name resolves to the record.

User response: If the problem is caused by name resolution, qualify *targetName* with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6653.e *programName* **-** *targetName* **and** *primitiveType* **are not compatible types in the expression** *expressionText***.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable that has the same name as another form or dataTable. In VisualAge Generator, the name resolution is context sensitive so that *targetName* resolves to the field when the source is a primitive type or a literal. In EGL, the name resolves to the form or dataTable.

User response: If the problem is caused by name resolution, qualify *targetName* with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6665.e *programName* **- Invalid move source** *operandName***. The source must be a record, form, item, literal, or constant.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable that has the same name as another dataTable. In VisualAge Generator, the name resolution is context sensitive so that *operandName* resolves to the field. In EGL, the name resolves to the dataTable.

User response: If the problem is caused by name resolution, qualify *operandName* with the name of the record, form, or dataTable. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6676.e *programName* **- Invalid move target** *targetName*[*subscriptName*]**. The target must be an item array of compatible type with the source scalar.**

Explanation: In general, this error occurs when there is a field in a record, form, or dataTable that has the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that both the source and the target (*targetName*) resolve to fields. In EGL, the source or the target resolves to the record, form, or dataTable. A name resolution problem can occur due to a name conflict for either the source or the target field.

User response: If the problem is caused by name resolution, qualify the source or the target (*targetName*) with the name of the record, form, or dataTable that contains the field. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6695.e *functionName* **- The state** *XXXXX* **is not allowed for this item reference.**

Explanation: The meaning for migrated VAGen code varies based on the context as described under User response.

User response: The meaning varies based on the context as follows:

- If state is PROTECT, SKIP, INVISIBLE, BLINK, INITIALATTRIBUTES, or a color, the field is on a print form. VisualAge Generator tolerates setting these attributes for printer forms. EGL does not. Modify the function to remove the statement. Alternatively, if the same function is used for both a text form and a print form, you must create a copy of the function for use with print forms or move the statement to the text form functions that invoke the current function.
- If state is EMPTY, determine if a form or record was not available during migration. EGL permits the definition of independent data items and assumes that if a type definition cannot be found, the definition is for an item. EGL does not support the use of set empty for a field in a record or form. Define or migrate the missing record or form.

IWN.VAL.6697.e *programName* **- The state** *formFieldStateName* **is not allowed for a record reference.**

Explanation: In general, this error occurs when there is a field in a form that has the same name as a record. In VisualAge Generator, the name resolution is context sensitive so that the name resolves to the field on the map when the SET statement is for a property such as CURSOR, a color, and so on. In EGL, the name resolves to the record.

User response: If the problem is caused by name resolution, qualify the field specified in the **set** statement with the name of the form. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6704.e *programName* **- Items in fixed non-SQL records, records, form fields, and SQL items with the isNullable=no cannot be set to null.**

Explanation: In general, this error occurs when there is a field in an SQL record that has the same name as another record, form, or dataTable. In VisualAge Generator, the name resolution is context sensitive so that the name in the SET x NULL statement resolves to the field. In EGL, the name resolves to the record, form, or dataTable.

User response: The problem might be caused by one of the following:

- If the problem is caused by name resolution, qualify the field name in the ***set*** statement with the name of the SQL record. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.
- If you selected the VAGen migration preference *Omit isNullable property* when you migrated, the migration tool does not include the **isNullable**=yes property for each field in an SQL record. Edit the SQL record to add the **isNullable**=yes property for this SQL field. Alternatively, change the function so that it no longer checks the SQL field for null.

IWN.VAL.6716.e *programName* **- The argument** *argumentName* **cannot be passed to the inOut parameter** *parameterName* **of the function** *functionName***. The types** *type1* **and** *type2* **are not reference compatible.**

Explanation: *functionName* is the name of the invoked function. An argument passed to an inOut parameter is required to be reference compatible. Reference compatible means that the argument and parameter types must match exactly. This error can occur for either of the following reasons:

- VisualAge Generator does not support, but in some cases tolerates, different types for the argument and parameter.
- There is a field in a record, form, or dataTable that has the same name as another record, form, or dataTable.

The meaning for migrated VAGen code varies based on the context as described under User response.

User response: The meaning varies based on the context as listed below.

- If *functionName* is a system function and EGL resolves to a record or form, this might be a situation in which VisualAge Generator tolerates a record or form even when it does not make sense. For example, VisualAge Generator tolerates passing a record as the argument for an EZE math function and passing a form as the argument to a string function. Review the program logic to determine what is intended.
- If *functionName* is a system function and EGL resolves to a field, but the field is not of the correct type. VisualAge Generator tolerates some argument types that are not compatible with the parameter types. EGL requires the types to be compatible. Add a substructure (or parent field) for the argument to provide a field that has the correct definition. For example, if the problem occurs for the third argument in **sysLib.startTransaction** and the third argument is an **int** field, add a **char** parent field to use as the third argument. Specifying the **char** field as the parent field ensures that when the record is initialized, the substructure **int** field is initialized to binary zeroes.
- If the invoked function is a user function and EGL resolves to a field, the field is not of the correct type. You might be able to change the invoked function to use a function parameter type such as **number** that permits a wider variety of argument types and lengths. Alternatively, review the invoked function and all the places where it is invoked. You might have to split the invoked function into multiple functions, each with a different definition of the parameter.
- Also consider whether there is a field with the same name as another record, form, or dataTable. See the User response for message IWN.VAL.6621.w for information about how to confirm that name resolution is the problem and how to determine the possible qualifiers.

IWN.VAL.6731.e *programName* **- The argument** *argumentName* **cannot be passed to the in or out parameter** *parameterName* **of the function** *functionName***. The types** *type1* **and** *type2* **are not assignment compatible.**

Explanation: *functionName* is the name of the invoked function. An argument passed to an in or out parameter is required to be assignment compatible. VisualAge Generator tolerates some types that are not assignment compatible. EGL does not permit incompatible types. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: See the User response for message IWN.VAL.6716.e.

IWN.VAL.6736.e *programName* **- The argument** *argumentName* **in function invocation** *functionName* **is invalid. The argument must be a fixed record or have a primitive type besides string, blob, or clob.**

Explanation: *functionName* is the name of the invoked function. The argument must be a fixed record or a primitive type that has a fixed length. The migration tool converts all VAGen records to fixed records. VisualAge Generator tolerates some types that are not assignment compatible. EGL does not permit incompatible types. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: See the User response for message IWN.VAL.6716.e.

IWN.VAL.6741.e *programName* **- The argument** *argumentName* **in function invocation** *functionName* **is invalid. The argument must be of primitive type char, mbchar, dbchar, hex, num, or unicode.**

Explanation: *functionName* is the name of the invoked function. The argument is limited to the listed primitive types. VisualAge Generator tolerates some types that are not assignment compatible. For example, VisualAge Generator tolerates passing records as arguments to string functions, even though this is not valid based on the VAGen documentation. EGL does not permit incompatible types. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: See the User response for message IWN.VAL.6716.e.

IWN.VAL.6742.e *programName* **- The argument** *argumentName* **in function invocation** *functionName* **is invalid. The argument must be of primitive type char, dbchar, unicode, hex, num, bin, int, smallint, bigint, pacf, money, or decimal.**

Explanation: *functionName* is the name of the invoked function. The argument is limited to the listed primitive types. VisualAge Generator tolerates some types that are not assignment compatible. EGL does not permit incompatible types. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: See the User response for message IWN.VAL.6716.e.

IWN.VAL.6743.e *programName* **- The argument** *argumentName* **cannot be passed to the loose parameter input of the function** *functionName***. It must be of primitive type char.**

Explanation: *functionName* is the name of the invoked function. The argument is limited to the listed primitive types. VisualAge Generator tolerates some types that are not assignment compatible. EGL does not permit incompatible types. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: See the User response for message IWN.VAL.6716.e.

IWN.VAL.6744.e *programName* **- The argument** *argumentName* **cannot be passed to the loose parameter** *parameterName* **of the function** *functionName***. It must have a numeric primitive type.**

Explanation: *functionName* is the name of the invoked function. The argument is limited to the listed primitive types. VisualAge Generator tolerates some types that are not assignment compatible. For example, VisualAge Generator tolerates passing forms and records as arguments to math functions and to index and length arguments of string functions. EGL does not permit incompatible types. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: See the User response for message IWN.VAL.6716.e.

IWN.VAL.7553.e *functionName* **- Argument** *n* **for** *systemFunctionName* **must be a string item, string constant or a string literal.**

Explanation: *functionName* is the name of the invoked function. The argument is limited to the listed primitive types. VisualAge Generator tolerates some types that are not assignment compatible. EGL does not permit incompatible types. The meaning for migrated VAGen code varies based on the context as described under User response.

User response: See the User response for message IWN.VAL.6716.e.

