IBM Host Access Transformation Services

Rich Client Platform Programmer's Guide

Version 9.6

SC27-5903-02

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Note

Before using this information and the product it supports, be sure to read the general information under Appendix B, "Notices," on page 83.

Ninth Edition (November 2018)

Contents

Chapter 1. Introduction

The Host Access Transformation Services (HATS) Toolkit offers many tools for creating and customizing Web HATS applications that provide an easy-to-use graphical user interface (GUI) for your character-based 3270 or 5250 host applications. HATS Web applications, including portlets can be developed with a look and feel that matches your company's Web or portal pages, and your users can access them through their Web browsers. HATS can also be used to create service-oriented architecture (SOA) assets from logic contained in your character based 3270, 5250, or VT applications.

Service-Oriented Architecture expresses a perspective of software architecture that defines the use of loosely coupled software services to support the requirements of the business processes and software users. In an SOA environment, resources on a network are made available as independent services that can be accessed without knowledge of their underlying platform implementation.

SOA can also be regarded as a style of Information Systems architecture that enables the creation of applications that are built by combining loosely coupled and interoperable services. These services operate together based on a formal definition or contract (for example, WSDL) that is independent of the underlying platform and programming language. The interface definition hides the implementation of the language-specific service. SOA-compliant systems can therefore be independent of development technologies and platforms (such as Java™ and .NET). For example, services written in C# running on .NET platforms and services written in Java running on Java EE platforms can both be consumed by a common composite application. In addition, applications running on either platform can consume services running on the other as Web services, which facilitates reuse. SOA can support integration and consolidation activities within complex enterprise systems, but SOA does not specify or provide a methodology or framework for documenting capabilities or services.

You might find that your HATS application requires some additional function that you cannot add using the wizards and editors in HATS Toolkit and IBM® Rational® Software Delivery Platform (SDP). This *Web Application Programmer's Guide* explains several ways that you can extend your HATS application with additional programming. It also assumes that you are familiar with basic HATS concepts such as:

- How HATS processes host screens
- Creating a transformation using components and widgets
- Events and actions
- Using global variables
- Recording a macro
- Creating an Integration Object from a macro

If you are not already familiar with any of these topics, refer to the information about them in *HATS User's and Administrator's Guide* so that you will have the necessary background to make good use of the information in this book. You should also be familiar with using Rational SDP to create Java EE applications.

This *Web Application Programmer's Guide* describes ways to enhance your HATS application by programming. You can:

- Add business logic classes to be invoked as an action when an event occurs. You can also create custom logic to aid in recognizing host screens. See Chapter 2, "Adding business logic," on page 3 for more information.
- Add new host components or widgets to be used in transformations by extending the existing host components and widgets. See Chapter 3, "Creating custom components and widgets," on page 17 for more information.
- Perform several programming tasks with Integration Objects. See and for more information.
- Make one or more Integration Objects available as a Web service, which makes the objects available for use by other applications. See for more information.
- Create your own plug-ins for Web Express Logon. See .
- Enhance the capabilities of your HATS portlets. See for more information.
- Use the HATS bidirectional API to work with the orientation of screen elements in applications that use bidirectional code pages. See Chapter 4, "Using the HATS bidirectional API," on page 29 for more information.

When enhancing your applications, you might find that you need to edit some of the Java source files. Information provided in the section of the Rational Software Delivery Platform help titled *Developing Java applications* can help you with this task.

Code examples

Code examples throughout this guide illustrate the use of the objects or APIs introduced in the adjoining sections. The examples may or may not work if you copy them from the book into your application.

Using the API documentation (Javadoc)

The HATS API reference documentation is useful for many programming tasks. To view this documentation, see IBM Knowledge Center collection for HATS at http://www.ibm.com/support/knowledgecenter/SSXKAY_9.6.0 and click the HATS API References (Javadoc) link. Refer to this documentation when you need information about, and examples of, any of the Application Programming Interfaces provided with HATS.

Chapter 2. Adding business logic

Business logic is any Java code that is invoked as an action when an event occurs, such as a host screen being recognized or your HATS application being started. Business logic is specific to the application and is not provided as part of HATS. You can use business logic to extend your HATS application to integrate with other data sources, such as a database or an Integration Object. For example, you can read the contents of a file or a database into HATS global variables and use the global variables to fill in a drop-down list or pop-up to be used in the application's GUI pages.

HATS automatically updates your class loader policy when you include HATS business logic in your HATS Web project. This updates the default WAR class loader policy of your HATS application to **Single class loader for application**.

You can create business logic and add it to your project using the Create Business Logic wizard. To invoke this wizard, right-click in the **HATS Projects** tab of the HATS Toolkit, and click **New HATS > Business Logic**.

In the Create Business Logic wizard, specify the project you want to add the business logic to and supply the Java class name. The default package name is *projectName*.businessLogic, but you can change this in Studio Preferences. Optionally, you can supply a package name or click **Browse** to select an existing Java package. If you want your business logic to include methods for easy access to the project global variables, or to remove project global variables, select the **Create global variable helper methods** check box. Click **Finish** when you have provided the required information.

After you create your business logic class, you will want to link it to one or more screen or application events so it is executed when that event occurs. Edit each event (application event or screen customization) to which you want to add the link. On the Actions tab, click **Add**, select **Execute business logic**, then fill in the details for your business logic class. Refer to *HATS User's and Administrator's Guide* for information about editing both screen customization and events.

You can see the business logic files in the project by expanding the **Source** folder on the **HATS Project View** tab of the HATS Toolkit. Each package name or class name appears in the **Source** folder. Expand the package name folder to see the Java class name. Click the class name to edit the class. The **Source** folder can also include other Java files that have been imported into your HATS project.

If you use the Create Business Logic wizard to create business logic, the method that is invoked by the execute action is named **execute** by default. If you write your own class, the method must have the following attributes:

- Be marked public and static
- Have a return type of void
- Accept a com.ibm.hats.common.IBusinessLogicInformation object as the only parameter

The method must use this form, followed by your own business logic code:

```
public static void myMethod (IBusinessLogicInformation businesslogic)
```

The IBusinessLogicInformation object that is passed to your custom Java code enables you to access and use or modify various objects and settings of your HATS project. These include:

- The com.ibm.hats.runtime.IRequest class, which returns an object representing the request made to the HATS runtime and provides access to request parameters.
- The com.ibm.hats.runtime.IResponse class, which returns an object representing the response from the HATS runtime.
- The `getConnectionMap()` method, which returns a java.util.Map that contains the settings for the connection information that you provided for the application.
- The `getGlobalVariables()` method, which returns a java.util.Hashtable of global variables for this application instance. This table does not include shared global variables.
- The `getSharedGlobalVariables()` method, which returns a java.util.Hashtable of shared global variables for this application instance.
- Class properties, which provide default settings for objects such as components and widgets
- The com.ibm.hats.common.HostScreen object, which contains host screen information
- The java.util.Locale class of the client
- The com.ibm.hats.common.TextReplacementList values and settings
- The client session identifier string (returned by getter methods in the business logic template that the Create Business Logic wizard provides)
- The current screen orientation of bidirectional sessions
- The existence of the **Screen Reverse** button in the browser for bidirectional sessions

For more information about the classes made available to you, see the HATS API documentation in the HATS Knowledge Center at http://www.ibm.com/support/knowledgecenter/SSXKAY_9.6.0 for the IBusinessLogicInformation class. Since IBusinessLogicInformation extends the IBaseInfo class, several of these APIs are defined in the IBaseInfo class.

Incorporating Java code from other applications

You can incorporate Java code from other existing applications into your HATS projects in a variety of ways.

If you want to incorporate the source code (.java files) from your existing business logic so you can modify the code, you can import the .java files into the **Source** folder in your existing project. Click **File > Import > General > File System** to open the Import wizard. In the Import wizard, select the location of your source files in the **From directory** field. For Web projects, select the **Java Source** folder of your project in the destination **Into folder** entry field. When your source .java files are imported, they are automatically compiled and packaged into your HATS project. You can edit, set breakpoints, and debug your source files in the Rational SDP workbench.

You can also incorporate a Java archive (.jar) file with compiled Java business logic. The entire Java archive is added; you cannot select individual classes to add.

1. Import the .jar file into the HATS EAR project.
   a. Click **File > Import > General > File System** to open the Import wizard.

b. Select the source directory of the Java archive (.jar) you want to import in the **From directory** field.
c. Select the .jar file from the right pane.
d. Select your HATS EAR project as the destination in the **Into folder** field.
e. Click **Finish**.
f. When your .jar file is imported, click the **Navigator** tab of the HATS Toolkit and expand your HATS ear project. You will see the imported java archive file.

2. Add a java archive to the project build path.
   a. In the **Navigator** tab of the HATS Toolkit, select the project in which you want to invoke your business logic.
   b. Right-click the high-level HATS project, and select **Properties**.
   c. In the **Properties** window, select **Java Build Path** in the left table and click the **Libraries** tab on the right.
   d. Click **Add JARs** to open the **JAR Selection** window.
   e. Expand the HATS EAR project, and select the newly imported Java archive file.
   f. Click **OK** in the **JAR Selection** window, and click **OK** in the **Properties** window.
   g. Repeat this process for all HATS projects for which you want to use the business logic.
3. Define the project where the business logic is to be invoked.
   a. In the **Navigator** tab of the HATS Toolkit, again select the project in which you want to invoke your business logic.
   b. Expand the project, the Web Content folder, and the META-INF folder.
   c. Double-click the MANIFEST.MF file to open the JAR dependencies editor. Select the check box next to each .jar file that you want to include in your project's class path.

There are other ways to import Java archives into the HATS project. HATS projects are extensions of Web projects in the Rational SDP workbench. For more information about importing files into Web projects, open the Rational SDP Help and search for **Web projects**

Using global variables in business logic

If your HATS application uses global variables to store information, you can use these global variables in your business logic.

There are two types of global variables: local and shared. A local global variable is one that is created within a HATS project and is only visible to the project. A shared global variable is one that is visible to and can be used by all the applications in an EAR file. There are also two lists of HATS global variables, one for local global variables and one for shared global variables. Two global variables with the same name can coexist if one is local and the other is shared.

When you create your business logic class, use the Create Business Logic wizard and select the **Create global variable helper methods** check box. This creates methods in your business logic for getting, setting, and removing local and shared global variables.

The following methods are created:

```
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//  IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING
//  OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SAMPLE.
////////////////////////////////////////////////////////////////////////////
/**
 * Example method that sets a named global variable
 * from the current session to a value
 * @param blInfo - IBusinessLogicInformation from current session
 * @param name - Name of the global variable
 * @param value - Value of the global variable
 */
public static void setGlobalVariable(IBusinessLogicInformation blInfo,
     String name,Object value)
{
  IGlobalVariable gv = blInfo.getGlobalVariable(name);
  if ( gv == null )
   {
    gv = new GlobalVariable(name,value);
   }
  else
   {
    gv.set(value);
   }
  blInfo.getGlobalVariables().put(name,gv);
}

/**
 * Example method that sets a named shared
 * global variable from the current session to a value
 * @param blInfo - IBusinessLogicInformation from current session
 * @param name - Name of the shared global variable
 * @param value - Value of the shared global variable
 */
public static void setSharedGlobalVariable(IBusinessLogicInformation
  blInfo,String name,Object value)
{
  IGlobalVariable gv = blInfo.getSharedGlobalVariable(name);
  if ( gv == null )
   {
    gv = new GlobalVariable(name,value);
   }
  else
   {
    gv.set(value);
   }
  blInfo.getSharedGlobalVariables().put(name,gv);
}

/**
 * Example method that removes a named global variable from the current session
 * @param blInfo - IBusinessLogicInformation from current session
 * @param name - Name of the global variable
*/
public static void removeGlobalVariable(IBusinessLogicInformation blInfo, String  name)
{
  IGlobalVariable gv = blInfo.getGlobalVariable(name);
  if ( gv != null )
   {
    blInfo.getGlobalVariables().remove(name);
    gv.clear();
    gv = null;
   }
}
/**
 * Example method that removes a named shared global variable from the current session
 * @param blInfo - IBusinessLogicInformation from current session
 * @param name - Name of the shared global variable
*/
public static void removeSharedGlobalVariable(IBusinessLogicInformation blInfo, String name)
{
```

```
  IGlobalVariable gv = blInfo.getSharedGlobalVariable(name);
   if ( gv != null )
    {
     blInfo.getSharedGlobalVariables().remove(name);
     gv.clear();
     gv = null;
    }
}
/**
 * Example method that retrieves a named global variable from the current session
 * @param blInfo - IBusinessLogicInformation from current session
 * @param name - Name of the global variable
 * @return - an instance of the global variable, or null if not found.
 */
public static IGlobalVariable getGlobalVariable(IBusinessLogicInformation
  blInfo,String name)
{
  IGlobalVariable gv = blInfo.getGlobalVariable(name);
  return gv;
}

/**
 * Example method that retrieves a named shared
 * global variable from the current session
 * @param blInfo - IBusinessLogicInformation from current session
 * @param name - Name of the shared global variable
 * @return - an instance of the global variable, or null if not found.
 */
public static IGlobalVariable getSharedGlobalVariable(IBusinessLogicInformation
  blInfo,String name)
{
  IGlobalVariable gv = blInfo.getSharedGlobalVariable(name);
  return gv;
}
```

Elsewhere in your code, when you need the value of a local global variable, you can call this method:

```
GlobalVariable gv1 = getGlobalVariable(blInfo,"varname");
```

To get the value of a shared global variable, use the following method:

```
GlobalVariable gv1 = getSharedGlobalVariable(blInfo,"varname");
```

Business logic examples

This section contains examples of using business logic. Each works with global variables. Each example uses one or more of the global variable helper methods previously described, and the classes should include those methods. They are omitted in these examples to make it easier to view the example code.