IWN.VAL.7740.e *programName* **-** *variableName* **is read-only and cannot be assigned to.**

Explanation: *variableName* is one of the EGL system variables such as **sysVar.userID**. The migration tool always qualifies the EGL system variables with the EGL library name. If *variableName* is not qualified and is in uppercase, it might be an implicit item that is created automatically in VisualAge Generator. EGL does not permit implicit items.

User response: Validate the program in VisualAge Generator to determine whether it allows implicit items and if *variableName* is one of the implicit data items created for the program. If so, modify the EGL program to add a variable declaration for *variableName*. Use the information in the VAGen validation messages to determine the correct definition of the item in EGL.

IWN.VAL.7757.e The number of elements in the initializer array must be no greater than the number of occurs of item *fieldName***.**

Explanation: For a VGUI record, the list of values for a **submit** or **submitBypass** button array is too big for the size of the array. VisualAge Generator ignores any extra values during generation. EGL requires that the array size match the number of values in the list.

User response: Edit the VGUI record and remove the additional values.

IWN.VAL.7789.e The numElementsItem item *fieldName* **cannot be a multiply occurring item.**

Explanation: For UI records, VisualAge Generator tolerates the Occurrences item as an array, but treats it as though it was not an array. EGL does not permit the numElementsItem property to specify a multiply occurring item.

User response: Edit the VGUI record and change the specified fieldName so that it not an array. You might have to move the field outside a multiply occurring parent field.

IWN.VAL.7868.e *programName* **-** *stateName* **is not a valid state for a DL/I segment record.**

Explanation: For a DL/I record, the *stateName* in an **if** or **while** statement is not valid. VisualAge Generator tolerates some *stateNames* that do not make sense for DL/I (for example, FMT). EGL does not permit this *stateName*.

User response: Review your program logic to determine what you really intended the program to do. Change or comment out the statement.

IWN.XML messages

IWN.XML.3997.e XML Validation Error - Attribute *"yyyyy"* must be declared for element type *"xxxxx"*.

Explanation: In VisualAge Generator, the option *yyyyy* is valid for element *xxxxx*. This combination is not supported by EGL. The migration tool migrates the value even though it is invalid so there will be an error in the Problems view to remind you to resolve the problem.

User response: Review the EGL online helps for the options that are valid for *xxxxx*. When you decide which option (or options) to use, you might need to open the build descriptor file with the Text Editor to be able to make the necessary change.

IWN.XML.3999.e (first of six alternatives) XML Validation Error - Attribute *"xxxxx"* was already specified for element *"yyyyy"*.

Explanation: Attribute *xxxxx* is specified multiple times in the same control part. The XML parser stops processing the .eglbld file. As a result, this error can mask other errors. Because this error ends the processing of the .eglbld file, there might be errors for unresolved parts that are in the .eglbld file, but which are defined after the point of the error.

User response: Edit the current .eglbld file using the Text Editor so that there is only one specification for *xxxxx* in the control part. When you save the .eglbld file, the messages in the Problems view should be updated. Because the XML parser stops processing at the first duplicate attribute in the .eglbld file, you might have to resolve several errors before the entire file can be parsed.

IWN.XML.3999.e (second of six alternatives) XML Validation Error - The content of element type *"xxxxx"* must match *"(listOfValues)"*.

Explanation: In VisualAge Generator, one or more of the values specified for a resource association is a valid value. This value is not supported by EGL. The migration tool migrates the value even though it is invalid so there will be an error in the Problems view to remind you to resolve the problem.

User response: Review the EGL online helps for the options that are valid for *xxxxx*. When you decide which option to use, you might need to open the build descriptor file with the Text Editor to be able to make the necessary change.

IWN.XML.3999.e (third of six alternatives) XML Validation Error - Attribute *xxxxx* with value *yyyyy* must have a value from the list *zzzzz*.

Explanation: Not all VAGen values have a corresponding replacement in EGL.

User response: For details on how migration converts the values, refer to the tables for linkage table and resource association in "Control parts" on page 316. For information on the choices available in EGL, refer to the EGL documentation.

IWN.XML.3999.e (fourth of six alternatives) XML Validation Error - Attribute *xxxxx* must be declared for element type *"yyyyy"*

Explanation: Not all VAGen values have a corresponding replacement in EGL. In some cases, combinations of values that are valid in VisualAge Generator are not valid in EGL. For example:

- In a linkage table part, the library attribute is not valid for a localCall entry. In EGL, calls from generated Java code to a native C++ DLL are considered to be remote calls even **when running on the same machine**.
- In a linkage table part, the remotePgmType attribute is not valid for a localCall entry. In VAGen, the remoteAppType option is ignored for local calls. In EGL, XML validation is more restrictive—only attributes that are meaningful are permitted.

User response: For details on how migration converts the values, refer to the tables for linkage table and resource association in "Control parts" on page 316. For information on the choices available in EGL, refer to the EGL documentation.

IWN.XML.3999.e (fifth of six alternatives) XML Validation Error - Element type "xxx" must be followed by either attribute specifications, ">" or "/>". - in file

Explanation: In a resource association part, the target environment information is invalid. This can occur when the original VAGen resource association entry contains /system=xxx*yyy or /system=xxx*. The wildcard * is valid in VAGen, but not in EGL. The migration tool does not attempt to convert the entry to all possible EGL target systems that might be valid.

User response: Change the entry to be a valid EGL runtime environment. Repeat the entry as many times as necessary for all of your EGL runtime environments that apply. For example, if the original VAGen entry is /system=mvs*, repeat the entry for the EGL environments zosbatch and zoscics. Because the XML parser stops processing at the first resource association

entry that contains an * in the target environment, you might have to resolve several errors before the entire file can be parsed.

IWN.XML.3999.e (sixth of six alternatives) XML Validation Error - The content of elements must consist of well-formed character data or markup. - in file

Explanation: In a resource association part, the target environment information is invalid. This can occur when the original VAGen resource association entry contains /system=*xxx or /system=*. The wildcard * is valid in VAGen, but not in EGL. The migration tool does not attempt to convert the entry to all possible EGL target systems that might be valid.

User response: Change the entry to be a valid EGL runtime environment. Repeat the entry as many times as necessary for all of your EGL runtime environments that apply. For example, if the original VAGen entry is *cics, the only valid EGL runtime environment is zoscics. Because the XML parser stops processing at the first resource association entry that contains an * in the target environment, you might have to resolve several errors before the entire file can be parsed.

Java messages for JSPs

Invalid character constant

Explanation: This can occur in the following situations:

- For the *xxxxx*Bean.java generated for a VGUI record, the setFillCharacter method uses a value of 'nullFill'. In VisualAge Generator, a shared data item has two sets of properties -- one for maps and one for UI records. In EGL, a dataItem part has one set of properties. The migration tool merges the two sets of properties, giving precedence to the UI properties. However, the migration tool cannot predict whether the data item part is used in a map, a UI record, or both. The data item did not specify a UI default fill character so the migration tool used the map default character, which was null. When the shared data item was used in a UI record, VisualAge Generator used blank as the default fill character because no UI fill character was specified. When the data item part is used as a type definition in a VGUI record, EGL generates using the null fill character, which is not valid.

User response: If the problem is due to the setFillCharacter method with a value of "nullFill", edit the VGUI record and add an override property for the item to set fillCharacter=" ". This preserves nullFill as the default fillCharacter for use on EGL forms.

Reference information for messages - name resolution and qualification rules

The VisualAge Generator and EGL name resolution and qualification rules differ due to enhancements in the EGL. In most cases, the differences in the VAGen and EGL name qualification and name resolution rules do not pose a problem. However, in the case where a field in a record, form, or dataTable has the same name as another record, form, or dataTable, VisualAge Generator and EGL might resolve the names differently. The following sections review the rules for the two products and then describe the validation messages that might appear in the Problems view when this situation occurs.

VisualAge Generator name resolution and qualification rules

VisualAge Generator does not permit two parts to have the same name. However, any of the following might have the same name as a record, map, or table:

- A nonshared item in a record or table
- A field on a map (which is always treated as a nonshared item)
- A nonshared field in a function's local storage or function's parameter list

In addition, multiple items might have the same name as follows:

- Function local storage or function parameter
- Level 77 item in the program's primary working storage record
- Item in the program's called parameter list
- Item in an I/O object for a function
- Item in any other record, map, or table for the program

In the situations in which the same name is defined in multiple places within a program, the VisualAge Generator name resolution is context sensitive and depends on the statement type as follows:

- An item is used in statements such as the following:
  - An assignment statement or a MOVE statement in which one of the following occurs:
    - The source is a literal, another item, or, in the case of an assignment statement, an arithmetic expression.
    - The target is another item.
  - A subscript in any statement.
  - The source, target, or for count in a MOVEA statement.
  - An IF, WHILE, or TEST statement in which the right-hand side of the comparison can only be used with an item (such as BLANKS, NUMERIC, NULLS, TRUNC) or in which the other side of the comparison is a literal or another item.
  - A SET statement in which the value being set can only be used with an item (such as NULL or CURSOR).
  - A FIND or RETR statement.
  - If the item name is not qualified and there are multiple items with the same name, VisualAge Generator resolves the name based on categories VG1 through VG3 as described below.
- A record is used in statements such as the following:
  - A MOVE statement in which the source or target is another record or map.
  - An IF, WHILE, or TEST statement in which the right-hand side of the comparison can only be used with a record (such as DUP or ERR).
  - A SET statement in which the value being set can only be used with a record (such as EMPTY or SCAN).
  - A DXFR statement
  - An XFER or XFER with UI record statement.
- A map is used in statements such as the following:
  - A MOVE statement in which the source or target is another record or map.
  - A SET statement in which the value being set can only be used with a map (such as EMPTY, CLEAR, or PAGE).
  - An XFER with map statement.
- In cases in which the statement context does not determine the part type that is expected, the precedence varies based on the statement, whether the statement is in an I/O function, and whether an item and a record, map, or table have the same name. For example:
  - For a CALL statement or a system function invocation in which the argument names are all unique, there is no problem. In the case where a field has the same name as another record, map, or table, the observed VAGen name resolution varies based on the use of level 77 items, called parameters, records in the tables and additional records list, the use of records or forms as I/O objects, and so on.

    Note: Based on tests using VisualAge Generator 4.5 Fix Pack 5, no consistent pattern was determined for CALL statements or function invocations. In the event of a name resolution conflict for a CALL statement or

system function invocation, generating the COBOL program might be the quickest method of determining how VisualAge Generator resolved the name.

– For the statement IF *x* IS MODIFIED, *x* might be a map or a field on another map. In this case, the map is used. To reference the field in the other map, you must qualify the name as *mapName.x*. Similarly, if *x* is a UI record or a field in another UI record, the UI record is used. To reference the field in the other UI record, you must qualify the name as *UIRecord.x*.

When VisualAge Generator expects to find an item, the following name qualification rules are used to determine where the item is located.

- If the item name is qualified, the qualifier can be a record, map, or table. Multiple levels of qualification are not necessary (and are not supported) because an item name must be unique within a record, map, or table.
- If an item name is not qualified, the priority in which data items are checked to determine the qualifier is as follows:
  – Category VG1 - Item names in the local storage and parameter list for this function.
  – Category VG2 - Records and maps that are specific to this function as follows:
    - I/O object and its items.
    - Records in the function parameter list and their items.
    - Records in the function local storage list and their items.
    - If the name is not unique in this category, it must be qualified.
  – Category VG3 - Records, maps, and tables in the program as follows:
    - Program working storage and its items.
    - Table and Additional Records list and their items.
    - Records and maps in the called parameter list and their items.
    - I/O objects of other functions in the program and their items.
    - If the name is not unique in this category, it must be qualified.
  – If the program allows implicit data items, VisualAge Generator creates an implicit definition based on usage.

For a CALL statement or function invocation, records tend to take precedence over fields (because a record name cannot be qualified) and level 77 items tend to take precedence over other fields (because long ago, only level 77 items could be used in a CALL statement). However, based on tests using VisualAge Generator 4.5 Fix Pack 5, no consistent pattern was determined for CALL statements or function invocations.

EGL name resolution and qualification rules

In EGL, the name resolution rules differ from the VisualAge Generator rules due to the following EGL enhancements:

- The same field name can be included multiple times in a record under different substructures. Multiple levels of qualification are supported and in some cases are required. The qualifier can be a field within the record (for example, MYRECORD.SHIPPING.ADDRESS or just SHIPPING.ADDRESS).
- A function can have multiple I/O statements and therefore, multiple I/O objects.
- The **show** statement (VAGen XFER with map or UI record) is considered to be an I/O statement.
- Fields (item variables) can be declared at the program level.

- EGL does not have level 77 items. The migration tool includes the level 77 items in a separate basic record that is declared in the program.
- New EGL parts such as libraries.
- The EGL keyword **this**, which can be used to indicate that you want to use a record variable declared at the program level or a form specified in the program's **use** forms statement rather than a name in Categories EGL1 and EGL2 as described below.

When EGL finds a name, the following name resolution and qualification rules are used to determine where the field is located.

- If the program does not set the **allowUnqualifiedItemReferences** property to yes, all field references must be qualified. If the field is in a substructure, the field must be fully qualified. For example, if **allowUnqualifiedItemReferences** is not set to yes and CUSTOMER_RECORD contains the field NAME which is the parent of LASTNAME, then CUSTOMER_RECORD.NAME.LASTNAME is valid, but CUSTOMER_RECORD.LASTNAME is not valid.
- The qualifier can be a record, form, dataTable, or another field within a fixed record or dataTable. Multiple levels of qualification are permitted and in some cases are required.
- If a field is not qualified or is partially qualified, the priority in which fields are checked to determine the qualifier is as follows:
  - Category EGL1 - Variables declared at the function level as follows:
    - Item variable names declared in the local storage and parameter list for this function.
    - Record variable names declared in the local storage and parameter list for this function.
    - Names must be unique in this category.
  - Category EGL2 - The I/O objects and other fields that are specific to this function as follows:
    - I/O objects and their fields. In EGL, a function can have multiple I/O statements. In addition, in EGL the **show** statement (VAGen XFER with map or XFER with UI record) is considered to be an I/O statement.
    - The fields in record variables in the function parameter list.
    - The fields in record variables in the function local storage list.
    - If the name is not unique in this category, it must be qualified.
  - Category EGL3 - Variables declared at the program level as follows:
    - Record variable names from the program's record declarations. The record declarations list includes records specified by the **inputRecord** property or used in I/O statements in any function of the program.
    - Item variable names declared at the program level.
    - Item variable and record variable names listed in the program's parameter list.
    - If the name is not unique in this category, it must be qualified.
  - Category EGL4 - A form name from the program's **use** forms statement. This list includes forms specified by the **inputForm** property, program's parameter list, or used in I/O statements in any function of the program. If the **use** form statement only specifies a formGroup, then all forms within the formGroup are considered.
  - Category EGL5 - A dataTable name that is specified in the program's **use** declarations.

– Category EGL6 - Fields used anywhere in the program as follows:
  - Fields from record variables, forms, and dataTables in categories EGL3 through EGL5.
  - If the **use** form statement only specifies a formGroup, then all fields on all forms within the formGroup are considered.
  - If the name is not unique in this category, it must be qualified
– Category EGL7 - fields in a user library specified the program's use declarations. (This category does not affect migrated VAGen programs because nothing migrates to an EGL library.)
– Category EGL8 - fields in a system library. (The migration tool always qualifies fields migrated from the VAGen EZE words with the EGL system library name.)
– Implicit definitions are not permitted in EGL.

The EGL name resolution and qualification rules are consistent -- they are not affected by the type of statement or function being invoked.

Validation messages due to differences in name resolution and qualification rules

In most cases, the differences in the VisualAge Generator and EGL name resolution and qualification rules do not pose a problem. However, in the case where a field in a record, form, or dataTable has the same name as another record, form, or dataTable, VisualAge Generator and EGL might resolve the names differently. This can result in the following:

- Invalid EGL statements which are detected by normal EGL validation (for example, trying to set the color for a record rather than a field on a form). In these cases, there will be a validation error message in the Problems view.
- Special EGL warning messages that are produced by validation **if you are using VisualAge Generator Compatibility mode**. These warning messages indicate that the name resolution **might** be different between VisualAge Generator and EGL.
- No EGL message is issued for situations in which there is a level 77 item or called parameter which received precedence for a CALL statement or function invocation in VisualAge Generator and which results in a different resolution in EGL.

The following are examples of situations in which name resolution might change between VAGen and EGL if there are things that have the same name.