Example: Date conversion

This example converts a date from mm/dd/yy format to month, day, year format. For example, the example converts 6/12/2004 into June 12, 2004. The example assumes that the global variable *theDate* has been set before the business logic is called. Note how the example uses the following method to obtain the value of the input variable:

```
IGlobalVariable inputDate = getGlobalVariable(blInfo, "theDate");
```

After using standard Java functions to manipulate the string to represent the date in the desired format, the example uses the following method to put the new string into the same global variable:

```
setGlobalVariable(blInfo, "theDate", formattedDate);
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```

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//  IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING
//  OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SAMPLE.
////////////////////////////////////////////////////////////////////////////
import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.Date;

import com.ibm.hats.common.IBusinessLogicInformation;
import com.ibm.hats.common.GlobalVariable;
import com.ibm.hats.common.IGlobalVariable;

public class CustomDateFormatter
{
   public static void execute(IBusinessLogicInformation blInfo)
   {
    IGlobalVariable inputDate = getGlobalVariable(blInfo, "theDate");
    SimpleDateFormat inputFormat = new SimpleDateFormat("MM/dd/yyyy");
    SimpleDateFormat outputFormat = new SimpleDateFormat("MMMM dd, yyyy");

    try
     {
      Date tempDate = inputFormat.parse(inputDate.getString().trim());
      String formattedDate = outputFormat.format(tempDate);
      setGlobalVariable(blInfo, "theDate", formattedDate);
     }
      catch (ParseException ex)
       {
        ex.printStackTrace();
       }
   }
}
```

Example: Adding values that are contained in an indexed global variable

This example adds the values that are contained in an indexed global variable and stores the sum in another, non-indexed global variable. It assumes that you have stored strings representing numbers in the indexed global variable *subtotals*.

The previous example included the names of the input and output global variables (*theDate*) on the set calls. This example sets the names of the input and output variables into local string variables and uses those strings on calls to get and set the global variable values. Because the name of the global variable is being passed as a variable, it is not put into quotes:

```
setGlobalVariable(blInfo,gvOutputName, new Float(myTotal));
```

```
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//  IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING
//  OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SAMPLE.
////////////////////////////////////////////////////////////////////////////
import com.ibm.hats.common.IBusinessLogicInformation;
import com.ibm.hats.common.GlobalVariable;
import com.ibm.hats.common.IGlobalVariable;

  public static void execute(IBusinessLogicInformation blInfo)
```

```
   {
    // Name of indexed global variable to be read in
       String gvInputName = "subtotals";
       // Name of global variable to be calculated and saved
       String gvOutputName = "total";

       // The indexed global variable where each index is a subtotal to be summed
       GlobalVariable gvSubtotals =
    ((GlobalVariable)getGlobalVariable(blInfo, gvInputName));

       float myTotal = 0;

       // Calculate the total by adding all subtotals
       for (int i = 0; i < gvSubtotals.size(); i++)
       {
        myTotal = myTotal + Float.valueOf(gvSubtotals.getString(i)).floatValue();
       }

       // Save the total as a non-indexed local variable
       setGlobalVariable(blInfo,gvOutputName, new Float(myTotal));
   }
```

Example: Reading a list of strings from a file into an indexed global variable

This example reads a file from the file system and stores the strings in the file into an indexed global variable. You can use a technique like this to read a file that contains, for example, a list of your company's locations. After storing the strings in a global variable, you can use the global variable to populate a drop-down list or other widget to enable users to select from a list of values. You can create a global rule to use this widget wherever an appropriate input field occurs. To make sure that the global variable is available as soon as the application is started, add the execute action for this business logic class to the Start event.

Note: If your text file has carriage returns and line feeds between lines, you might need to use "\r\n" as the second argument of the StringTokenizer constructor call in the following example.

```
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//  IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING
//  OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SAMPLE.
////////////////////////////////////////////////////////////////////////////
import com.ibm.ejs.container.util.ByteArray;
import com.ibm.hats.common.IBusinessLogicInformation;
import com.ibm.hats.common.GlobalVariable;
import com.ibm.hats.common.IGlobalVariable;

public class ReadNamesFromFile
{

  public static void execute(IBusinessLogicInformation blInfo)
  {
  // Name of indexed global variable to be saved
  String gvOutputName = "namesFromFile";

  // The file containing a list of information (in this case, it contains names)
  java.io.File myFileOfNames = new java.io.File("C:" + java.io.File.separator
       + "temp" + java.io.File.separator + "names.txt");

     try
     {
   // First, read the contents of the file

   java.io.FileInputStream fis = new java.io.FileInputStream(myFileOfNames);
```

```
   int buffersize = (int)myFileOfNames.length();
   byte[] contents = new byte[buffersize];;

   long n = fis.read(contents, 0, buffersize);

   fis.close();

   String namesFromFile = new String(contents);

   // Next, create an indexed global variable from the file contents

   java.util.StringTokenizer stok =
      new java.util.StringTokenizer(namesFromFile, "\n", false);

   int count = stok.countTokens();
   String[] names = new String[count];
   for (int i = 0; i < count; i++)
   {
    names[i] = stok.nextToken();
   }

   IGlobalVariable gv = new GlobalVariable(gvOutputName, names);
   blInfo.getGlobalVariables().put(gvOutputName,gv);
     }
     catch (java.io.FileNotFoundException fnfe)
     {
      fnfe.printStackTrace();
     }
     catch (java.io.IOException ioe)
     {
      ioe.printStackTrace();
     }
  }
}
```

Example: Calling an Integration Object

This example illustrates calling an Integration Object from business logic. The example assumes that you have an Integration Object named Iomac, which takes one input parameter, a string called input, and returns a string named output.

This business logic performs these steps:

1. Instantiates the Integration Object:

   ```
   IntegrationObject.Iomac io = new IntegrationObject.Iomac();
   ```

2. Sets the input variable from a global variable:

   ```
   io.setInput(getGlobalVariable(blInfo,"input").getString());
   ```

3. Gets the servlet request and response objects from the HATS wrapper method and invokes the Integration Object using the request and response:

   ```
   WebRequest webReq = (WebRequest)blInfo.getRequest();
   HttpServletRequest req = webReq.getHttpServletRequest();
   WebResponse webResp = (WebResponse)blInfo.getResponse();
   HttpServletResponse resp = webResp.getHttpServletResponse();
   io.doHPTransaction(req,resp);
   ```

4. Checks for exceptions.

5. If the Integration Object executed successfully, sets the global variable output to the value returned by the Integration Object's `getOutput()` method:

   ```
   if (io.getHPubErrorOccurred() == 0)
      setGlobalVariable(blInfo,"output",io.getOutput());
   ```

If you want to invoke an Integration Object that accepts more input variables or returns more variables, add setter and getter calls to set the input variables before invoking the Integration Object and retrieve the output values after it executes.

```
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```

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//  IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING
//  OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SAMPLE.
////////////////////////////////////////////////////////////////////////////
import com.ibm.hats.common.IBusinessLogicInformation;
import com.ibm.hats.common.GlobalVariable;
import com.ibm.hats.common.IGlobalVariable;

public class myLogic
{

    public static void execute(IBusinessLogicInformation blInfo)
    {
        //add code here to perform your business logic
        IntegrationObject.Iomac io = new IntegrationObject.Iomac();

  // Set Integration Object's HAOVariable "input"
  // equal to text from HATS gv "input"
  io.setInput(getGlobalVariable(blInfo,"input").getString());

  // Get the request and response objects from the HATS wrapper method and run the hp transaction

  try {
   WebRequest webReq = (WebRequest)blInfo.getRequest();
   HttpServletRequest req = webReq.getHttpServletRequest();
   WebResponse webResp = (WebResponse)blInfo.getResponse();
   HttpServletResponse resp = webResp.getHttpServletResponse();
   io.doHPTransaction(req,resp);
  }
  catch (Exception e) {
   System.out.println("Exception thrown: " + e.toString());
   setGlobalVariable(blInfo,"output",
    "An exception was thrown. Please view the log for more details");
  }

  // Retrieve "output" computed through IO transaction
  // and set it to HATS gv "output"

  if (io.getHPubErrorOccurred() == 0) {
   setGlobalVariable(blInfo,"output",io.getOutput());
   System.out.println("Transaction has been completed successfully.");
  }
  else {
   setGlobalVariable(blInfo,"output","Transaction has failed unexpectedly.
     HATS Error message = " + io.getHPubErrorMessage());
   System.out.println("Transaction failed unexpectedly. HATS Error message =
     " + io.getHPubErrorMessage()");  }
    }
}
```

Note: To run an Integration Object from business logic in standard portlets, the processRequest() method must be called instead of doHPTransaction(HttpServletRequest, HttpServletResponse). You can use the following code in step 3 (above) instead:

```
io.setHPubStartPoolName("my_hats_project/default_connection");
io.processRequest();
```

If the Integration Object is configured to use Web Express Logon in standard portlets, you must ensure PortletRequest is available in the Integration Object by calling setHPubPortletRequest(javax.portlet.PortletRequest) before executing the processRequest() method. For example:

```
io.setHPubStartPoolName("my_hats_project/default_connection");
  com.ibm.hats.portlet.runtime.JsrStandardPortletRequest jsrReq =
 (com.ibm.hats.portlet.runtime.JsrStandardPortletRequest)blInfo.getRequest();
  javax.portlet.PortletRequest req = jsrReq.getPortletRequest();
  io.setHPubPortletRequest(req);
  io.processRequest();
```

Using custom screen recognition

You can use business logic to perform custom screen recognition. HATS Toolkit provides many options for recognizing screens within a screen customization, including the number of fields on a screen, the presence or absence of strings, and the use of global variables. These options are described in *HATS User's and Administrator's Guide*. You might find, however, that you want to recognize a screen in a way that you cannot configure using the options in the screen customization editor. In that case, you can add your own custom screen recognition logic.

Note: The information in this section can be used for screen recognition within macros as well as within screen customizations.

If you want to create custom screen recognition logic using HATS global variables, see "Custom screen recognition using global variables" on page 14.

If you have already created custom screen recognition logic by extending the ECLCustomRecoListener class, you can use this logic within HATS. If you are creating new custom logic, follow these steps:

1. Open the Java perspective.
2. Click **File > New > Class**.
3. Browse to the Source directory of your HATS project.
4. Enter the names of your package and class.
5. For the superclass, click **Browse** and locate com.ibm.hats.common.customlogic.AbstractCustomScreenRecoListener.
6. Select the check box for **Inherited abstract methods**. Click **Finish**. This imports the code skeleton into the project you specified.
7. Add your logic to the `isRecognized` method. Make sure that it returns a boolean value.

   ```
   public boolean isRecognized(String arg0, IBusinessLogicInformation
   arg1, ECLPS arg2, ECLScreenDesc arg3)
   ```

   Refer to the HATS API documentation at the HATS Knowledge Center for a description of this method.
8. After creating your method, you must update the screen recognition to invoke your method. From the HATS Projects view, expand your project and the **Screen Customizations** folder. Double-click the name of the screen customization to which you want to add your custom logic. Click the **Source** tab to open the Source view of the screen customization.
9. Within the Source view, you will see a block that begins and ends with the <description> and </description> tags. This block contains the information that is used to recognize screens. Add a line within this block to invoke your custom logic:

   ```
   <customreco id="customer.class.package.MyReco::settings"
   invertmatch="false" optional="false"/>
   ```

   where customer.class.package.MyReco is your package and class name. If you want to pass any settings into your class, add them after the class name, separated by two colons. Settings are optional, and your class must parse whatever values are passed in. If you do not need settings, omit the two colons.

   Consider where within the description block you want to place the <customreco> tag. If you want your custom logic invoked only if all the other criteria match, place the <customreco> tag at the end of the block,

immediately before the </description> tag. If your screen customization compares a screen region to a value, the description block will contain a smaller block, beginning and ending with the <block> and </block> tags, to define the value to which the screen region is compared. Be sure not to place your customreco tag inside this block.

Following is an example section of a description block. Note the <customreco> tag just before the </description> tag, and not between the <block and </block> tags.

```
<description>
<oia invertmatch="false" optional="false" status="NOTINHIBITED"/>
<numfields invertmatch="false" number="61" optional="false"/>
<numinputfields invertmatch="false" number="16" optional="false"/>
<block casesense="false" col="2" ecol="14" erow="21"
   invertmatch="false" optional="false" row="20">
<string value="USERID ==="/>
<string value="PASSWORD ==="/>
</block>
<cursor col="16" invertmatch="false" optional="false" row="20"/>
<customreco id="customer.class.package.MyReco::settings"
   invertmatch="false" optional="false"/>
</description>
```

10. To rebuild your HATS project, click **Project > Clean** on the toolbar.
11. Use Run on Server to test your project. If you receive a ClassNotFoundException error, modify the class loader policy on your server. Refer to *HATS Getting Started* for more information.

Example of custom screen recognition

Following is an example of business logic that performs custom screen recognition. This business logic class takes a list of code page numbers, separated by blanks, as its settings, and recognizes the screen if its code page matches one of those listed in the settings. The tag syntax is:

```
<customreco id="company.project.customlogic.CodePageValidate::[settings]"
optional="false" invertmatch="false" />
```

For example, you can insert the following tag into a description block:

```
<customreco id="company.project.customlogic.CodePageValidate::037 434 1138"
optional="false" invertmatch="false" />
```

In this case the screen will be recognized if its code page is 037, 434, or 1138.

```
////////////////////////////////////////////////////////////////////////////
//  This sample is provided AS IS.
//  Permission to use, copy and modify this software for any purpose and
//  without fee is hereby granted. provided that the name of IBM not be used in
//  advertising or publicity pertaining to distribution of the software without
//  specific written permission.
//
//  IBM DISCLAIMS ALL WARRANTIES WITH REGARD TO THIS SAMPLE, INCLUDING ALL
//  IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. IN NO EVENT SHALL IBM
//  BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY
//  DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER
//  IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING
//  OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SAMPLE.
////////////////////////////////////////////////////////////////////////////
package company.project.customlogic;

import java.util.StringTokenizer;
import java.lang.Integer;
import com.ibm.eNetwork.ECL.ECLPS;
import com.ibm.eNetwork.ECL.ECLScreenDesc;
import com.ibm.hats.common.IBusinessLogicInformation;
import com.ibm.hats.common.HostScreen;
import com.ibm.hats.common.customlogic.AbstractCustomScreenRecoListener;

public class CodePageValidate extends AbstractCustomScreenRecoListener {
```

```
/**
 * @see com.ibm.hats.common.customlogic.AbstractCustomScreenRecoListener
 * #isRecognized(java.lang.String, com.ibm.hats.common.IBusinessLogicInformation,
 *       com.ibm.eNetwork.ECL.ECLPS,  com.ibm.eNetwork.ECL.ECLScreenDesc)
  */
 public boolean isRecognized(
  String settings,
  IBusinessLogicInformation bli,
  ECLPS ps,
  ECLScreenDesc screenDescription) {
  HostScreen hs=bli.getHostScreen();
  int int_codepage=hs.GetCodePage();
  if(settings!=null)
  {
   StringTokenizer tokenizer = new StringTokenizer(settings);
   while( tokenizer.hasMoreTokens() )
   {
    int int_token= Integer.valueOf(tokenizer.nextToken()).intValue();
    if ( int_token==int_codepage )
    {
      return true;
    }
   }
  }
  return false;
 }

}
```

Custom screen recognition using global variables

HATS Toolkit provides some screen recognition options using global variables, including these functions:

- Verify that a global variable exists
- Verify that a global variable does not exist
- Verify the integer or string value of a global variable

Refer to *HATS User's and Administrator's Guide* for information about these options. If you want to perform screen recognition that is based on HATS global variables and the options in the Global Variable Logic panel do not meet your requirements, you can add your own logic based on the values or existence of one or more global variables. This approach does not require you to create a Java class; instead, it uses the GlobalVariableScreenReco class, which is provided by HATS, and you can specify comparisons to be made as settings on the <customreco> tag. The format is one of the following:

- ```
  <customreco
  id="com.ibm.hats.common.customlogic.GlobalVariableScreenReco::
  {variable(name,option,resource, index)}COMPARE{type(name,option,resource,
                                                      index)}"
    invertmatch="false" optional="false"/>
  ```
- ```
  <customreco
  id="com.ibm.hats.common.customlogic.GlobalVariableScreenReco::
  {variable(name,option,resource, index)}COMPARE{type(value)}"
  invertmatch="false" optional="false"/>
  ```

Braces {} are used to contain each of the two items that are being compared. The first item is a HATS global variable, whose name is specified in *name*. You can use `option` to specify that you want to use the variable's value, length, or existence in your comparison. The `resource` and `index` settings are optional. Use `resource` to indicate whether the global variable is local (which is the default) or shared. Use `index` to indicate which value to use from an indexed global variable.

The second item can be one of the following:

- Another HATS global variable, with similar options, in which case the first format is used
- A fixed value, in which case the second format is used

The valid values for the settings are shown in Table 1. For the COMPARE setting, the only valid values for comparing strings are EQUAL and NOTEQUAL.

Table 1. Valid values for settings

Setting	Valid values
type	• variable • integer • boolean • string
COMPARE	• EQUAL • NOTEQUAL • GREATERTHAN • GREATERTHANOREQUAL • LESS THAN • LESSTHANOREQUAL
options	• exists (boolean) • value (string/integer/boolean) • length (integer) • object (object)
resource	• local • shared
index	Any positive integer or 0

The following example compares the values of two local global variables:

```
<customreco id="com.ibm.hats.common.customlogic.GlobalVariableScreenReco::
  {variable(name=gv1,option=value,resource=local)}EQUAL
  {variable(name=gv2,option=value,resource=local)}"
  invertmatch="false" optional="false"/>
```

This expression evaluates to true if the values of *gv1* and *gv2* are the same.

Now consider the length option. For a non-indexed global variable, length is the length of the value of the variable. For an indexed global variable, if you specify an index, length is the length of that index of the global variable; if you do not specify an index, length is the number of indexed entries in the global variable.

```
<customreco id="com.ibm.hats.common.customlogic.GlobalVariableScreenReco::
  {variable(name=gv1,option=length,resource=shared)}LESSTHANOREQUAL
  {variable(name=gv2,option=length,index=4)}" invertmatch="false" optional="false"/>
```

This expression compares the length of *gv1* to the length of the fourth index of *gv2*. It evaluates to true if the length of *gv1* is less than or equal to the length of the fourth index of *gv2*. You can use LESSTHANOREQUAL because length returns an integer value.

The use of resource=shared on *gv1* in this example indicates that *gv1* is a shared global variable. The other option is resource=local, which is the default, and means that the global variable is not shared with other applications.

You do not have to compare one global variable with another. You can compare the length of a global variable with a fixed integer. You can compare the value of a global variable with another string. For example:

```
<customreco id="com.ibm.hats.common.customlogic.GlobalVariableScreenReco::
  {variable(name=gv1,option=value)}EQUAL{string(value=mystring)}"
  invertmatch="false" optional="false"/>
```

This expression compares the value of *gv1* with the string that is contained in mystring. The string can be a fixed string, the value of a variable, or a value that is returned from a method call. In general, you do not need to use custom logic to compare the length or value of a global variable to a fixed value; you can add these comparisons using the Global Variable Logic panel.

Accessing javax.servlet classes

In order to provide a consistent set of APIs for both Web and rich client application developers, some HATS APIs were generalized so they would work in either a Web or rich client environment. For example, prior to HATS 7.0, the javax.servlet.HttpServletRequest object for a request could be accessed via the BusinessLogicInfo.getRequest() method. Although this API is still available (but deprecated), new business logic classes use the new IBusinessLogicInformation interface instead of the BusinessLogicInfo class.

The getRequest() method on this interface returns a com.ibm.hats.runtime.IRequest object. In a Web application, this object will be of type com.ibm.hats.runtime.WebRequest. WebRequest has similar methods to HttpServletRequest, but does not extend from it. To access the actual HttpServletRequest object from a WebRequest object, the getHttpServletRequest() method can be called.

Table 2. Javax.servlet class plus HATS class plus the method to access

javax.servlet Class	+ Wrapper HATS Class	+ Method to access
HttpServletRequest	com.ibm.hats.runtime.WebRequest	WebRequest.getHttpServletRequest()
HttpServletResponse	com.ibm.hats.runtime.WebResponse	WebResponse.getHttpServletResponse()
ServletContext	com.ibm.hats.runtime.WebContext	WebContext.getServletContext()
ServletConfig	com.ibm.hats.runtime.WebConfig	WebConfig.getServletConfig()

See the Javadoc API for IBusinessLogicInformation for more information and code samples.

Chapter 3. Creating custom components and widgets

HATS provides a set of host components that recognize elements of the host screen and widgets that render the recognized elements. The components and widgets have settings that you can modify if the default settings do not recognize components or render widgets as you want them. If the components, widgets, and the settings that are provided by HATS do not meet your needs, you can create your own custom components or widgets or modify existing host components or widgets. You might want to create your own host component in order to recognize elements of your host screen that the HATS components do not recognize. You might want to create your own widget in order to change the way elements are presented on the Web page. The following sections describe how to create custom host components and widgets. For further information, see Appendix A, "HATS Toolkit files," on page 35.

Notes:

1. HATS automatically updates your class loader policy when you add custom components or widgets to your HATS application. This updates the default WAR class loader policy of your HATS application to **Single class loader for application**.
2. If you are using a bidirectional code page, you can control the direction of widgets and other presentation aspects. See Chapter 4, "Using the HATS bidirectional API," on page 29.

HATS component tag and attributes

HATS creates a JavaServer Pages (JSP) page (and writes information to a .jsp file) that reflects host component and widget selections that were made during transformation configuration in the HATS Toolkit. HATS writes this configuration as a set of attributes for the <HATS:Component> tag. The <HATS:Component> tag invokes the code to define host components and specify widget output. To view or edit the transformations in your HATS project, expand the project in the HATS Projects view and look under **Web Content/Transformations**.

This JSP code example shows the format of the <HATS:Component> tag.

```
<HATS:Component type="<fully qualified component class name>"
   widget="<fully qualified widget class name>"
   row="1" col="1" erow="24" ecol="80" componentSettings="" widgetSettings=""
   textReplacement=""  />
```

The attribute data of the <HATS:Component> tag determine which host component and widget classes to call and how to present the widget in HTML output. The **type** attribute of the <HATS:Component> tag specifies which component recognition class to use when recognizing the selected host screen component. The **widget** attribute specifies which rendering class to use when generating the HTML output. The following list describes the other attributes:

row The starting row position for host component recognition.

col The starting column position for host component recognition.

erow The ending row position for host component recognition. You can specify -1 to mean the last row on the host screen.

ecol The ending column position for host component recognition. You can specify -1 to mean the last column on the host screen.

componentSettings

A set of key and value pairs that is sent to the component class. When you specify componentSettings values, specify them in the form `key:value`. If you specify more than one `key:value` pair, separate them with a split vertical bar (|). For example, `<.. componentSettings="key1:value1|key2:value2" ... >`.

You can use the componentSettings attribute for advanced customization of the component. Surround the entire list with quotation marks. For example, if your command line uses the token >>> instead of ==>, you can pass this component setting value here.

widgetSettings

A set of key and value pairs that is sent to the widget class. When you specify widgetSettings values, specify them in the form `key:value`. If you specify more than one `key:value` pairs, separate them with a split vertical bar (|). Surround the entire list with quotation marks. For example, `<... widgetSettings="key1:value1|key2:value2" ... >`.

You can use the widgetSettings attribute for advanced customization of the widget. For example, if you want a table to have a certain number of columns, you can pass this widget setting here.

textReplacement

Any settings that are defined for text replacement for this use of the component. Text replacement attributes are the same as those for definition of text replacement at the project level. See "<replace> tag" on page 46 for descriptions of the attributes.

When defining text replacement, if you want to replace certain special characters, you must use the following in the settings:

@vb. | (split vertical bar)

@cm. , (comma)

@dq. " (double quote)

@lt. < (less than)

@gt. > (greater than)

@eq. = (equal sign)

For example, to replace the string *ABC* with the string *"ABC"*, specify text replacement as follows:

```
textreplacement="ABC=@dq.ABC@dq."
```

HATS performs the following steps to process each <HATS:Component> tag that it encounters in the JSP page.

1. HATS attempts to instantiate the component specified by the **type** attribute of the tag. This attribute can be the fully qualified class name of a component provided by HATS or one created by you.

   Note: You must specify the fully qualified path, e.g. com.company.division.product.*MyComponent*. If you want to be able to

work with your custom component in HATS Toolkit, place the class file in either the WEB-INF/classes directory or in a jar file in the WEB-INF/lib directory. If you prefer, you can import the source (.java) file into the project's source directory. If you have tested your custom component and you do not wish to work with it in HATS Toolkit, you must make the .jar file available to your HATS application when it is installed on WebSphere® Application Server.

2. HATS attempts to instantiate a widget object specified by the **widget** attribute of the tag.

   Note: You must specify the fully qualified path, like `com.company.division.product.MyWidget`. If you want to be able to work with your custom widget in HATS Toolkit place the class file in either the WEB-INF/classes directory or in a jar file in the WEB-INF/lib directory. If you prefer, you can import the source (.java) file into the project's source directory. If you have tested your custom widget and you do not wish to work with it in HATS Toolkit, you must make the jar file available to your HATS application when it is installed on WebSphere Application Server.

3. HATS invokes the `recognize()` method of the component object.

   Each component has a different implementation of the `recognize()` method. The `recognize()` method performs pattern recognition logic and host screen data location. Component classes return an array of com.ibm.hats.transform.ComponentElement objects. This array is the logical representation of what was recognized by this component at the specified region with the specified settings.

4. HATS performs text replacement by calling the `doTextReplacement()` method on each ComponentElement object in the array that was returned by the `recognize()` method of the component object.

5. HATS invokes the `drawHTML()` method of the widget. If an applicable `drawHTML()` method cannot be found, the widget's `draw()` method is called. This method simply returns (unless overridden by subclasses) the concatenation of the toString() calls on each component element in the component element array returned by the component.

   The `drawHTML()` method renders the array of component elements as HTML output. The `drawHTML()` method does this by returning a StringBuffer object that contains its rendering of the supplied component element array. The widget used for the component determines how the component elements are rendered. Two widgets can take the same type of input. For example, the Link widget and the Button widget can both take the same type of input, but their `drawHTML()` methods generate different HTML content.

The following figure illustrates the flow of data from a region of the host screen, through the component and widget, to the Web page.

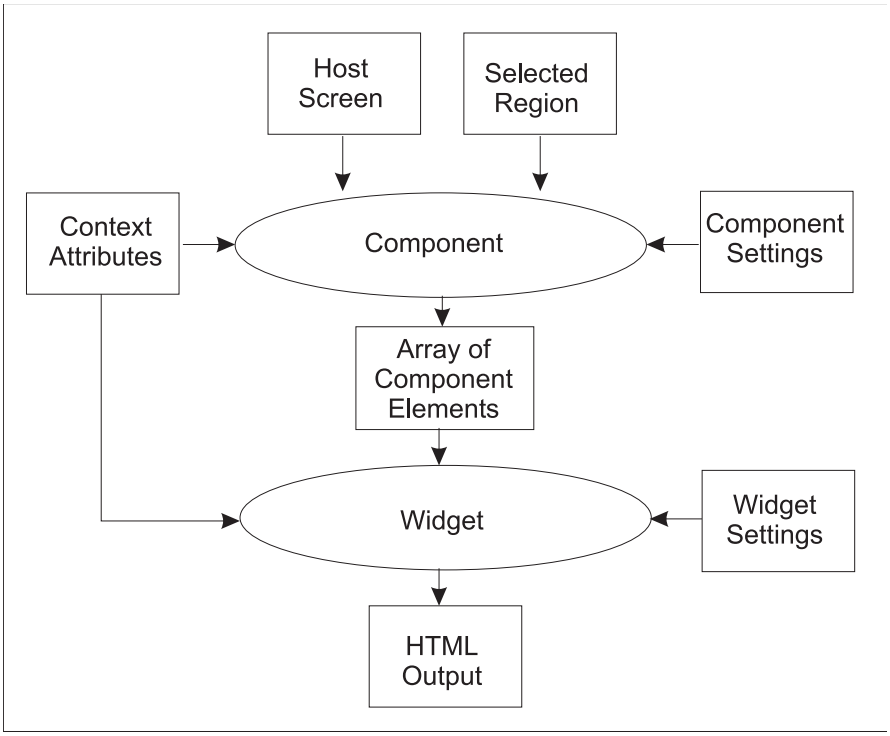


Figure 1. Flow of data from host screen to Web page

Creating a custom host component

HATS provides a Create Component wizard to help you create custom components. You can start the wizard in several ways:

- From the **File > New > HATS Component** menu in HATS Toolkit
- From the **HATS > New > Component** menu in HATS Toolkit
- From the context (right-click) menu of a HATS project, select **New HATS > Component**

There are two panels of the Create Component wizard. On the first panel, you provide the name of the project, the name of the new component, and the name of the Java package for the component. Optionally, you can select a check box to include stub methods that allow you to define a GUI panel for configuring the settings used by the new component (see "HATS Toolkit support for custom component and widget settings" on page 26 for more information). On the second panel, you enter the name you want displayed for the new component in the HATS Toolkit and select the widgets to associate with the component. Widget association is not necessary to complete the wizard. You can define the association of components and widgets later. Refer to "Registering your component or widget" on page 25 for more information about associating components and widgets.