Example 1

Resolution changes from field in one record to another record:

```
ProgramA:
  Tables and Additional Records List
    RECORDA - a record that contains field RECORDZ defined as CHAR
    RECORDZ - a record that contains other fields
  FunctionA:
    MOVE "abc" to RECORDZ;
                 /* VAGen-resolves to field RECORDA.RECORDZ,        */
                 /*       based on statement context;               */
                 /*       record is invalid if source is a literal  */
                 /* EGL  -resolves to record RECORDZ,               */
                 /*       based on Category EGL3; a record is valid */
                 /*      -message IWN.VAL.6621.w is issued          */
```

Example 2

Resolution changes from a field in the original I/O object to being ambiguous due to the name of a form used in **show** statement:

```
ProgramB:
  FORMF is a form in the program's formGroup
  FunctionB:
    INQUIRY RECORDB  /* RECORDB contains field FORMF defined as BIN      */
    XFER PGMBX , FORMF;/* converts to EGL show statement                 */
    FORMF = 123;     /* VAGen-resolves to field RECORDB.FORMF           */
                     /*       based on statement context;               */
                     /*       form is invalid if source is a literal    */
                     /* EGL  -cannot resolve between field or form FORMF;*/
                     /*       based on Category EGL2; form is not valid  */
                     /*      -FORMF is now an I/O object for show       */
                     /*      -a form is invalid;                        */
                     /*      -message IWN.VAL.6620.e is issued          */
```

Example 3

Resolution changes from a record to a field in a form used in **show** statement

```
ProgramC:
    FORMF is a form in the program's formGroup and contains field RECORDZ
    Tables and Additional Records List
        RECORDZ - a record that contains some fields
    FunctionC:
        XFER PGMCY , FORMF;/* converts to EGL show statement               */
        CALL PGMCX RECORDZ;/* VAGen-resolves to record RECORDZ             */
                   /*       based on statement context;             */
                   /*       record receives precedence on a CALL    */
                   /* EGL  -resolves to field FORMF.RECORDZ;        */
                   /*       based on Category EGL2                  */
                   /*      -FORMF is now an I/O object for show     */
                   /*      -message IWN.VAL.6571.w is issued        */
```

Example 4

Resolution changes from a field in the original I/O object to being ambiguous due to a field in a form used in **show** statement.

```
ProgramD:
  FORMF is a form in the program's formGroup and
        contains a field named ITEMD defined as BIN
  FunctionD:
    INQUIRY RECORDD    /* RECORDD contains field ITEMD defined as BIN   */
    XFER PGMDX , FORMF;/* converts to EGL show statement                */
    ITEMD = 123;       /* VAGen-resolves to field RECORDD.ITEMD         */
                       /*       based on Category VG2                   */
                       /*         - RECORDD is I/O object               */
                       /*         - FORMF is not an I/O object          */
                       /* EGL  -cannot resolve between 2 fields ITEMD   */
                       /*       based on Category EGL2                  */
                       /*      -FORMF is now an I/O object for show     */
                       /*      -message IWN.VAL.6620.e is issued        */
```

Appendix F. Situations where incorrect External Source Format causes problems in creation of EGL

There are some situations in which the External Source Format produced after running the Stage 1 migration tool will cause problems when running the migration tool that produces EGL. Those situations, which are very rare and unlikely, are discussed here.

- Data item part
  - The map range edit (minimum and maximum values) can cause an exception in Stage 2 due to invalid External Source Format. The problem occurs if External Source Format is imported into VisualAge Generator and the data item is never modified. When the External Source Format is exported in Stage 1 of the migration, the map range edit is in an invalid format. Modify the data item in VisualAge Generator and save the item. For example, add and remove a blank from the item description. Alternatively, **before you run Stage 1 of migration,** install the fix for VisualAge Generator APAR PQ75621 or APAR PQ79914. This APAR is included in VAGen V4.5 FixPack 5.
  - For VisualAge Generator on Java, data items with similar part names can cause unpredictable results when the # symbol is used in one of the names. For example, DATAITEM#A, DATAITEM@A, and DATAITEM$A can result in the wrong External Source Format code being stored in the migration database for DATAITEM#A. If you have used the # symbol in data item names, review the resulting EGL source code to ensure that the correct information was migrated. Alternatively, **before you run Stage 1 on Java,** install the fix for VisualAge Generator APAR PQ85794. This APAR is included in VAGen V4.5 FixPack 5.
- Record part
  - For SQL records, the default key item can cause a problem where there is an invalid (or unprintable) character in the field. If you receive a message during Stage 2 indicating "NoSuchElementException", modify the record in VisualAge Generator, swipe through the default key item field and delete the unprintable character. Save the record and run Stage 1 again. Alternatively, **before you run Stage 1 of migration**, install the fix for VisualAge Generator APAR PQ89390. This APAR is included in VAGen V4.5 FixPack 5.
- Program part
  - For VisualAge Generator on Smalltalk, when you list the associates for a program, the message table does not appear in the associates list. When the message table is not included in the associates list, the Stage 3 migration tool does include the project containing the message table in EGL Build Path. Similarly, the Stage 3 migration tool does not include an import statement for the package containing the message table. After Stage 3, if there is a message on the Problems view about a program not being able to resolve a dataTable part, check the EGL Build Path and the import statements. Alternatively, **before you run Stage 1 on Smalltalk**, install the fix for VisualAge Generator APAR PK19541. This APAR is **not** included in VisualAge Generator Version 4.5 Fix Pack 5.

Appendix G. Migration Database

Creating the DB2 migration database

Except where noted, the following instructions apply regardless of whether you are migrating from Java or Smalltalk. Even if you are migrating from Smalltalk, you must set the JDBC driver level on the machine where you plan to run Stage 2 and 3 of migration.

Setting the JDBC level for DB2 7.2

Note: The migration tool requires DB2 7.2 with Fix Pack 14 or higher.

The migration tool requires that db2java.zip be at the JDBC 2.0 level. DB2 7.2 ships with two db2java.zip files -- one at the JDBC 1.1 level and one at the JDBC 2.0 level. To configure DB2 7.2 for JDBC 2.0, do the following:

1. Stop all DB2 processes.
   a. Navigate to the **Control Panel** and then select **Administrative Tools -> Services**.
   b. You might have to stop the *DB2 - DB2* process last if it does not stop on your first attempt.
2. Open a DOS command prompt window and navigate to the directory that contains the *usejdbc2.bat* file. If you used the default install directory when you installed DB2 7.2, the file should be in the \SQLLIB\java12 directory.
3. Run the *usejdbc2.bat* file.
4. Start everything you stopped in the first step.

Setting the JDBC level for DB2 8.1 or higher

If you have DB2 8.1 or higher installed, the db2java.zip file is already at the correct level.

Using DB2 on Windows XP

The migration tool requires the following:

- The user ID that is used to access the migration database must not contain any blanks.
- The Windows user ID needs to have administrator authority, not limited authority, for the migration sets to be visible in the migration tool wizards in Stages 2 and 3.

Creating the migration database

To create the migration database, do the following:

1. Make sure that DB2 and any other applications that use it are shut down. For example, shut down VisualAge Generator and the EGL development environment.
2. Open a DB2 Command Window.
   - If you are migrating from Java, navigate to the *VisualAgeJava-installation-directory*\ide\vgmigration directory.

- If you are migrating from Smalltalk, navigate to the *VisualAge-Smalltalk-installation-directory*.

3. Run the file named *SetupDatabase.bat*. This runs a file in the same directory called createdatabase.sql and saves the output to a file called createdatabase.out in the same directory. This creates a DB2 database called VGMIG, connects to the database, and configures the database parameters. It might take up to a minute to create the database. Be sure to wait until all the commands finish executing.

   Note:

   - The first command that appears in the console might result in an error message. You can ignore this message. It simply means that the VGMIG database did not already exist.
   - If you want to create a database with a name other than VGMIG, you must change all occurrences of VGMIG in createdatabase.sql to your desired database name. You must also remember to change VGMIG in your Stage 1 – 3 migration tool preferences.
   - By default the VGMIG database is not password protected. If you need password protection, you must change the database to be password protected.

4. Run the file named *SetupTables.bat*. This runs a file in the same directory called createtables.sql and saves the output to a file called createtables.out in the same directory. This creates all the tables and views that the migration tool needs in the migration database. The tables are crated with a high-level qualifier (a schema) called MIGSCHEMA. It might take up to a minute to create the database. Be sure to wait until all the commands finish executing.

   Note:

   - The first commands that appear in the console might result in error messages. You can ignore these messages. They simply mean that the tables and views did not already exist.
   - If you want to create a schema with a name other than MIGSCHEMA, you must change all occurrences of MIGSCHEMA in createtables.sql to your desired schema name. You must all remember to change MIGSCHEMA in your Stage 1 – 3 migration preferences.
   - If you ever need to completely clean out the migration database, you can rerun the SetupTables.bat file from a DB2 Command Window.

5. Close the DB2 Command Window.

At this point the migration database, schema, tables, and views have been created. You are now ready to create a preferences file for the Stage 1 migration tool to use. If you are migrating from Java, see "Setting Stage 1 preferences" on page 116. If you are migrating from Smalltalk, see "Setting Stage 1 preferences" on page 136.

Resetting the migration database

If you need to reset the migration database (for example, due to changing your renaming rules), use one of the following techniques:

- Use the tool that deletes and recreates all the tables in the migration database.

  Use this tool in the following situations:

  – If you need to delete all your migration plans.
  – If you have migrated multiple versions of a Java project.

– If you have migrated multiple versions of a Smalltalk configuration map.

To run the tool that deletes and recreates all the tables, do the following:

1. From a DB2 Command Window, navigate to the directory where **SetupTables.bat** is located.
   – For Java, this is your *VisualAge-for-Java-install-directory*\ide\vgmigration.
   – For Smalltalk, this is your *VisualAge-Smalltalk-install-directory*.
2. Run **SetupTables.bat**.