The following sections explain the required elements of a custom component that the wizard provides:

- Extends the host component abstract class, `com.ibm.hats.transform.components.Component`.

If one of the HATS host components is very similar to what you need, it will be easier to extend that component. See "Extending component classes" on page 22 for more information.

- Adds the constructor method. This method, named for your component, must accept a com.ibm.hats.common.HostScreen object. For example:

```
public MyComponent(HostScreen hostScreen) {
  super(hostScreen);
}
```

  The constructor should initialize parameters that the `recognize()` method will require, based on the host screen object.

- Adds the `recognize()` method.

```
public ComponentElement[] recognize(BlockScreenRegion region,
                                    Properties settings)
```

  The `recognize()` method has a different implementation in each host component class. It accepts the region and settings passed to it and returns an array of component element objects. You should implement this method to implement your own pattern recognition logic.

  The `recognize()` method must return an array of ComponentElement objects, as defined in com.ibm.hats.transform.elements.ComponentElement. Each HATS component returns a slightly different set of elements that extend ComponentElement. For example, the SelectionListComponent returns an array of SelectionComponentElement objects. This array of component elements is passed to the specified widget, so be sure to return an array of elements that can be accepted by the widget you want to use.

  For a description of the arguments of this method, refer to the HATS API References (Javadoc) for the `recognize()` method of the Component class. See "Using the API documentation (Javadoc)" on page 2.

- Adds the source code for the component into the **Source** folder of your project
- Compiles the new component .java file, if you have **Build Automatically** checked in the Rational SDP workbench preferences (**Window > Preferences > General > Workspace** or **Project > Build Automatically**). If the component is not compiled into a .class file, it is not available for use in the HATS Toolkit.
- Registers the new component in the `ComponentWidget.xml` file. See "Registering your component or widget" on page 25 for more information about registering components.

If you selected the check box to include HATS Toolkit graphical user interface support methods, enabling you to modify the settings of the component, the Create Component wizard adds the following methods:

- Method to return the number of pages in the property settings:

```
public int getPropertyPageCount() {
  return (1);
}
```

- Method to return the settings that can be customized:

```
public Vector getCustomProperties(int iPageNumber, Properties properties,
   ResourceBundle bundle) {
  return (null);
}
```

- Method to return the default values of the settings that can be customized:

```
public Properties getDefaultValues(int iPageNumber) {
  return (super.getDefaultValues(iPageNumber));
 }
```

See “HATS Toolkit support for custom component and widget settings” on page 26 for more information about the methods necessary to support your custom component.

Note: If you want your component to work properly within Default Rendering, you must set the consumed region (that is, the area of the host screen that has been processed) on each component element that your component returns, before returning the component element. This tells the Default Rendering that this region of the screen has been consumed, or processed, by a host component and should not be processed again. To set the consumed region, use this method:

```
public void setConsumedRegion(BlockScreenRegion region)
```

Refer to the HATS API References (Javadoc) for the ComponentElement class for more information. See “Using the API documentation (Javadoc)” on page 2.

Extending component classes

HATS provides a number of host component classes. You can extend any of the host component classes that are found in the `ComponentWidget.xml` file by replacing the statement `public class` *`MyCustomComponent`* `extends Component` in the created .java file for the new component with the class name of an existing component. For example:

```
public class MyCustomComponent
             extends com.ibm.hats.transform.components.CommandLineComponent
```

Note: Bidirectional components are stored in the com.ibm.hats.transform.components.BIDI package. The names of bidirectional classes for components are the same as regular components, but they are followed by “BIDI”; for example, com.ibm.hats.transform.components.BIDI.CommandLineComponentBIDI.

Each HATS component performs recognition of elements of the host screen in the `recognize()` method. To extend a host component and accomplish the specific recognition task you need, you can use either of these approaches:

- Extend one of the component classes that is provided by HATS and override the `recognize()` method of the component. Somewhere in your `recognize()` method you should add a call like `super.recognize(region, settings);` to invoke the `recognize()` method of the class you extended. You can modify the process by changing the settings before calling the superclass, or by manipulating the output returned by the superclass.
- Extend one of the component classes that is provided by HATS and override the `recognize()` method of the component. Instead of using the `recognize()` method of the superclass, invoke the `recognize()` method of one of the other component classes. This approach will be useful if you want to recognize a complex host component that combines aspects of more than one of the HATS components.

The Create Component wizard generates a recognize() method that returns null, which indicates that the host screen region is not recognized by the new component. To change the custom component to act as the HATS component it is extended from, whose elements contain all of the correct ComponentElements, remove the "return null" from the .java file and change the code in the component code. For example:

```
public ComponentElement[] recognize(LinearScreenRegion region, Properties settings) {
ComponentElement [] elements = super.recognize(region, settings);
return elements;
}
```

HATS instantiates the custom component based on the setting of the **type** attribute of the <HATS:Component> tag.

To edit the `ComponentWidget.xml` file, click the **Navigator** tab of the HATS Toolkit. The `ComponentWidget.xml` file is shown at the bottom of the **Navigator** view of your project. See "Registering your component or widget" on page 25 for more information about the `ComponentWidget.xml` file.

Creating a custom HTML widget

HATS provides a Create Widget wizard to help you create custom widgets. You can start the wizard in several ways:

- From the **File > New > HATS Widget** menu in HATS Toolkit
- From the **HATS > New > Widget** menu in HATS Toolkit
- From the context (right click) menu of a HATS project, select **New HATS > Widget**

There are two panels in the Create Widget wizard. On the first panel, you provide the name of the project, the name of the new widget, and the name of the Java package for the widget. Optionally, you can select a check box to include stub methods that allow you to define a GUI panel for configuring the settings used by the new widget (see "HATS Toolkit support for custom component and widget settings" on page 26 for more information). On the second panel, enter the name you want displayed for the new widget in the HATS Toolkit and select the components to associate with the widget.

The wizard provides the following required elements of a custom widget:

- Extends the widget abstract class and implements the HTMLRenderer interface: `public class MyCustomWidget extends Widget implements HTMLRenderer`.

  See "Extending widget classes" on page 24 for more information.
- Adds the constructor method:

  ```
  public MyCustomWidget(ComponentElement[] arg0, Properties arg1) {
    super(arg0, arg1);
  }
  ```
- Adds the following method to generate HTML for Web project output.

  ```
  public StringBuffer drawHTML() {
     StringBuffer buffer = new StringBuffer(256);
     HTMLElementFactory factory = HTMLElementFactory.newInstance(
       contextAttributes, settings);
     return (buffer);
    }
  ```

  The HTMLElementFactory class automatically generates any JavaScript needed to present the widget. Refer to the HATS API References (Javadoc) for detailed information about the HTMLElementFactory class and more examples of its use. See "Using the API documentation (Javadoc)" on page 2.
- Adds the source code for the widget into the **Source** folder of your project
- Compiles the new widget .java file, if you have **Build Automatically** selected in the Rational SDP workbench preferences (**Window > Preferences > General > Workspace**) or the Project menu. If the widget is not compiled into a .class file, it is not available for use in the HATS Toolkit.

- Registers the new widget in the `ComponentWidget.xml` file. See "Registering your component or widget" on page 25 for more information about registering widgets.

If you selected the check box to include HATS Toolkit graphical user interface support methods, enabling you to modify the settings of the widget, the Create Widget wizard adds the following methods:

- Method to return the number of pages in the property settings:

```
public int getPropertyPageCount() {
  return (1);
}
```

- Method to return the settings that can be customized:

```
public Vector getCustomProperties(int iPageNumber, Properties properties,
   ResourceBundle bundle) {
  return (null);
}
```

- Method to return the default values of the settings that can be customized:

```
public Properties getDefaultValues(int iPageNumber) {
  return (super.getDefaultValues(iPageNumber));
 }
```

See "HATS Toolkit support for custom component and widget settings" on page 26 for more information about the methods necessary to support your custom widget.

Extending widget classes

HATS provides a number of widget classes. You can extend any of the widget classes found in the `ComponentWidget.xml` file by replacing the

```
public class MyCustomWidget extends Widget implements HTMLRenderer
```

in the created .java file for the new widget with the class name of an existing widget, such as

```
public class MyCustomWidget extends
  com.ibm.hats.transform.widgets.FieldWidget
```

Note: Bidirectional widgets are stored in the com.ibm.hats.transform.widgets.BIDI package. The names of bidirectional classes for widgets are the same as regular widgets, but they are followed by "BIDI"; for example,

```
com.ibm.hats.transform.widgets.BIDI.FieldWidgetBIDI
```

If you want to modify an existing widget, you must extend one of the existing widget classes and override its `drawHTML` method. Refer to the HATS API References (Javadoc) for details about widget interfaces and methods. See "Using the API documentation (Javadoc)" on page 2.

HATS instantiates the custom widget based on the setting of the **widget** attribute of the <HATS:Component> tag.

Widgets and global rules

Widgets that present input fields should check whether the input field has already been processed by a HATS global rule. When a host screen is received, HATS searches it for host components that match global rules that are defined for that HATS application. When your widget checks whether the input field has already been processed by a HATS global rule, the call returns null if the input field has not been processed. If the input field has already been processed according to a global rule, the call returns the transformation fragment to which the input field

has been transformed by the global rule. Your widget should output the fragment rather than processing the component element. Examples are shown below for Web applications:

```
String ruleReplacement =
  RenderingRulesEngine.processMatchingElement(componentElement, contextAttributes);
if (ruleReplacement != null) {
  buffer.append(ruleReplacement);
} else {
    .
    .
    .
}
```

Add the above example to the drawHTML() method for the widget.

Registering your component or widget

Registering your custom components and widgets in the `ComponentWidget.xml` file makes them available for use in the HATS Toolkit, such as in the Insert Host Component wizard.

Host components must map to specific widgets. Custom host components can map to any existing widget or to a custom widget. The Create a custom component or widget wizards register your custom components and widgets in the `ComponentWidget.xml` file, and associates components and widgets. When using the wizards, if you did not associate your custom component or widget, you need to edit the `ComponentWidget.xml` file and add the associations. To edit the `ComponentWidget.xml` file, click the **Navigator** tab of the HATS Toolkit. The `ComponentWidget.xml` file is shown at the bottom of the **Navigator** view of your project.

Note: If you decide to delete a custom component or widget after it has been registered, simply deleting the source code for the component or widget from the **Source** folder of your project is not enough to completely remove it. It is still referenced in the registry and there is no programmatic way to remove it. You should remove it from the registry by editing the `ComponentWidget.xml` file and deleting the references to the component or widget.

Following is an example of the `ComponentWidget.xml` file that shows the HATS-supplied Field Table component and one of the associated widgets, the vertical bar graph widget.

```
<ComponentWidgetList>
  <components>
    <component className="com.ibm.hats.transform.components.FieldTableComponent"
       displayName="Field table" image="table.gif">
      <associatedWidgets>
        <widget className="com.ibm.hats.transform.widgets.VerticalBarGraphWidget"/>
      </associatedWidgets>
    </component>
  </components>


  <widgets>
    <widget className="com.ibm.hats.transform.widgets.VerticalBarGraphWidget"
       displayName="Vertical graph" image="verticalBarGraph.gif" />
  </widgets>
</ComponentWidgetList>
```

As you can see, there are two sections to this file: components and widgets.

The components section contains the list of all registered components. To register a custom component and make it available to the HATS Toolkit, add a <component> tag and the associated <widget> tags to the `ComponentWidget.xml` file. You must supply a className, displayName, and the associated widgets.

className
Identifies the Java class that contains the code to recognize elements of the host screen. The class name is usually in the form com.*myCompany.myOrg.ClassName*.

displayName
Identifies the name by which your custom component is known and how it appears in the list of components in the HATS Toolkit. This name must be unique among the registered components. The form of the displayName for a custom component is simply a string. Spaces are allowed in the displayName.

image The image attribute identifies the image to use for your component when it appears in the HATS Toolkit.

widget
Identifies the widgets that are associated with this component. There must be a separate <widget> tag for each associated widget. All of the <widget> tags for the component must be defined within the <associatedWidgets> tag and its </associatedWidgets> ending tag. The <widget> tag within the <associatedWidgets> tag contains only the className attribute, which identifies the Java class that contains the code to link the widget to the component. The class name is usually in the form com.*myCompany.myOrg.ClassName*.

The widgets section contains the list of all registered widgets. To register a widget, link it to a component, make it available for use in the HATS Toolkit, and add a <widget> tag to the `ComponentWidget.xml` file. You must supply a className and a displayName.

className
Identifies the Java class that contains the code to render the widget. The class name is usually in the form com.*myCompany.myOrg.ClassName*.

displayName
Identifies the name by which your custom widget is known and how it appears in the list of widgets in the HATS Toolkit. This name must be unique among the registered widgets. The form of the displayName for a custom widget is simply a string. Spaces are not allowed in the displayName. However, you can use an underscore (_) in place of a space.

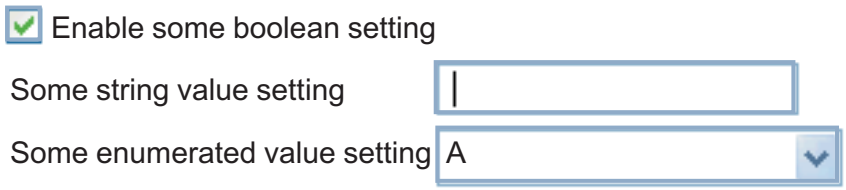
HATS Toolkit support for custom component and widget settings

You can provide GUI support for modifying the settings of your custom component and widget. This is useful if other developers will be using your custom component or widget or you want to easily test different combinations of settings using the preview features available in the HATS Toolkit. The base component and widget classes implement the ICustomPropertySupplier interface. This interface allows a component or widget to contribute setting information to the HATS Toolkit. This information is used to render a panel by which the settings of the component or widget can be modified. Not all settings need to be exposed in the GUI.

The `getCustomProperties()` method returns a vector of **HCustomProperty** customizable property objects. Each **HCustomProperty** object represents a setting of the component or widget. The HATS Toolkit renders each **HCustomProperty** objects based on its type. For example, an object of type HCustomProperty.TYPE_BOOLEAN is rendered as a GUI checkbox.

The following sample code demonstrates how a widget can provide GUI support for three of its settings (mySetting1, mySetting2, and mySetting3):

```
// Returns the number of settings panels (property pages) to be contributed
//by this widget.  The returned value must be greater than or equal to 1 if
//custom properties will be supplied via the getCustomProperties() method.
public int getPropertyPageCount() {
         return 1;
}

// Returns a Vector (list) of custom properties to be displayed in the GUI
//panel for this component or widget.
public Vector getCustomProperties(int iPageNumber, Properties properties,
         ResourceBundle bundle) {
         Vector props = new Vector();

// Constructs a boolean property that will be rendered as a checkbox
HCustomProperty prop1 = HCustomProperty.new_Boolean("mySetting1",
                "Enable some boolean setting", false, null, null);
props.add(prop1);

// Constructs a string property that will be rendered as a text field
HCustomProperty prop2 = HCustomProperty.new_String("mySetting2",
                "Some string value setting", false, null,
                 null, null, null);
props.add(prop2);

// Constructs an enumeration property that will be rendered as a drop-down
HCustomProperty prop3 = HCustomProperty.new_Enumeration("mySetting3",
                 "Some enumerated value setting", false,
                 new String[] { "A", "B", "C" }, new String[]
                 { "Option A", "Option B", "Option C" }, null, null, null);
props.add(prop3);

return props;     }
```



The values supplied by the user of the custom component or widget will be available in the *componentSettings* **Properties** object passed into the `recognize()` method of the component or the *widgetSettings***Properties** object passed into the constructor of the widget. The `getCustomProperties()` method may be called during runtime to collect default values for settings.

For a description of the arguments and usage of these methods, refer to the HATS API References (Javadoc) for the HCustomProperty class. See “Using the API documentation (Javadoc)” on page 2.

Chapter 4. Using the HATS bidirectional API

If you create HATS applications that use bidirectional (Arabic or Hebrew) code pages, and you add business logic or create your own custom components or widgets, you can use the bidirectional API to handle the recognition of host components and the presentation of widgets on the Web page. This chapter describes this API. Before using the material in this chapter you should be familiar with the bidirectional concepts described in *HATS User's and Administrator's Guide*.

Data Conversion APIs

Two APIs for handling text conversion from visual to logical and vice versa are included in the HostScreen class. You can use these APIs when creating custom widgets and components to handle the extraction of data.

ConvertVisualToLogical

```
public java.lang.String ConvertVisualToLogical(java.lang.String
inputBuffer, boolean isleft-to-rightVisual,
boolean isleft-to-rightImplicit)
```

Converts the given string from visual to implicit format and returns the implicit format of the string.

inputBuffer
The input string in visual format.

isleft-to-rightVisual
If true, inputBuffer is in visual left-to-right form.

isleft-to-rightImplicit
If true, the output buffer is in implicit left-to-right form.

ConvertLogicalToVisual

```
public java.lang.String ConvertLogicalToVisual(java.lang.String
inputBuffer, boolean isleft-to-rightImplicit,
boolean isleft-to-rightVisual)
```

Converts the given string from implicit to visual format and returns the visual format of the string.

inputBuffer
The input string in implicit format.

isleft-to-rightImplicit
If true, inputBuffer is in implicit left-to-right form.

isleft-to-rightVisual
If true, the output buffer is in visual left-to-right form.

Global Variable APIs

There are two getter methods that you can use to get the value of global variables. Using these methods you can get the global variable value either in implicit format or in visual format. These two methods are in class com.ibm.hats.common.BaseInfo.

getGlobalVariable

```
public IGlobalVariable getGlobalVariable(String name, boolean
createIfNotExist,boolean bidiImplicit)
```

Gets the named global variable, optionally creating it if it does not already exist.

createIfNotExist
Indicates whether or not to create a nonexistent global variable.

bidiImplicit
Indicates whether to get the global variable value in implicit format if `true`, or in visual format if `false`.

getSharedGlobalVariable

```
public IGlobalVariable getSharedGlobalVariable(String name, boolean
createIfNotExist,boolean bidiImplicit)
```

Gets the named shared global variable, optionally creating it if it does not already exist.

createIfNotExist
Indicates whether or not to create a nonexistent global variable

bidiImplicit
Indicates whether to get the global variable value in implicit format if `true`, or in visual format if `false`.

BIDI OrderBean

You can use the methods of the BIDI OrderBean for the correct display of bidirectional data. It contains the following parameters:

BidiString
String. Contains bidirectional text

FromTextVisual
Boolean. Indicates whether the source bidirectional text is visual. Default is `true`.

FromOriLTR
Boolean. Indicates whether the orientation of the source bidirectional text is LTR. Default is `true`.

ToTextVisual
Boolean. Indicates whether the target bidirectional text is visual. Default is `true`.

ToOriLTR
Boolean. Indicates whether the orientation of the target bidirectional text is LTR. Default is `true`.

NeedShape
Boolean. Indicates whether bidirectional text is Arabic text and whether it needs shaping. Default is `false`.

CharSet
String. Defines the character encoding for the JSP.

NumShape
String. Defines the numerals shaping method. Default is `Nominal`.

SymSwap
Boolean. Indicates whether symmetric swapping is on. Default is `false`.

BIDI OrderBean methods

setBidiString
```
public void setBidiString (String BdString)
```
Sets the bidirectional text to be reordered to the given string. The only parameter is **BdString**, which is the bidirectional string that needs reordering.

getBidiString
```
public String getBidiString ()
```
Gets the bidirectional text. Returns the bidirectional string that needs reordering.

setFromTextVisual
```
public void setFromTextVisual (boolean on)
```
Sets the source bidirectional text type as visual. The only parameter is **on**. If `true`, defines this source bidirectional text as visual. If `false`, defines this source bidirectional text as implicit.

setFromOriLTR
```
public void setfromOriLTR (boolean on)
```
Sets the source bidirectional text orientation as LTR. The only parameter is **on**. If `true`, defines this source bidirectional text as LTR. If `false`, defines this source bidirectional text as RTL.

setToTextVisual
```
public void setToTextVisual (boolean on)
```
Sets the target bidirectional text type as visual. The only parameter is **on**. If `true`, defines this target bidirectional text as visual. If `false`, defines this target bidirectional text as implicit.

setToOriLTR
```
public void setToOriLTR (boolean on)
```
Sets the target bidirectional text orientation as LTR. The only parameter is **on**. If `true`, defines this target bidirectional text as LTR. If `false`, defines this target bidirectional text as RTL.

setEncoding
```
public void setEncoding (String CharSet)
```
Sets the encoding character set. The only parameter is **CharSet**, which is a character-encoding name.

setNeedShape
```
public void setNeedShape (boolean on)
```
Sets the need to perform shaping. The only parameter is **on**. If `true`, indicates the need to perform shaping on the bidirectional text.

Order `public void Order ()`

Performs the ordering of the bidirectional text. There are no parameters.

CompressLamAlef
```
public String CompressLamAlef(String input,boolean direction)
```

Returns a string in which a Lam character followed by an Alef character is replaced by one LamAlef character. Parameters are:

- Direction. If `true`, indicates input text is in visual form. If `false`, input text is in implicit form.
- Input. An input string containing LamAlef characters to be compressed.

ExpandLamAlef

```
public String ExpandLamAlef(String input,boolean direction)
```

Returns a string in which a Lam Alef character is replaced by a Lam followed by one Alef character. Parameters are:

- Direction. If `true`, indicates input text is in visual form. If `false`, input text is in implicit form.
- Input. An input string containing LamAlef characters to be expanded.

setNumerals

```
public void setNumerals(String NumShape)
```

Sets the numerals shape of the output buffer. The only parameter is:

- NumShape. A string that takes one of three values:
  - NOMINAL. Numerals are in Latin format.
  - CONTEXTUAL. Numerals follow numbers.
  - NATIONAL. Numerals are in National format.
- Input. An input string containing LamAlef characters to be expanded.

setSymSwap

```
public void setSymSwap (boolean on)
```

Sets the Symmetric swapping option with Visual RTL orientation. The only parameter is **on**. If `true`, symmetric swapping is enabled for swapping characters in RTL screens. If `false` (the default), symmetric swapping is disabled for swapping characters in RTL screens.

ShapeArabicData

```
public String ShapeArabicData(String strInBuffer,boolean
isLTRVisual, boolean EnableNumSwap)
```

Returns a string in which Arabic data is shaped. Parameters are:

- strInBuffer. The bidirectional string that needs shaping.
- isLTRVisual. An input string containing LamAlef characters to be expanded. If `true`, bidirectional string is left to right visual. If `false`, bidirectional string is right to left visual.
- EnableNumSwap. If `true`, enable Numeric swapping. If `false`, disable numeric swapping.

DeshapeArabicData

```
public String DeshapeArabicData (String strInBuffer,boolean
isLTRVisual,boolean EnableNumSwap)
```

Returns a string in which Arabic data is deshaped. Parameters are:

- strInBuffer. The bidirectional string that needs deshaping.
- isLTRVisual. If `true`, bidirectional string is left to right visual. If `false`, bidirectional string is right to left visual.
- EnableNumSwap. If `true`, enable numeric swapping. If `false`, disable numeric swapping.

ConvertLogicalToVisual

```
public java.lang.String ConvertLogicalToVisual(java.lang.String
inputBuffer, boolean isLTRimplicit,
boolean isLTRVisual)
```

Converts the given string from implicit to visual format and returns the visual format of the string. Parameters are:

- InputBuffer. The input string in implicit format.
- isLTRimplicit. If `true`, inputBuffer is in implicit left-to-right form.
- isLTRVisual. If `true`, the output buffer is in visual left-to-right form.

ConvertVisualToLogical

```
public java.lang.String ConvertVisualToLogical(java.lang.String
inputBuffer, boolean isLTRVisual,
boolean isLTRimplicit)
```

Converts the given string from visual to implicit format and returns the implicit format of the string. Parameters are:

- InputBuffer. The input string in visual format.
- isLTRimplicit. If `true`, the output buffer is in implicit left-to-right form.
- isLTRVisual. If `true`, inputBuffer is in visual left-to-right form.

Appendix A. HATS Toolkit files

When you use HATS Toolkit to build your project, files for each component of the project are created. This appendix tells you where the file is located on your system, how to view and edit the source for the file, and describes the tags that make up each file.

Note: Use the HATS Toolkit editors if you edit these source files.

All of the files you create with HATS Toolkit are stored on your system in one or more workspaces managed by your Rational SDP program, such as Rational Application Developer. You can choose your workspace directory, and you can have more than one. Refer to the information provided with Rational SDP for information about choosing your workspace.

All of the file locations in this appendix refer to the relative path from the directory named for your project, which will be created within your workspace.

Application file (.hap)

The application file contains XML tags that define the settings you select when you create the project.

The application (.hap) file is stored in the *project_name*/Web Content/WEB-INF/profiles directory, where *project_name* is the name you gave the project when you created it. The application (.hap) file for a HATS EJB project is stored in the *project_name*/ejbModule directory. To view and edit the source of the application file for your HATS project, expand your project in the **HATS Projects** view and double-click **Project Settings** to open the project editor. You can view the source by clicking on the **Source** tab.

You can modify the application file using any of the tabs in the project editor. HATS Toolkit updates the affected information on other tabs when you make changes on any tab.

<application> tag

The <application> tag is the enclosing tag for the project.

The attributes of the <application> tag are:

active This attribute is not used by HATS. It is contained here for compatibility with HATS Limited Edition.

configured
This attribute is not used by HATS. It is contained here for compatibility with HATS Limited Edition.

description
Specifies the description you enter when you create a project.

template
Specifies the name of the template you selected for the project when you created the project. The default template is Finance.jsp.

<connections> tag

The <connections> tag is a container for all the connection tags that define connections for this project.

The attributes of the <connections> tag are:

default
Specifies the name of the default connection. The default connection, which is created using the connection values that you specify in the New HATS Project wizard, defaults to the name of main.

<connection> tag

The <connection> tag identifies a connection defined for the project and points to the connection (.hco) file that defines the connection.

The attributes of the <connection> tag are:

name Specifies the name you entered when you created the connection.

<eventPriority> tag

The <eventPriority> tag is the enclosing tag for the screen events you defined for the project. The order of the event tags within the <eventPriority> tag is the order in which screen events are checked when a new host screen is encountered. This tag has no attributes.

<event> tag

The <event> tag specifies a screen event that you defined for the project.