- Use the tool that deletes a specified migration set. Use this tool if you need to delete only a few migration sets. To run the tool that deletes a specified migration set, do the following:
  1. Determine the migration set ID that you need to delete from the migration database as follows:
     a. Using the DB2 Control Center or an SQL query, look at the CONFIGPLAN table.
     b. Find the CONFIGPLANNAME that you want to delete.
     c. The migration set ID you need to specify is the value in the corresponding CONFIGPLANID column.
  2. From a DB2 Command Window, navigate to the directory where **deletemigsets.bat** is located.
     – For Java, this is your *VisualAge-for-Java-install-directory*\ide\vgmigration.
     – For Smalltalk, this is your *VisualAge-Smalltalk-install-directory*.
  3. Run the **deletemigsets.bat** file, using one of the following formats:
     – If you want to delete just one migration set, use the following format:

       ```
       deletemigsets n
       ```

       where *n* is the value in the CONFIGPLANID column corresponding to the migration set ID that you want to delete.
     – If you want to delete several migration sets, use the following format:

       ```
       deletemigsets "n1,n2"
       ```

       where *n1* and *n2* are the migration set IDs that you want to delete.

Cataloging a remote database using DB2

The migration tool provides better performance if you use a local DB2 database. However, if you decide to use a remote database, this section provides information that can be helpful. You need the following information to catalog a remote database on DB2:

- Hostname or IP address of the remote machine where the database resides
- Port number and protocol on the client (for example: 60000/tcp)
- Node name (alias that describes the remote machine (for example: db2node)
- Database name
- Database alias (optional)

To establish a TCP/IP connection to a remote database using DB2, do the following:

1. Bring up a Command Prompt window on Windows .
2. To catalog the node, enter the following command all on one line:

   ```
   db2 catalog tcpip node nodeName remote [ hostName | ipAddress ]
       server [ svcename | portNumber ]
   ```

You can enter either the hostName or the ipAddress. For example, to catalog a remote server on node db2node with the IP address 9.10.11.123 using port number 60000, enter the following command:

```
db2 catalog tcpip node db2node remote 9.10.11.123 server 60000
```

3. To catalog the database, enter the following command all on one line:

   ```
   db2 catalog database databaseName
     [ as databaseAlias ] at node nodeName
   ```

   The "as *databaseAlias*" is optional. If you do not specify *databaseAlias*, the alias will be the same as the database name. The *nodeName* must be the same *nodeName* you used in step 2.

   For example, to catalog a remote database called SAMPLE so that it has the alias sam1 on node db2node, enter the following command:

   ```
   db2 catalog database sample as sam1 at node db2node
   ```

4. To test the connection to the database, enter the following command all on one line:

   ```
   db2 connect to databaseAlias use userName using password
   ```

   If you did not specify an alias (*databaseAlias*) in step 3, use the database name. For example, to connect to database SAMPLE with the alias sam1 for user db2user who has a password db2password, enter the following command:

   ```
   db2 connect to sam1 user db2user using db2password
   ```

   If you did not specify sam1 as the database alias in step 2, then enter the following command:

   ```
   db2 connect to SAMPLE user db2user using db2password
   ```

5. You should see the Database Connect Information.

For additional assistance, go to the following Web site:

```
https://aurora.vcu.edu/db2help/db2i4/frame3.htm#idx
```

Uncataloging a remote database using DB2

You need the following information to uncatalog a remote database on DB2:

- Database alias or the database name if no alias was specified when you cataloged the database

To uncatalog a remote database using DB2, do the following:

1. Bring up a Command Prompt window on Windows.
2. To uncatalog the database, enter the following command, where *databaseAlias* is the database alias:

   ```
   db2 uncatalog database databaseAlias
   ```

   For example, to uncatalog database SAMPLE (which was given the alias sam1), enter the following command:

   ```
   db2 uncatalog database sam1
   ```

   If you did not specify a database alias when you cataloged the database, use the name of the database. For example, if you did not specify sam1 as the database alias, enter the following command:

   ```
   db2 uncatalog database SAMPLE
   ```

For additional assistance, go to the following Web site:

```
https://aurora.vcu.edu/db2help/db2i4/frame3.htm#idx
```

Useful Queries

If you modify the sample Stage 1 migration tool or develop your own Stage 1 migration tool, the following SQL queries might be useful in verifying your changes.

Note:

- These examples can run from a DB2 Command Window.
- These examples assume that you use the default migration database name (VGMIG) and the default schema (MIGSCHEMA).
- Unless noted otherwise, the entire DB2 command must be entered on one line. The commands shown later in this document might be on several lines due to space limitations.
- These examples require that you connect to the database first. To connect to the database, run the following:

  ```
  db2 connect to VGMIG
  ```

To assist in determining if the Stage 1 migration tool ran correctly, run the following .bat file that is located in your *VAGen-installation*\ide\vgmigration directory for Java or your *VAGen-installation* directory for Smalltalk:

checkStage1.bat

The .bat file runs several queries:

- List of the migration plan names in the database
- Total number of parts in the database
- Other queries to check the validity of the External Source Format and parts placement into EGL files.

The results of the first two queries should be greater than 0. The results of the other queries should be 0. If your results differ, then there was a problem during Stage 1 migration and you should contact IBM Support.

To determine if a VAGen part has been migrated:

```
db2 select configplanname, configplanversion, vgpartname, vgparttime, is_migrated
   from migschema.vgpart where vgpartname = 'yourPartName'
```

To verify the first few characters of the External Source Format for all parts in the migration database:

```
db2 select vgpartname, cast(vgesfsource as char(n)) from migschema.vgpart
```

n is a number between 1 and 256 and is the number of characters you want to display.

To determine if any parts in the migration database do not begin with valid External Source Format tags:

```
db2 select vgpartname, cast(vgesfsource as char(n))
    from migschema.vgpart  where vgesfsource not like ':%'
```

n is a number between 1 and 256 and is the number of characters you want to display.

To reset all parts in the migration database if you want to rerun Stage 2 and 3 of migration without rerunning Stage 1:

```
db2 update migschema.vgpart  set is_migrated = 'N', eglsource = NULL,
    eglpartname = NULL
db2 delete from migschema.translation_msgs
```

To backup the migration database:

```
db2 backup database vgmig to x:\mybackups\backupName
```

x:\mybackups\backupName is the drive and directory where you want the backup to be placed. Several subdirectories will be created under *x:\mybackups\backupName*.

To restore the migration database that you previously backed up:

```
db2 restore database vgmig from x:\mybackups\backupName REPLACE EXISTING
```

x:\mybackups\backupName is the drive and directory where you want the backup to be placed.

Appendix H. Migration tool performance

There are many factors that affect the performance of the migration tool. These factors include the following:

- General performance for Stage 1, 2 and 3
  - Memory.
  - Processor speed.
  - Local or remote DB2 database. For remote databases, the speed of the network connection is critical.
  - Number of Java projects and packages or number of Smalltalk configuration maps and applications.
  - Number of parts and their distribution by part type.
  - Number of migration sets.
  - Number of lines in function parts.
- Performance for Stage 1
  - Clean Java workspace or Smalltalk image before starting migration.
  - Local or remote Java repository or Smalltalk library. For remote repositories or libraries, the speed of the network connection is critical. Some customers improve the processing speed by copying their repository to the machine where migration is running.
  - Complexity of renaming rules.
  - Whether the migration set already exists in the migration database. If you are recreating a migration set with a different set of renaming rules, it is more efficient to recreate the SQL tables by running setuptables.bat than to have the Stage 1 migration tool clean out the original migration set. Recreating the SQL tables is only practical if there are no other migration sets in the migration database.
- Performance for Stage 2 and 3
  - Setting for the VMArgs option in the .ini file. When the VMArgs option is not set, the refresh and rebuild of the workspace in Stage 3 does not run reliably. You must set this option. For details of how to set this option, see "Start up parameters" on page 155.
  - Migration options.

Given the number of factors involved, there is no specific formula that can predict migration run time. However, the following sections provide some antedotal guidance on how long the various stages of migration might take:

- Number of projects, packages, parts and programs
- Number of migration sets and other migration options
- Processor speed
- Number of lines in function parts
- Clean Java workspace for Stage 1

In addition, there is a section that provides some information that you can use to help plan your disk space requirements.

Number of projects, packages, parts, and programs

The next table provides information on how long the various stages of migration might take. These tests were run using Windows XP with a 1.0 gigaHertz of memory and a 1.1 gigaHertz processor speed. The measurements are for EGL 6.0.1.1, and all times are in minutes.