The attributes of the <event> tag are:

enabled
Specifies whether the screen event's screen recognition criteria should be checked when a new host screen is encountered. Valid values are `true` and `false`. The default value is `true`.

name Specifies the name you gave the screen event when you defined it. If you store a screen event file under a folder (or group), the name of the folder is prepended to the name of the file.

type Specifies that this is a screen combination event. The available attribute is **screenCombination**.

<classSettings> tag

The <classSettings> tag is the enclosing tag for the Java classes you include in the project. This tag has no attributes.

<class> tag

The <class> tag specifies a class whose attributes are defined in the enclosed <setting> tags.

The attributes of the <class> tag are:

name Specifies one of the following Java classes:

- com.ibm.hats.common.AppletSettings
- com.ibm.hats.common.ApplicationKeypadTag

- com.ibm.hats.common.ClientLocale
- com.ibm.hats.common.DBCSSettings
- com.ibm.hats.common.DefaultConnectionOverrides
- com.ibm.hats.common.DefaultGVOverrides
- com.ibm.hats.common.HostKeypadTag
- com.ibm.hats.common.KeyboardSupport
- com.ibm.hats.common.OIA
- com.ibm.hats.common.RuntimeSettings
- com.ibm.hats.transform
- com.ibm.hats.transform.components.*name*
- com.ibm.hats.transform.DefaultRendering
- com.ibm.hats.transform.widgets.dojo.*name*
- com.ibm.hats.transform.widgets.*name*

<setting> tag

The <setting> tag specifies the settings associated with the class in which the <setting> tag is enclosed. The <setting> tag contains **name** and **value** pairs for each of the classes. The following sections described the **name** and **value** pairs for each of the classes.

com.ibm.hats.common.AppletSettings

For the com.ibm.hats.common.AppletSettings class, name specifies a customizable setting for the HATS application automatic disconnect and refresh implementation methods, Client pull (AJAX) and Server push (applet). The following settings can be used to configure the Client pull (AJAX) method, including the auto-disconnect and auto-refresh functions. These settings are supported for HATS Web applications, including JSR 286 portlets.

browserDisconnectDelay
Effective when the **enable** setting is `ajax` and the **browserDisconnectEnabled** setting is `true`. The time in milliseconds to wait before performing the auto-disconnect function. The minimum value is 2000 milliseconds (2 seconds). The default is **15000** milliseconds (15 seconds).

browserDisconnectEnabled
If the **enable** setting is `ajax`, and if this setting is `true`, enables the auto-disconnect function. If enabled, the HATS application initiates a disconnect action if the client has not polled the HATS application within the time specified by the **browserDisconnectDelay** setting.

browserPollInterval
Effective when the **enable** setting is `ajax`. The interval in milliseconds at which the browser will poll the HATS application to restart the **browserDisconnectDelay** timer, if enabled, and check for host screen updates. The minimum value is 1000 milliseconds (1 second). If **browserDisconnectEnabled** is `true`, then the poll interval value must be less than the value in the **browserDisconnectDelay** setting by at least 1000 milliseconds (1 second). The default is **5000** milliseconds (5 seconds).

Note: If an HTTP session idle timeout is configured, browser polling of the HATS application effectively disables the HTTP session idle timeout functionality. Because of this, the HATS runtime takes responsibility

for monitoring the HTTP session idle timeout period and initiates a disconnect of the HATS session when no user activity is seen before the idle time is exceeded.

browserRefreshEnabled
If the **enable** setting is `ajax`, and if this setting is `true`, enables the auto-refresh function. If enabled, the browser initiates a refresh of the screen if there has been no user input and the poll response indicates that the host screen has changed.

enable
Use this setting to configure which automatic disconnect and refresh method to use. Specify `ajax` to configure the Client pull (AJAX) methods, auto-disconnect and auto-refresh. Specify `true` to configure the Server push (applet) method, also known as the asynchronous applet update method. Specify `false` to disable both of the methods. The default is **false**.

Refer to the section, *Using the Server push (applet) method*, in the *HATS User's and Administrator's Guide* for a description of the settings for the Server push (applet) method.

Note: The Server push (applet) method of detecting disconnect and host refresh is deprecated. You are encouraged to use the Client pull (AJAX) method instead. While the applet method is currently supported, IBM reserves the right to remove this capability in a future release of the product.

com.ibm.hats.common.ApplicationKeypadTag

For the com.ibm.hats.common.ApplicationKeypadTag class, name specifies a customizable setting:

show If `true`, shows a keypad in the application.

showDefault
If `true`, shows a key in the application keypad to change the presentation to the default transformation.

showDisconnect
If `true`, shows a key in the application keypad to disconnect from the host.

showKeyboardToggle
If `true`, shows a key in the application keypad for toggling display of a host keyboard.

showPrintJobs
If `true`, shows a key in the application keypad for showing print jobs.

showRefresh
If `true`, shows a key in the application keypad to refresh the browser window contents using the original transformation, and restore the input fields to their original value.

showReset
If `true`, shows a key in the application keypad to clear all the fields on the browser page of any entries made by the end user.

showReverse
If `true`, shows a key in the application keypad for bidirectional support.

style Depending on the value attribute, shows the keys defined with value=`buttons` or `links` in the application keypad.

com.ibm.hats.common.ClientLocale

For the com.ibm.hats.common.ClientLocale class, name is always `locale`. The value for the locale setting specifies the language to be used to display button captions and messages. Value can be one of the following. The default is **accept-language**.

Characters that identify the country code of the locale

ar Arabic

cs Czech

de German

en English

es Spanish

fr French

hu Hungarian

it Italian

ja Japanese

ko Korean

pl Polish

pt_BR Brazilian Portuguese

ru Russian

tr Turkish

zh Simplified Chinese

zh_TW
Traditional Chinese

accept-language
The language is acquired from the `Accept-Language` HTTP header of the user's browser.

primaryLocale
The language is acquired from the primary locale of the WebSphere Application Server where the HATS application runs.

com.ibm.hats.common.DBCSSettings

For the com.ibm.hats.common.DBCSSettings class, there are three settings, autoConvertSBCStoDBCS, eliminateMaxlengthInIdeographic, and showUnprotectedSISOSpace.

- Valid values for the **autoConvertSDBCtoDBCS** attribute are:

  true Automatically convert single byte characters to double byte characters for 3270 and 3270E G-type or 5250 G-type and J-type fields.

  false Do not automatically convert single byte characters to double byte characters for 3270 and 3270E G-type or 5250 G-type and J-type fields.

  The default is **false**. For more information, see the section Project settings editor in the *HATS User's and Administrator's Guide*.

- Valid values for the **eliminateMaxlengthInIdeographic** attribute are:

  true If the **enableAutoAdvance** Runtime setting is `true`, then characters that exceed the maximum length of the DBCS field can be entered into the

IME. Also, when the user selects the IME candidate for the field, the excess characters are cut and pasted into the next field.

If the **enableAutoAdvance** Runtime setting is `false`, then characters that exceed the length of the DBCS field can be entered into the IME. However, when the user selects the IME candidate for the field, the excess characters are removed and not entered into any other field.

false Characters that exceed the maximum length of the DBCS field cannot be entered into the IME.

The default is **false**. For more information, see the section Project settings editor in the *HATS User's and Administrator's Guide*.

- Valid values for the **showUnprotectedSISOSpace** attribute are:

  true Show any unprotected Shift In or Shift Out characters as a space.

  false Do not use a space to show unprotected Shift In or Shift Out characters.

  The default is **true**. For more information, see the section Project settings editor in the *HATS User's and Administrator's Guide*.

com.ibm.hats.common.DefaultConnectionOverrides

For the com.ibm.hats.common.DefaultConnectionOverrides class, there is always at least one <setting> tag with a name attribute of `allowAll`. This <setting> tag indicates the chosen default security policy regarding the overriding of connection parameters. Any exceptions to the chosen security policy for connection overrides are recorded with additional <setting> tags, with the name attribute set to the name of the exceptional connection parameter.

Valid values for the name attributes are:

true The end user can override the named connection parameter. If the named connection parameter is `allowAll`, this means that all unnamed connection parameters may be overridden with clients requests.

false The end user can not override the named connection parameter. If the named connection parameter is `allowAll`, this means that no unnamed connection parameters may be overridden

The default for the `allowAll` setting is **false**.

com.ibm.hats.common.DefaultGVOverrides

For the com.ibm.hats.common.DefaultGVOverrides class, there is always at least one <setting> tag with a name attribute of `allowAll`. This <setting> tag indicates the chosen default security policy regarding the overriding of global variables. Any exceptions to the chosen security policy are recorded with additional <setting> tags, with the name attribute set to hatsgv_*variableName* for regular global variable exceptions, or hatssharedgv_*variableName* for shared global variable exceptions.

Valid values for the name attributes are:

true The end user can override the named connection parameter. If the named connection parameter is `allowAll`, this means that all unnamed connection parameters may be overridden with clients requests.

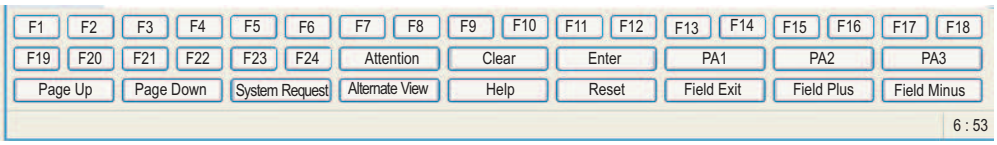
false The end user can not override the named connection parameter. If the named connection parameter is `allowAll`, this means that no unnamed connection parameters may be overridden

The default for the `allowAll` setting is **false**.

com.ibm.hats.common.HostKeypadTag

For the com.ibm.hats.common.HostKeypadTag class, name specifies a customizable setting:

show If `true`, shows a host keypad in the application.



showAltView
If `true`, shows an AltView key in the host keypad.

showAttention
If `true`, shows an ATTN key in the host keypad.

showClear
If `true`, shows a CLEAR key in the host keypad.

showEnter
If `true`, shows an Enter key in the host keypad.

showF1 – showF24
If `true`, shows a Function key with the corresponding number in the host keypad.

showFieldExit
If `true`, shows a Field Exit key in the host keypad.

showFieldMinus
If `true`, shows a Field Minus key in the host keypad.

showFieldPlus
If `true`, shows a Field Plus key in the host keypad.

showHelp
If `true`, shows a Help key in the host keypad.

showPA1
If `true`, shows a PA1 key in the host keypad.

showPA2
If `true`, shows a PA2 key in the host keypad.

showPA3
If `true`, shows a PA3 key in the host keypad.

showPageDown
If `true`, shows a Page Down key in the host keypad.

showPageUp
If `true`, shows a Page Up key in the host keypad.

showPrint
If `true`, shows a PRINT key in the host keypad for printing output.

showReset
If `true`, shows a RESET key in the host keypad.

showSystemRequest
If `true`, shows a SYSREQ key in the host keypad.

style Specifies how keys defined with value=`true` are displayed in the host keypad. Valid values are `buttons` or `links`. The default is **buttons**.

com.ibm.hats.common.KeyboardSupport

For the com.ibm.hats.common.KeyboardSupport class, name specifies a customizable setting:

enable
Specifies whether keyboard support is available in the project. When keyboard support is enabled, end users can use the physical keyboard keys to interact with the host. The end user can press certain physical keys that have been mapped to host aid keys, such as the F1, SYSREQ, RESET, or ATTN keys. The end user can toggle keyboard support to be disabled if he wants to use a mapped physical keyboard key to interact with the browser.

Note: This must be set to `true` to turn on the wizard that allows the HATS theme to change from the default emulator style to a modern application style.

initialState
If `true`, the initial state of the host keyboard is on (the user can interact with the application using the physical keyboard).

supportAllKeys
If `true`, all mapped keys are supported, regardless of what buttons or links are displayed. If `false`:

- If there are no recognized host functions displayed in the current page as buttons or links, support all mapped host functions.
- If there are any recognized host function buttons or links, support only those host functions.

com.ibm.hats.common.OIA

For the com.ibm.hats.common.OIA class, name specifies a customizable setting:

active If `true`, an operator information area (OIA) is visible in the project. The default is **true**.

Note: This must be set to `true` to turn on the wizard that allows the HATS theme to change from the default emulator style or to a modern application style.

appletActive
If `true`, an indicator is displayed in the OIA if asynchronous update support is enabled. The default is **false**.

autoAdvanceIndicator
If `true`, displays in the OIA whether auto-advance is enabled, if it is supported by the browser. The default is **false**.

bidiControls
If `true`, displays in the OIA the current bidirectional controls to indicate editing status, if they are supported by the browser. The default is **true**.

cssClass
Specifies the cascading stylesheet (CSS) class name that controls the appearance of the OIA. The default is **statusArea**.

cursorPosition
If `true`, displays in the OIA the absolute cursor position for the host, such as 1391. The default is **false**.

cursorRowColumn
If `true`, displays in the OIA the row and column of the host cursor, such as 18/031. The default is **true**.

fieldData
If `true`, displays in the OIA field extended data, such as numeric only or field exit required. The default is `false`.

inputInhibited
If `true`, displays in the OIA whether the keyboard is locked, preventing input from the keyboard. The default is **true**.

insertMode
If `true`, displays in the OIA whether overwrite mode is enabled, if it is supported by the browser. The default is **true**.

layout Depending on the value attribute, determines how to display the OIA, either horizontally (across the bottom of the page) or vertically (as a side frame on the page). The default is **horizontal**.

msgWaiting
If true, displays an indicator when the host system has one or more message for the session. The setting is applicable only for 5250 host systems.

sslCheck
If `true`, displays in the OIA whether the Host On-Demand connection is SSL secured. The default is **true**.

systemWait
If `true`, displays in the OIA whether the system is locked while waiting for data to be returned. The default is **true**.

com.ibm.hats.common.RuntimeSettings

For the com.ibm.hats.common.RuntimeSettings class, name specifies a customizable setting:

autoEraseFields
Specifies whether modified input fields should have `[erasefld]` applied before modified data is entered into the field. The default value is **true**. If the value is set to `false`, space characters may be used to replace data already entered in the field by the host.

Notes:

1. Any host field that is rendered as multiple input fields will not be automatically cleared. For example, long host fields that wrap from one line to the next are rendered as multiple input fields and will not be automatically cleared before updating.
2. This setting can only be specified at the project level. It cannot be specified for a single transformation.

enableAutoAdvance
Specifies whether the cursor moves to the next input field when located at the end of an input field; that is, when the input field is entirely filled in. When `true`, the cursor will move to the next input field when located at the end of an input field. When `false`, the cursor does not move to the next input field unless the user explicitly moves it. The default is **false**.

enableAutoTabOn
Specifies whether the tab key will move the cursor to the next input field when the cursor reaches the end of an input field; that is the input field is

entirely filled in. When set to `true`, based on the order of presentation field in the browser, the tab key will move cursor in the current field to the next field when the position of the cursor is at the end of the current field. When set to `false`, the tab key does not move to the next input field unless the user explicitly moves it. The default is **false**.

enableBusyPage
When set to `true`, sending multiple requests will be redirected to busy page behavior. When set to `false`, sending multiple requests will be blocked in the client side and busy page is not displayed. The default is **false**.

enableCompression
When set to `true`, enables the HTTP compression filter used to reduce the number of bytes transferred between the HATS runtime, which runs on the WebSphere Application Server, and the user's browser. The default is **false**.

enableSameOriginPolicy
When set to `true`, enables the CSRF validation filter for same-origin policy protection security mechanism that restricts how data (a document or script) loaded from one origin can interact with a resource from another origin. It restricts the attack from a different source origin to target origin in the HATS runtime, which runs on the WebSphere Application Server, and the user's browser. The default is **false**.

enableTokenProtection
When set to `true`, enables the CSRF validation filter for token based protection security mechanism where by a malicious website will send a request to a HATS web application that a user is already authenticated against from a different website. This way an attacker can access functionality in a target web application via the victims already authenticated browser in the HATS runtime, which runs on the WebSphere Application Server, and the user's browser. The default is **false**.

escapeHTMLTags
Specifies whether HTML tag interpretation should be performed for data on a host screen. If `true`, then all data is interpreted as simple text. If `false`, then data that looks like a valid HTML tag, is treated as such. For example, if a screen contains data such as, `<S>elect`, and this setting is `true`, the data is interpreted as the simple text, `<S>elect`. If this setting is `false`, the `<S>` is interpreted as the HTML strikeout tag. The default is **false**.

Note: If `true`, data that matches a valid HTML tag, supplied using the text replacement function, is treated as simple data.

enableOverwriteMode
If `true`, text entered into an input field overwrites text at the cursor position one character at a time. If `false`, text entered into an input field is inserted at the cursor position pushing existing text ahead. The user can toggle from this initial setting using the Insert key. The default is **true**.

nextFieldForDropDown
If `true`, the cursor position is moved to the next input field when a selection is made from a drop-down list. The default for new projects created in HATS V7.5.0.2, or later, is **true**. The default for projects created before HATS V7.5.0.2 is **false**.

Note: This setting is effective only when **enableAutoAdvance** is `true`.

selectAllOnFocus

If `true`, all text in a field is selected when the field receives focus, which is typical behavior for a Web application. If `false`, no text is selected when the field receives focus which is typical behavior for a terminal emulator.

Notes:

1. For Web applications:
   - The default is **true**.
   - This setting does not affect the **enableOverwriteMode** setting behavior.
   - This setting is only valid when Internet Explorer is used as the browser for the application.
2. For rich client applications:
   - The default is **false**.
   - When selected, this setting functions like the **enableOverwriteMode** setting in that characters are overwritten as a user types into the field.
   - Text is selected only when the keyboard is used to tab into the field. Text is not selected when clicking the mouse in the field.

suppressUnchangedData

If `true`, disables all fields whose contents are the same as when the form was rendered. If `false`, sends any field contents received from the browser to the host even if the current presentation space contents are identical for that field. The default is **false**.

com.ibm.hats.transform

For the com.ibm.hats.transform class, name specifies a customizable setting:

alternate

The value `DEFAULT` if an alternateRenderingSet is specified. Otherwise, unspecified.

alternateRenderingSet

Specifies the name of the rendering set to use for default rendering if nothing is found to render during transformation of a HATS component tag.

com.ibm.hats.transform.components.*name*

Refer to the *HATS User's and Administrator's Guide* for descriptions of component settings.

com.ibm.hats.transform.DefaultRendering

For the com.ibm.hats.transform.DefaultRendering class, name is always `applicationDefaultRenderingSetName`. The value specifies the name of the rendering set defined as the default rendering set for the project. The rendering set name specified on the value setting must match the value of the default attribute specified for the <defaultRendering> tag.

com.ibm.hats.transform.widgets.dojo.*name*

Refer to the *HATS User's and Administrator's Guide* for descriptions of HATS Dojo widget settings.

com.ibm.hats.transform.widgets.*name*

Refer to the *HATS User's and Administrator's Guide* for descriptions of widget settings.

<textReplacement> tag

The <textReplacement> tag is the enclosing tag for any text replacement values you define in the project. This tag has no attributes.

<replace> tag

The <replace> tag specifies the text replacement values in a project.

Note: If you are using a bidirectional code page, refer to *HATS User's and Administrator's Guide*.

The attributes of the <replace> tag are:

caseSensitive
Specifies whether the case of text replacement values must match before text replacement occurs. Valid values are `true` and `false`. The default is `false`.

from Specifies the text you want to replace. The text on the **from** attribute must be enclosed in quotes.

to When replacing text with text or HTML coding (Web only), specifies the replacement string you want to insert in place of the value specified on the **from** attribute. The replacement string on the **to** attribute must be enclosed in quotes. If you want to replace the text with a button or a link, the code for the button or link must be added inside the quotes.

regularExpression
Specifies whether Java regular expression support is used as part of the text replacement algorithm. A regular expression is a pattern of characters that describes a set of strings. You can use regular expressions to find and modify occurrences of a pattern. Valid values are `true` and `false`. The default is `false`.

toImage
When replacing text with an image, specifies the path and name of the image you want to insert in place of the value specified on the **from** attribute. The path and name of the image on the **toImage** attribute must be enclosed in quotes.

matchLTR
When using a bidirectional code page, specifies whether the value specified on the **from** attribute is replaced on left-to-right screens. Valid values are `true` and `false`. The default is `true`.

matchRTL
When using a bidirectional code page, specifies whether the value specified on the **from** attribute is replaced on right-to-left screens. Valid values are `true` and `false`. The default is `false`.

matchReverse
When using a bidirectional code page, specifies whether the value specified on the **from** attribute is replaced when the section of the screen in which it appears has been reversed from the original direction of the page. Valid values are `true` and `false`. The default is `false`.

Note: Care should be taken when using text replacement. Text replacement with a disparate number of characters in the strings can cause changes in the

representation of the screen. Depending on the widget used for presenting a region of a screen, text on a line of the screen can be contracted, expanded, or forced to a new line.

<defaultRendering> tag

The <defaultRendering> tag is the enclosing tag for all rendering sets you define in the project.

The attribute of the <defaultRendering> tag is:

default
Specifies the name of the rendering set to use for default rendering in the project. The rendering set name specified on the default attribute *must* match the value specified for the value attribute of the class setting named com.ibm.hats.transform.DefaultRendering.

<renderingSet> tag

The <renderingSet> tag is the enclosing tag for rendering items defined in the rendering set.

The attributes of the <renderingSet> tag are:

name The name specified for the rendering set when it was created.

description
The description specified for the rendering set when it was created.

layout Indicates whether to use compact rendering, which eliminates unnecessary blanks in fields and text on the transformed screen. This attribute should only be used if you want your default rendering to be compacted. The only valid value for layout is COMPACT. By default, a rendering set does not specify this attribute and does not use compact rendering.

separated
Indicates whether to render the output using inline span tags to differentiate between fields and reduce the amount of HTML and blank space on the transformed screen. This is the default for Web applications optimized for mobile devices. By default, a rendering set does not specify this attribute.

table Indicates whether to render the output in a table and preserve the layout of the original host screen. This is the default for Web applications not optimized for mobile devices.

<renderingItem> tag

The <renderingItem> tag is the enclosing tag for a specific rendering item.

The attributes of the <renderingItem> tag are:

componentIdentifier
The name of the rendering item used to coordinate component information with the transformation. The default setting is the name of the screen combination event.

associatedScreen
The name of the captured screen used to create this rendering item.

description
The description entered when the rendering item was created.

enabled
Indicates whether this rendering item is enabled. Reflects the state of the check box on the Rendering page of Project Settings.

endCol
The last column of the host screen to which this rendering item should be applied. -1 means the rightmost column of the host screen.

endRow
The last row of the host screen to which this rendering item should be applied. -1 means the bottom row of the host screen.

startCol
The first column of the host screen to which this rendering item should be applied.

startRow
The first row of the host screen to which this rendering item should be applied.

type The host component whose contents will be transformed. The attribute value is the full class name of the host component. There is no default value for this required attribute.

widget
The widget into which the host component will be transformed.

The following tags are also included in each specific rendering item:

componentSettings
The <componentSettings> tag is the enclosing tag for any settings modified for the component for this rendering item. This tag has no attributes.

setting
The <setting> tag is the enclosing tag for any settings modified for the component for this rendering item.

The attributes of the <setting> tag are:

name Specifies the name of a customizable setting for the component. The available settings depend on the component.

Refer to *HATS User's and Administrator's Guide* for descriptions of component settings.

value Specifies the value of a customizable setting for the component. The default values vary depending on the setting.

widgetSettings
The <widgetSettings> tag is the enclosing tag for any settings modified for the widget for this rendering item. This tag has no attributes.

setting
The <setting> tag is the enclosing tag for any settings modified for the widget for this rendering item.

The attributes of the <setting> tag are:

name Specifies the name of a customizable setting for the widget. The available settings depend on the widget.

Refer to *HATS User's and Administrator's Guide* for descriptions of widget settings.

value Specifies the value of a customizable setting for the widget. The default values vary depending on the setting.

textReplacements

The <textReplacements> tag is the enclosing tag for any text replacement specified for this rendering item. This tag has no attributes.

replace

The <replace> tag specifies the text replacement values for this rendering item.

The attributes of the <replace> tag are:

caseSensitive
Specifies whether the case of text replacement values must match before text replacement occurs. Valid values are `true` and `false`. The default is `false`.

from Specifies the text you want to replace. The text on the **from** attribute must be enclosed in quotes.

to Specifies the replacement string you want to insert in place of the value specified on the **from** attribute. The replacement string on the **to** attribute must be enclosed in quotes.

regularExpression
Specifies whether Java regular expression support is used as part of the text replacement algorithm. A regular expression is a pattern of characters that describes a set of strings. You can use regular expressions to find and modify occurrences of a pattern. Valid values are `true` and `false`. The default is `false`.

toImage
When replacing text with an image, specifies the path and name of the image you want to insert in place of the value specified on the **from** attribute. The path and name of the image on the **toImage** attribute must be enclosed in quotes.

matchLTR
When using a bidirectional code page, specifies whether the value specified on the **from** attribute is replaced on left-to-right screens. Valid values are `true` and `false`. The default is `true`.

matchRTL
When using a bidirectional code page, specifies whether the value specified on the **from** attribute is replaced on right-to-left screens. Valid values are `true` and `false`. The default is `false`.

matchReverse
When using a bidirectional code page, specifies whether the value specified on the **from** attribute is replaced when the section of the screen in which it appears has been reversed from the original direction of the page. Valid values are `true` and `false`. The default is `false`.

Note: Care should be taken when using text replacement. Text replacement with a disparate number of characters in the strings can cause changes in the HTML representation of the screen. Depending on the widget used for presenting a region of a screen, text on a line of the screen can be contracted, expanded, or forced to a new line.

<globalRules> tag

The <globalRules> tag is the enclosing tag for any global rules you define in the project. It has no attributes.

<rule> tag

The <rule> tag defines a global rule.

The attributes of the <rule> tag for project-level rules are the same as for screen customization-level global rules. However, when you create a project-level and a screen customization-level global rule using the same input field, the screen customization-level rule will have a higher priority. The <rule> tag attributes are:

associatedScreen
The name of a screen capture in the project, from which the global rule is defined.

description
The description entered when the global rule was created.

enabled
Indicates whether this global rule is enabled. Reflects the state of the check box on the Rendering page of Project Settings.

endCol
The last column of the host screen to which this global rule should be applied. -1 means the rightmost column of the host screen.

endRow
The last row of the host screen to which this global rule should be applied. -1 means the bottom row of the host screen.

name The name that will be shown in the list of global rules on the Rendering page of Project Settings.

startCol
The first column of the host screen to which this global rule should be applied.

startRow
The first row of the host screen to which this global rule should be applied.

transformationFragment
The name of the transformation fragment file associated with this global rule. This file contains the information specifying how to transform the host component. It will be included in a transformation if the appropriate input fields are present in the host screen.

type The pattern type component for this global rule, taken from the first page of the Create Global Rule wizard. The type can be one of the following:

com.ibm.hats.transform.components. InputFieldByTextPatternComponent
This pattern component recognizes input fields on the host screen based on text near the fields.

com.ibm.hats.transform.components. AllInputFieldsPatternComponent
This pattern component recognizes all input fields on the host screen.

com.ibm.hats.transform.components.InputFieldBySizePatternComponent
This pattern component recognizes input fields on the host screen based on the size of the input fields.

com.ibm.hats.transform.components.InputFieldByPositionPatternComponent
This pattern component recognizes input fields on the host screen by the field's position on the host screen.

The following tags are also included in each specific global rule:

componentSettings
The <componentSettings> tag is the enclosing tag for any settings defined for the pattern type component specified on the type attribute of the <rule> tag. This tag has no attributes.

setting
The <setting> tag is the enclosing tag for any settings defined for the pattern type component specified on the type attribute of the <rule> tag.

The attributes of the <setting> tag are:

name Specifies the name of a customizable setting for the pattern type component. The available settings depend on the component.