Table 161. Effect of migration set size on migration times

Test case	Number of projects	Number of packages	Number of parts	Number of programs	Stage 1 time	Stage 2 time	Stage 3 time to write files	Stage 3 time to refresh or build
1	1	98	18,403	1,246	53	10	6	9
2	1	10	2,771	147	23	5	1	2
3	3	29	2,660	33	8	1	1	1
4	3	44	7003	25	62	6	4	14
5	4	92	10,601	25	16	2	2	4
6	5	35	8,238	100	23	3	2	4
7	474	570	11,280	162	46	10	7	22
8	6	118	15,250	71	91	9	6	9

Here are some general observations based on Table 161:

- Test cases 2 and 3 have similar numbers of parts, but test case 2 takes 3 times as long to run in Stage 1 and 5 times as long to run in Stage 2. Test case 2 has 4.5 times as many programs to analyze for associates during Stage 1 and 2. So the number of programs has an impact on the run times.
- Test cases 5 and 7 have similar numbers of parts, but test case 7 takes nearly 3 times as long in Stage 1 and 5 times as long to run in Stage 2. Test case 7 has many more programs to analyze for associates during Stage 1. In addition, test case 7 has relatively few data items compared to test case 5. In VAGen, data items never have associates so the Stage 1 migration tool does not attempt to determine associates for the data items. Test case 7 also takes 3.5 times as long to write the files in Stage 3. There are more generatable parts for which to analyze associates. Because each generatable part is in its own file, there are more files to write. Proportionally fewer parts are placed into the CommonParts.egl and UnusedParts.egl files than in test case 5. The files are smaller and there are more of them.
- Test case 1 has 50% more parts than test case 7, but test case 7 takes more than twice as long to refresh and rebuild the workspace. Test case 7 has many more projects and packages to analyze during the build. In addition, in test case 7 there are 162 project cycles detected during the build process, so this contributes to the longer build times.

Based on the information in Table 161, if you have several hundred or even 1000 programs you might want to migrate them as a single migration set even if the programs are split across several subsystems. This assumes that the subsystems all use the same version of your common projects and that the subsystems do not have any duplicate part names.

Number of migration sets and other migration options

Table 162 shows the impact of consolidating into a smaller number of migration sets. It also shows the impact of the Stage 2 Migrate remaining VAGen parts option and the Stage 3 Override existing files option. The table shows the same set of VAGen projects migrated using 3 different techniques. There are 10 projects, 228 packages, 19255 parts, and 225 programs. The two common projects contain 7734 parts and 41 programs. This represents 40% of the parts. Each of the 8 migration sets represents one subsystem and includes the two common projects. There are no duplicate parts in the 8 subsystems so it is possible to migrate all the subsystems as a single migration set as shown in TestCase 10C. The measurements for EGL 6.0.1, and all times are in minutes.

Table 162. Effect of number of migration sets and migration options

Test case	Number of migration sets	Migrate remaining VAGen parts	Override existing files	Stage 1 time	Stage 2 time	Stage 3 time to write files	Stage 3 time to refresh or build
10A	8	No	No	575	54	780	
10B	8	Yes	Yes	575	55	880	
10C	1	Yes	Yes	219	34	159	

Here are some general observations based on Table 162:

- Test cases 10A and 10B use the same Stage 1 database as the starting point for Stages 2 and 3. These two test cases differ only in the options chosen for Stage 2 and Stage 3.
  - In Stage 2, there is little impact due to changing the Migrate remaining VAGen parts option. This is probably due to the relatively small number (250) of unused parts.
  - In Stage 3, the time to merge in newly migrated parts into existing files is less than the time to rewrite the files completely. When you select the Override existing files option, each of the files in the common projects must be written each time. When you deselect the Override existing files option, the migration tool does not rewrite existing files if there are no newly migrated parts to merge into the file. In this particular test case, most of the common parts are used by the first two migration sets, so the time to merge additional parts is less than the time to rewrite the existing files for each migration set.
  - In Stage 3, there might also be a small impact in the analysis time because the unused parts do not have to be analyzed once to determine their import statements.
- Test case 10C added one project that contains a high-level PLP part that points to the 10 other projects. This technique enables all 8 subsystems to migrate as a single migration set.
  - In Stage 1, there is a significant savings in time because the common parts do not need to be loaded and analyzed for each migration set.
  - In Stage 2, there is some savings because the common parts do not have to be analyzed for cross part migration in multiple migration sets. However, because the migration tool does convert all the parts, there is not as big a percentage savings as in Stages 1 and 3.
  - In Stage 3, there is a significant savings in time due to a combination of several factors:

- The common parts are only analyzed once to determine their import statements.
- The EGL files are only written one time.
- There is no need for any merge logic for the files because all the parts are migrated at the same time.

Processor speed

Table 163 shows the impact of changing the processor speed from 1.1 gigaHertz to 1.6 gigaHertz. Both machines had 1.0 gigaHertz of memory. The 1.1 gigaHertz machine used Windows 2000; the 1.6 gigaHertz machine used Windows XP. The processor speed has a significant impact, particularly on the Stage 1 and 2 processing time. The measurements are for EGL 5.1.2.

Table 163. Effect of processor speed on migration times

	1.1 gigaHertz				1.6 gigaHertz			
Test case	**Stage 1 time (in hours)**	**Stage 2 time (in hours)**	**Stage 3 time to write files (in hours)**	**Stage 3 time to refresh or build files (in hours)**	**Stage 1 time (in hours)**	**Stage 2 time (in hours)**	**Stage 3 time to write files (in hours)**	**Stage 3 time to refresh or build files (in hours)**
10	1.2	1.0	0.4	0.2	0.4	0.3	0.3	0.1
11	3.0	1.6	1.8	0.9	1.6	0.6	0.9	0.9

Based on Table 163, you might want to use a machine with faster processor speed during migration.

Number of lines in function parts

At one point in time, VisualAge Generator had a problem that resulted in a series of blank lines being inserted into functions. In some cases, as many as 32,000 blank lines were inserted. These extraneous blank lines have a severe impact on performance. Table 164 shows the impact of the number of lines in a function on the migration times. The test case contains 2 projects, 17 packages, 919 parts, and 87 programs. There were 497 functions, 8 of which had numerous blank lines (suspected to be in the 30,000 range). The measurements are for EGL 5.1.2, and all times are in minutes.

Table 164. Effect of in-function lines on migration times

	Before removing blank lines in VAGen				After removing blank lines in VAGen			
Test case	**Stage 1 time**	**Stage 2 time**	**Stage 3 time to write files**	**Stage 3 time to refresh or build files**	**Stage 1 time**	**Stage 2 time**	**Stage 3 time to write files**	**Stage 3 time to refresh or build files**
12	40	25	1	3	12	11	1	3

There is a dramatic difference in the Stage 1 and 2 processing time just from removing the extraneous blank lines before starting migration. If you know of functions that have large numbers of blank lines, you should eliminate them before migration. However, due to the rarity of the problem in VisualAge Generator, it is

probably not cost effective to search for these functions prior to migration. If there are more than 3 consecutive blank lines, the migration tool automatically eliminates the additional blank lines during Stage 2 migration. Therefore, there is no change in the processing time for Stage 3. There is improved performance in EGL due to the elimination of these blank lines.

Clean Java workspace for Stage 1

The next table shows the impact of having a clean workspace at the start of Stage 1 migration. Test case 13 contains 3 projects, 29 packages, 2660 parts, and 33 programs. Test case 14 contains 7 versions of a migration set. The first version contains 3 projects, 4 packages, 30 parts and no programs. The last version contains 6 projects, 11 packages, 66 parts, and 7 programs. The measurements are for EGL 5.1.2, and all times are in minutes.

Table 165. Effect of clean Java workspace on migration times

Test case	Stage 1 Time without Clean Workspace	Stage 1 Time with Clean Workspace
13	17	12
14	11	1

Based on Table 165, you should consider starting with a clean workspace if you are migrating from VisualAge Java. For details on how to start with a clean Java workspace, see "Improving performance" on page 126.

For VisualAge Smalltalk, similar time savings are likely. Therefore, if you are migrating from VisualAge Smalltalk, you should also consider starting with a clean image. For details on how to start with a clean Smalltalk image, see "Improving performance" on page 146.

Disk space requirements

There is no direct relationship between the disk space requirements of a VisualAge Generator application and the corresponding EGL application.

The next table provides disk space requirements for the same test cases shown in Table 161 on page 420. The EGL measurements were all done immediately after migration, before correcting any messages in the Problems view and before doing any generation. The measurements are for EGL 6.0.1.1, and all sizes are in megabytes (MB).

Table 166. Disk space requirements

Test case	VAGen .dat file size	DB2 backup file size for Stage 1	EGL project interchange file	EGL workspace size	EGL .metadata directory size	EGL total workspace size
1	25.5	128.0	6.4	51.5	29.7	81.2
2	3.5	48.0	23.6	30.8	27.0	57.8
3	3.0	36.0	23.6	31.9	33.1	65.0
4	14.9	104.0	25.5	54.4	45.6	100.0
5	11.1	60.0	24.1	48.9	41.2	90.1
6	8.0	60.0	1.0	16.8	20.9	37.7

Table 166. Disk space requirements (continued)

Test case	VAGen .dat file size	DB2 backup file size for Stage 1	EGL project interchange file	EGL workspace size	EGL .metadata directory size	EGL total workspace size
7	33.5	124.0	6.0	44.1	95.9	140.0
8	13.2	136.0	1.5	33.2	26.0	59.2

Here are some general observations based on Table 166 on page 423:

- The VAGen .dat file size is the size of an exported VisualAge Java repository file that contains only the VAGen projects and packages from the migration set.
- The DB2 backup file size is the size **of the backup file** for the migration database at the end of Stage 1 after running the DB2 runstats.bat command file. The Stage 2 size will be larger due to adding the EGL source code to the database.
- Test cases 1, 6, 7, and 8 do not have any VAGen Web Transaction or UI records. The EGL project interchange file size is much smaller than the VAGen .dat file size.
- Test cases 2, 3, 4, and 5 all have VAGen Web Transaction programs and UI records. The migration tool creates EGL Web projects for each project within the test case that contains either a VAGen Web Transaction or UI record. EGL Web projects contain the contain the following:
  - standard .properties files such as the csogw.properties and gw.properties files
  - standard .jar files such as the hpt.jar and hptGateway.jar files
  - standard .jsp files such as the Vagen1LogonPage.jsp and CSOERRORUIR.jsp files
  - .jsp files that are generated for the UI records in the project

  These files result in a much larger project interchange file size than for projects that do not contain VAGen Web Transaction programs or UI records.
- EGL uses the .metadata directory to store information needed for building the workspace. Test case 7 has a much larger .metadata directory than the other projects. This is due to the much larger number of projects and packages for test case 7. Therefore, if you have many projects and packages, you should allow for more space for the .metadata directory. For example, if you organized your source code with one program per project in VAGen, then you should probably plan for a correspondingly larger .metadata directory. The same analysis applies for the total workspace size.

Appendix I. Required modifications if you migrated with a previous version of the migration tool

If you migrated from VisualAge Generator to EGL with a previous version of the migration tool, you might need to make the some changes by hand. The following sections describe the changes that are required:

- General changes
- Changes due to IMS and DL/I support
- Changes due to web transaction support

General changes

The following general changes have been made for EGL 6.0.1:

- Changes due to the @ sign.
- Additional EGL replacements for some EZE string functions.
- Also refer to the online help topic EGL to EGL Migration for additional changes you might need to make.

Changes due to the @ sign

VisualAge Generator: Part names and nonshared item names can start with the @ symbol.

EGL prior to 6.0.1: In VisualAge Generator Compatibility mode, part names and variable names can start with the @ symbol.

EGL 6.0.1: Even in VisualAge Generator Compatibility mode, part names and variable names cannot start with the @ symbol.

Required change: Change any part name or variable name that starts with the @ symbol.

Additional EGL replacements for some EZE string functions

VisualAge Generator: VisualAge Generator supports EZE string functions. VisualAge Generator tolerates the use of numeric items as character arguments in some of the EZE string functions.

EGL prior to 6.0.1: The migration tool converts the EZE string functions to the equivalent EGL system function. However, these functions are only intended to support character data.

EGL 6.0.1: EGL has added three new functions to support the use of numeric items as character arguments. The functions provide improved support for migrating VAGen customers. The original EGL functions are still available. The migration tool always converts to the new EGL functions because these provide the best match for VAGen behavior.

Required changes to previously migrated parts: See Table 167 on page 426 for the original VisualAge Generator EZE string functions that are affected, the EGL source produced by the migration tool prior to EGL 6.0.1, and the EGL source produced by the migration tool for EGL 6.0.1. You only need to change the EGL function

names if there is a message on the Problems view about an invalid argument for one of the affected EGL functions. For example, there might be a message such as one of the following, where *eglFunctionName* is one of the functions listed in the center column of Table 167 on page 426:

- IWN.VAL.6681.e *functionName* - The function *eglFunctionName(parameterTypeList)* is not applicable for the arguments *(argumentTypeList)*.
- IWN.VAL.7553.e *functionName* - Argument *n* for *eglFunctionName* must be a string item, string constant, or string literal.

Table 167. EZE string functions changed for EGL 6.0.1

VAGen Language Element	EGL prior to 6.0.1	EGL 6.0.1
EZESCMPR	strLib.compareStr	VGLib.compareBytes
EZESCNCT	strLib.concatenate	VGLib.concatenateBytes
EZESCOPY	strLib.copyStr	VGLib.copyBytes

Changes due to IMS and DL/I support

EGL now supports the IMS runtime environments and DL/I I/O. If you previously migrated parts that have language elements related to IMS or DL/I, you might need to make changes to the following:

- Program part
- PSB part and DL/I segment record
- Function I/O - PSB name, database identifier, scan parent, scan update, and SSAs
- EZEDL* special function words and CSPTDLI service routine
- Generation option parts
- Linkage table parts
- Resource association parts

Program part

VisualAge Generator: VisualAge Generator supports a program that specifies a PSB for use in the IMS runtime environments or for use with a DL/I database in the MVS or VSE runtime environments. VisualAge Generator automatically considers all DL/I segment records specified in the program's PSB as associates of the program. VisualAge Generator supports passing a PSB (EZEDLPSB) or PCBs (EZEDLPCB[*n*], where *n* is a numeric literal) to a called program.

EGL prior to 6.0.1: The migration tool includes the PSB information as a comment in the program. The tool does not add any DL/I segment records from the PSB to the program's record declaration list. The tool comments out program parameters that reference EZEDLPSB or EZEDLPCB[*n*].

EGL 6.0.1: EGL supports programs that specify a PSB for use in the IMS runtime environments or for use with a DL/I database in the z/OS runtime environment. EGL requires that all DL/I segment records specified in the program's PSB be defined. EGL also supports program parameters to receive the PSB or PCBs. The migration tool converts to the EGL syntax.

Required changes to previously migrated parts: For help in specifying the PSB for the program, see Table 104 on page 271. For help in manually converting EZEDLPSB and EZEDLPCB[*n*] to the correct EGL syntax, see Table 103 on page

269. Be sure to add declarations for all DL/I segment records referenced in the program's I/O statements or in the hierarchical path to a segment that is referenced in an I/O statement. Alternatively, migrate the program and its associates again.

PSB part and DL/I segment record

VisualAge Generator: VisualAge Generator supports PSB parts and DL/I segment records.

EGL prior to 6.0.1: The migration tool ignores PSB parts and DL/I segment records.

EGL 6.0.1: EGL supports PSB parts and DL/I segment records. The migration tool converts these parts.

Required changes to previously migrated parts: None. These parts were not previously migrated. You must migrate the parts using the migration tools provided with EGL 6.0.1.

Function I/O - PSB name, database identifier, scan parent, scan update, and SSAs

VisualAge Generator: VisualAge Generator supports a DL/I segment record as the I/O object for a function. VisualAge Generator permits you to specify a PSB and database identifier for the DL/I call. For a SCAN I/O option, you can specify that you want a scan parent (GNP) call or a scan update (GHN) call. You can also modify the default SSAs.

EGL prior to 6.0.1: The migration tool migrates functions that contain a DL/I I/O object as though the PSB, database identifier, scan parent, scan update, and SSAs are not specified. This preserves as much of your function logic as possible. The converted EGL is valid if the VAGen DL/I Call Editor was never used for the function. The migration tool does not include the PSB, database identifier, scan parent, scan update, or modified SSAs as comments.

EGL 6.0.1: EGL supports DL/I segment records for I/O in functions, including the usingPCB, inParent, and forUpdate options, as well as modified SSAs. The migration tool converts DL/I I/O functions to the equivalent EGL function.

Required changes to previously migrated parts: You could not use the DL/I functions in EGL releases prior to 6.0.1. You must migrate the DL/I functions again using the migration tools provided with EGL 6.0.1. Be sure to include the DL/I segment records.

EZEDL* special function words and CSPTDLI service routine

VisualAge Generator: VisualAge Generator supports EZEDL* special function words and the CSPTDLI service routine.

EGL prior to 6.0.1: The migration tool converts the EZEDL* special function words and the CSPTDLI service routine to its ″best guess″ as to the eventual EGL syntax. This preserves as much of your function logic as possible. The ″best guess″ varies with each release of EGL.

EGL 6.0.1: EGL provides replacements for the EZEDL* special function words and the CSPTDLI service routine. The migration tool now uses the EGL 6.0.1 replacements.

Required changes to previously migrated parts: See Table 168 for the original VisualAge Generator EZEDL* special function words and CSPTDLI service routine, the EGL source produced by the migration tool for EGL 6.0.0.1, and the EGL language element required for EGL 6.0.1. You must change any functions that reference incorrect replacements for the EZEDL* special function words or CSPTDLI.

Table 168. EZEDL special function words and CSPTDLI service routine*

VAGen Language Element	EGL 6.0.0.1 language element produced by the migration tool	EGL 6.0.1 language element and required change
EZEDLCER	dliVar.dliCicsErrorCode	dliVar.cicsError
EZEDLCON	dliVar.dliCicsConditionCode	dliVar.cicsCondition
EZEDLDBD	dliVar.dliDbdName	dliVar.dbName
EZEDLERR	dliVar.handleHardDLIErrors	dliVar.handleHardDLIErrors
EZEDLKEY	dliVar.dliKey	dliVar.keyArea[1:dliVar.keyAreaLen]
EZEDLKYL	dliVar.dliKeyLength	dliVar.keyAreaLen
EZEDLLEV	dliVar.dliLevel	dliVar.segmentLevel
EZEDLPCB[*n*] where *n* is a numeric literal	In statements, the migration tool converts to dliVar.dliPCB[*n*]. In a program's called parameter list, the migration tool converts to a comment that specifies dliVar.dliPCB[*n*] with a type definition of dliVar.dliPCB[*n*].	The migration tool always sets the variable that declares the program's PSB to *psb*. Therefore, in statements, EZEDLPCB[*n*] converts as follows: • EZEDLPCB[0] converts to psb.iopcb. • EZEDLPCB converts to psb.pcb1, because 1 is the default subscript. • EZEDLPCB[*n*], where *n* is a numeric literal, converts to psb.pcb*n*. In a program's called parameter list, special considerations apply. For details, see Table 103 on page 269.
EZEDLPRO	dliVar.dliPcbOptions	dliVar.procOptions
EZEDLPSB	In statements, the migration tool converts to dliVar.dliPsbName. In a program's called parameter list, the migration tool converts to a comment that specifies dliVar.dliPsbName with a type definition of dliVar.dliPsbName.	In statements except the CALL statement, EZEDLPSB converts to dliLib.psbData.psbName.In the CALL statement, EZEDLPSB converts to dliLib.psbData. In a program's called parameter list, special considerations apply. For details, see Table 103 on page 269.
EZEDLRST	dliVar.dliCicsProgramRestarted	dliVar.cicsRestart
EZEDLSEG	dliVar.dliSegmentName	dliVar.segmentName
EZEDLSSG	dliVar.dliSegmentCount	dliVar.numSensitiveSegs
EZEDLSTC	dliVar.dliStatusCode	dliVar.statusCode
EZEDLTRM	converseVar.commitOnConverse	converseVar.commitOnConverse
Service Routine: • CSPTDLI	EGL equivalent routine: • dliLib.callDLI	EGL equivalent routine: • VGLib.VGTDLI

Generation option parts

VisualAge Generator: VisualAge Generator supports the following generation options for IMS environments:

- /system=IMSVS and IMSBMP
- /mfsdev
- /spa=size,ADF,bytePosition, where size and bytePosition are numeric literals
- /workdb=DLI and SQL
- other IMS-related generation options

EGL prior to 6.0.1: The migration tool converts most IMS-related generation options to EGL build descriptor options that are valid for EGL 6.0.1. These options can be viewed in the Text Editor, but not in the EGL Build Parts Editor. The migration tool comments out the /mfsdev generation option and the /workdb values of DLI and SQL. The tool converts the /spa option to spaSize="size,ADF,bytePosition".

EGL 6.0.1: EGL supports the IMSVS and IMSBMP runtime environments, including replacements for the IMS-related generation options. The migration tool supports conversion of these generation options.

Required changes to previously migrated parts: See Table 141 on page 318 for help in manually converting the comments for the /mfsdev and /workdb generation options to EGL build descriptor options. In addition, you must change the spaSize build descriptor option into 3 new options: spaSize="size", spaADF="YES" or "NO", and spaStatusBytePosition="bytePosition". Alternatively, migrate the generation options part again and compare the results to your current EGL part definition.

Linkage table parts

VisualAge Generator: VisualAge Generator supports the following value for the /remoteComType for :calllink entries in the linkage table for the IMS environments:

- appcims

EGL prior to 6.0.1: The migration tool converts to remoteComType="appcims".

EGL 6.0.1: EGL does not support support remoteComType="APPCIMS". The replacement values are IMSJ2C and IMSTCP. The migration tool converts to remoteComType="appcims" to preserve as much of your linkage table entry as possible.

Required changes to previously migrated parts: Determine whether you want to use IMSJ2C or IMSTCP. Refer to the online helps for details about the EGL remoteComType attribute and the options that are available in EGL.

Resource association parts

VisualAge Generator: VisualAge Generator supports the following resource association options for IMS environments:

- /system=imsvs or imsbmp
- /filetype=gsam, mmsgq, smsgq, or seq. gsam is valid for MVSBatch, seq is valid for IMSBMP.
- /pcbno=*n*, where *n* is a numeric literal

EGL prior to 6.0.1: The migration tool comments out resource association entries for unsupported runtime environments, for unsupported file types, or that contain /pcbno.

EGL 6.0.1: EGL supports the IMSVS and IMSBMP runtime environments. EGL also supports the file types GSAM, MMSGQ, and SMSGQ. GSAM is supported for zosBatch. SEQ is valid for IMSBMP. The migration tool supports conversion of the new /system values, /filetype values, and the /pcbno option.

Required changes to previously migrated parts: See Table 147 on page 341 for help in manually converting the resource association comments to EGL resource association entries. Alternatively, migrate the resource association part again and compare the results to your current EGL part definition.

Changes due to Web transaction support

The following changes have been made due to adding Web transaction support to EGL. If you previously migrated parts that have language elements related to Web transactions, you might need to make changes to the following:

- DataItem parts - help and label text
- Web transaction program and UI Record parts
- XFER statement
- Generation option parts

DataItem parts - help and label text

VisualAge Generator: VisualAge Generator supports help and UI label text for data item parts that are used in UI records.

EGL prior to 6.0.1: The migration tool converts the help and label text to a ″best guess″ for the EGL help and displayName properties. If the help or label text has multiple lines, the migration tool concatenates the lines and includes \r\n for a carriage return and line feed for each line of text other than the last.

EGL 6.0.1: EGL supports help and displayName text for DataItem parts. If the help text has multiple lines, the migration tool concatenates the lines, but does not include \r\n for a carriage return and line feed for each line of text other than the last. This provides support for javaScript in the help text. If the UI label text has multiple lines, the migration tool concatenates the lines, but includes \n for a line break for each line of text other than the last.

Required changes to previously migrated parts: Modify the DataItem parts. If there are multiple lines specified for the help property, delete the \r\n at the end of each line other than the last. If there are multiple lines specified for the displayName property, change the \r\n to \n for each line of text other than the last.

Web transaction program and UI Record parts

VisualAge Generator: VisualAge Generator supports Web transaction programs and User Interface (UI) records.

EGL prior to 6.0.1: The migration tool ignores Web transaction programs or UI records.

EGL 6.0.1: EGL supports VGWebTransaction programs and VGUI records. The migration tool converts these parts.

Required changes to previously migrated parts: None. These parts were not previously migrated. You must migrate the parts using the migration tools provided with EGL 6.0.1.

XFER statement

VisualAge Generator: VisualAge Generator supports XFER with a map or UI record.

EGL prior to 6.0.1: The migration tool converts an XFER with a map to an EGL show statement and (as a ″best guess″) converts an XFER with a UI record to an EGL *forward* statement. This preserves as much of your logic as possible.

EGL 6.0.1: EGL uses the show statement for both forms and VGUI records. The migration tool converts an XFER with a map or UI record to a *show* statement.

Required changes to previously migrated parts: Edit the function and change the *forward* statement to a *show* statement.

Generation option parts

VisualAge Generator: VisualAge Generator supports the following generation options for Web transaction programs:

- /genuirecords
- /javadestdir, /javadesthost, /javadestpassword, /javadestuid, and /javasystem.
- /genout, /genresourcebundle, /messageTablePrefix, /resourceBundleLocale, and /targnls.

EGL prior to 6.0.1: The migration tool converts the /genuirecords generation option to the EGL genUIRecords=″YES″ build descriptor option. The tool comments out the other Web-transaction-related generation options.

EGL 6.0.1: EGL supports VGWebTransaction programs and VGUI records, including replacements for the Web-transaction-related generation options. genVGUIRecords is the replacement for /genuirecords. In addition, if you generate VGWebTransaction programs for COBOL runtime environments, EGL requires that you split your original VAGen generation options part into 2 EGL parts: one for generating the VGWebTransaction program for the COBOL runtime environment and one for generating the Java-related outputs for the VGUI record. The migration tool supports conversion of the Web-transaction-related generation options, as well as splitting the generation option part into 2 EGL build descriptor parts.

Required changes to previously migrated parts: See Table 141 on page 318 for help in manually converting the comments for the generation options to EGL build descriptor options. The table also indicates which options must be split into the secondary target build descriptor part for generating the Java-related outputs for VGUIRecords. In addition, you must change the genUIRecords build descriptor option to genVGUIRecords. Alternatively, migrate the generation options part again and compare the results to your current EGL part definition.

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Rational Software Development Platform
VisualAge Generator to EGL Migration Guide
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