- For the com.ibm.hats.transform.components.InputFieldByTextPattern Component, the settings for the name attribute are:

  caseSensitive
  Specifies whether the case of the text on the text setting must match before the pattern is recognized. Valid values are `true` and `false`. The default is `true`.

  immediatelyNextTo
  Specifies which input fields you want to transform.Valid values are:

  true Specifies that only the nearest input field should be transformed.

  false Specifies that all input fields should be transformed.

  The default is `false`.

  location
  Specifies where text in a protected field, as specified on the text setting, must be in relation to input fields for this global rule to be applied. Valid values are:

  ABOVE
  Specifies that the text must be above the input field.

  BELOW
  Specifies that the text must be below the input field.

  LEFT Specifies that the text must be to the left of the input field.

RIGHT
Specifies that the text must be to the right of the input field.

The default is RIGHT.

text Specifies some text in a protected field of the host screen. Valid values are any text in a protected field on the host screen.

- For the com.ibm.hats.transform.components.AllInputFieldsPattern Component, there are no component settings.
- For the com.ibm.hats.transform.components.InputFieldBySizePattern Component, the setting for the **name** attribute is **fieldSize**.Valid values are the sizes of any input fields on the host screen.
- For the com.ibm.hats.transform.components. InputFieldByPositionPatternComponent, the setting for the **name** attribute is **enableFieldLength**. Valid values are `true` and `false`.

Note: When **enableFieldLength** is specified, the entire field (as specified by the **fieldSize** attribute) must be within the defined region boundary in order for the field to be recognized. The region boundary is defined by the values for the **startRow**, **endRow**, **startCol** and **endCol** attributes.

Connection files (.hco)

Each connection that you define in a HATS project is represented by a connection file. The connection (.hco) files are stored in the *project_name*`/Connections` folder, where *project_name* is the name you gave the project when you created it. The default connection, which is created using the connection values that you specify in the New HATS Project wizard, is stored in main.hco.

<hodconnection> tag

The <hodconnection> tag begins the connection definition and specifies several characteristics for the connection.

The attributes of the <hodconnection> tag are:

certificateFile
Specifies the name of the file from which the project's SSL certificate was imported, if any.

codePage
Specifies the numeric value for the code page used on this connection. The default value is the value you selected when you created the project. Each connection can use a different code page. See the description of the codePageKey attribute for the code page numbers.

codePageKey
Specifies the usage key that corresponds to the numeric code page. The default value is KEY_US. Valid values for codePage and the location or usage key are:

Table 3. Code pages and usage keys

Code page	Usage key
037	KEY_BELGIUM KEY_BRAZIL KEY_CANADA KEY_NETHERLANDS KEY_PORTUGAL KEY_US
273	KEY_AUSTRIA KEY_GERMANY
274	KEY_BELGIUM_OLD
275	KEY_BRAZIL_OLD
277	KEY_DENMARK KEY_NORWAY
278	KEY_FINLAND KEY_SWEDEN
280	KEY_ITALY
284	KEY_SPAIN KEY_LATIN_AMERICA
285	KEY_UNITED_KINGDOM
297	KEY_FRANCE
420	KEY_ARABIC
424	KEY_HEBREW
500	KEY_MULTILINGUAL
803	KEY_HEBREW_OLD
838	KEY_THAI
870	KEY_BOSNIA_HERZEGOVINA KEY_CROATIA KEY_CZECH KEY_HUNGARY KEY_POLAND KEY_ROMANIA KEY_SLOVAKIA KEY_SLOVENIA
871	KEY_ICELAND
875	KEY_GREECE
924	KEY_MULTILINGUAL_ISO_EURO
930	KEY_JAPAN_KATAKANA
933	KEY_KOREA_EX
937	KEY_ROC_EX
939	KEY_JAPAN_ENGLISH_EX
1025	KEY_BELARUS KEY_BULGARIA KEY_MACEDONIA KEY_RUSSIA KEY_SERBIA_MONTEGRO
1026	KEY_TURKEY
1047	KEY_OPEN_EDITION

Table 3. Code pages and usage keys (continued)

Code page	Usage key
1112	KEY_LATVIA KEY_LITHUANIA
1122	KEY_ESTONIA
1123	KEY_UKRAINE
1137	KEY_HINDI
1140	KEY_BELGIUM_EURO KEY_BRAZIL_EURO KEY_CANADA_EURO KEY_NETHERLANDS_EURO KEY_PORTUGAL_EURO KEY_US_EURO
1141	KEY_AUSTRIA_EURO KEY_GERMANY_EURO
1142	KEY_DENMARK_EURO KEY_NORWAY_EURO
1143	KEY_FINLAND_EURO KEY_SWEDEN_EURO
1144	KEY_ITALY_EURO
1145	KEY_LATIN_AMERICA_EURO KEY_SPAIN_EURO
1146	KEY_UNITED_KINGDOM_EURO
1147	KEY_FRANCE_EURO
1148	KEY_MULTILINGUAL_EURO
1149	KEY_ICELAND_EURO
1153	KEY_BOSNIA_HERZEGOVINA_EURO KEY_CROATIA_EURO KEY_CZECH_EURO KEY_HUNGARY_EURO KEY_POLAND_EURO KEY_ROMANIA_EURO KEY_SLOVAKIA_EURO KEY_SLOVENIA_EURO
1154	KEY_BELARUS_EURO KEY_BULGARIA_EURO KEY_MACEDONIA_EURO KEY_RUSSIA_EURO KEY_SERBIA_MONTEGRO_EURO
1155	KEY_TURKEY_EURO
1156	KEY_LATVIA_EURO KEY_LITHUANIA_EURO
1157	KEY_ESTONIA_EURO
1158	KEY_UKRAINE_EURO
1160	KEY_THAI_EURO
1166	KEY_KAZAKHSTAN_EURO
1364	KEY_KOREA_EURO
1371	KEY_ROC_EURO
1388	KEY_PRC_EX_GBK

Table 3. Code pages and usage keys (continued)

Code page	Usage key
1390	KEY_JAPAN_KATAKANA_EX_EURO
1399	KEY_JAPAN_ENGLISH_EX_EURO

connecttimeout
Specifies the time that HATS attempts to connect to a host. Specify a number of seconds between 1 and 2147483647. The initial default is 120 seconds.

description
Specifies the description for the connection when it was created.

disableFldShp
When using a bidirectional code page, specifies whether you want Arabic data in password fields submitted to the host in isolated form or in shaped form. Valid values are `true` and `false`. There is no initial default.

disableNumSwapSubmit
When using a bidirectional code page, specifies whether you want to disable entry of Arabic-Western numbers, that is, allow entry of only Arabic-Indic numbers in RTL screens. Do this so that, when submitted, all numbers are submitted as Arabic-Western numbers. Valid values are `true` and `false`. There is no initial default.

disconnecttimeout
Specifies the time that HATS attempts to disconnect from a host. Specify a number of seconds in the range of 1-2147483647. The initial default is 120 seconds.

enableScrRev
When using a bidirectional code page, specifies which pages of an application should display a **Screen Reverse** button to enable users to reverse the direction of displayed text and input fields. Valid values are:

(blank)
The **Screen Reverse** button is not placed on any screens.

Customized
The **Screen Reverse** button is placed on screens that match a screen customization and on screens that do not match a screen customization, in other words, on all screens. There is no option to place the **Screen Reverse** button only on screens that match a screen customization.

Non-customized
The **Screen Reverse** button is placed only on screens that do not match a screen customization.

There is no initial default.

host Specifies the name of the host to which the connection is made.

hostSimulationName
Specifies the name of the host simulation trace file to use instead of a live connection.

LUName
Valid only on enhanced 3270 sessions (TNEnhanced="true"). Sets the LUName property, which is the LU name used during enhanced

negotiation. Values are in string format. Maximum length of LUName is 17 characters. There is no default. To configure print support for your 3270 HATS project, you must specify that the host type is 3270E. When you add the LUName parameter to the list of connection settings, do not use the printer LU name; use the name of your display LU or a pool of display LUs.

LUNameSource
Valid only on enhanced 3270 sessions (TNEnhanced="true"). Specifies the source of the LU name for the connection. Valid values are:

automatic
The LU name is automatically assigned when the connection is established.

prompt
Prompt the end user for the LU name. If pooling is enabled, prompt should not be used.

session
The LU name is defined using an HTTP session variable. The LUName attribute names the session variable. If pooling is enabled, session should not be used.

value The LU name is defined on the LUName attribute.

There is no initial default.

port Specifies the number of the port through which the connection to the host is made. The valid range for ports is 0–65535. The initial default is 23.

screenSize
Specifies the number of rows and columns that the host terminal displays. Valid values for screenSize are:

- 2=24x80
- 3=32x80
- 4=43x80
- 5=27x132
- 6=24x132 (VT only)

The initial default screen size is 24 x 80.

sessionType
Specifies the type of terminal the host terminal displays. Valid values for type are:

- 1=3270
- 2=5250
- 3=VT

The initial default is 3270.

singlelogon
When user lists are defined in the project, specifies whether a user ID can be used more than once at a time. Valid values are:

true The user ID can be used only once at a time.

false The user ID can connect multiple times simultaneously.

The initial default is `false`.

SSL Specifies whether SSL is enabled. Valid values are:

true SSL is enabled for the project.

false SSL is not enabled for the project.

TNEnhanced
Valid only on 3270 connections. Specifies whether the connection is a TN3270E connection. Valid values are `true` and `false`. The initial default is `true`.

VTTerminalType
Valid only on VT connections. Indicates the type of VT terminal. Valid values are:

- 1=VT420_7
- 2=VT420_8
- 3=VT100
- 4=VT52

WFEnabled
Valid only on 5250 connections. Specifies whether the connection is a 5250W connection. Valid values are `true` and `false`. The initial default is `false`.

workstationID
Valid only on 5250 and 5250W connections. When the workstationIDSource attribute is set to either session or value, specifies the HTTP session variable or the workstation ID for the connection. There is no initial default.

workstationIDSource
Valid only on 5250 and 5250W connections. Specifies the source of the workstation ID for the connection. Valid values are:

automatic
The workstation ID is automatically assigned when the connection is established.

prompt
Prompt the end user for the workstation ID. If pooling is enabled, prompt should not be used.

session
The workstation ID is defined using an HTTP session variable. The workstationID attribute names the session variable. If pooling is enabled, session should not be used.

value The workstation ID is defined on the workstationID attribute.

There is no initial default.

<otherParameters> tag

The <otherParameters> tag specifies additional Host On-Demand session parameters.

Host On-Demand session parameters supported by HATS include:

ENPTUI
Determines whether a project with a connection to a 5250 host can use

display data stream (DDS) keywords for the Enhanced Non-Programmable Terminal User Interface (ENPTUI). Valid values are `true` and `false`. The default value is `false`.

HTMLDDS
Determines whether a project with a connection to a 5250 host can use HTML fragments along with the 5250 display data stream (DDS). This feature is not intended for display with standard emulation programs; it is only sent to 5250 Workstation Gateway devices, and host access products such as HATS, that have been enhanced to show this HTML data in a browser HTML DDS is available as a component when the host type is specified as 5250. The use of this component is not part of the default rendering and must be added to either the default rendering or custom transformations. Valid values are:

- Ignore DDS data using filter
- Accept DDS data using filter

For further information, see the HATS User's and Administrator's Guide or HATS Knowledge Center at http://www.ibm.com/support/knowledgecenter/SSXKAY_9.6.0.

Lamalef
Sets the LamAlef property, which determines whether LamAlef should be expanded or compressed. This property applies to Arabic sessions only. Values are in string format. Valid values are:

- LAMALEF_ON
- LAMALEF_OFF

The default value is LAMALEF_OFF.

numeralShape
Sets the numeralShape property. This property applies to bidirectional sessions only. Values are in string format. The default value is NOMINAL.

numericSwapEnabled
Sets the Numeric swapping property. This property applies to Arabic 3270 sessions only. Valid values are `true` and `false`. The default value is `true`.

roundTrip
Sets the roundTrip property. This property applies to bidirectional sessions only. Values are in string format. Valid values are:

- ROUNDTRIP_ON
- ROUNDTRIP_OFF

The default value is ROUNDTRIP_ON.

SecurityProtocol
Sets the SecurityProtocol property, which indicates whether to use the TLS v1.0 protocol or the SSL protocol for providing security. Values are in string format. The default value is TLS.

SSLServerAuthentication
Sets the SSLServerAuthentication property, which indicates whether SSL server authentication is enabled. Valid values are `true` and `false`. The default value is `false`.

symmetricSwapEnabled
Sets the symmetric swapping property. This property applies to Arabic 3270 sessions only. Valid values are `true` and `false`. The default value is `true`.

textOrientation
Sets the textOrientation property. This property applies to bidirectional sessions only. Values are in string format. Valid values are:

- LEFT_TO_RIGHT
- RIGHT_TO_LEFT

The default value is LEFT_TO_RIGHT.

ThaiDisplayMode
Sets the Thai display mode property. This property applies to Thai sessions only. Values are in string format. The default value is THAI_MODE_5.

workstationID
Sets the workstationID property, which is used during enhanced negotiation for 5250. Values are in string format. All lowercase characters are converted to uppercase. There is no default value.

<classSettings> tag

The <classSettings> tag is the enclosing tag for the Java classes you include in the connection definition.

<class> tag

The <class> tag specifies a class whose attributes are defined in the enclosed <settings> tags.

The attributes of the **<class>** tag are:

name Specifies one of the following Java classes:

- com.ibm.hats.common.HATSPrintSettings
- com.ibm.hats.common.NextScreenSettings

The class names on the name attribute must be enclosed in quotes.

<setting> tag

The <setting> tag specifies the settings associated with the class in which the <setting> tag is enclosed.

The attributes of the <setting> tag are:

name Specifies the name of a customizable setting for the class defined by the name attribute of the <class> tag. The available settings depend on the class.

For the com.ibm.hats.common.HATSPrintSettings class, the customizable settings are:

printFontName
Specifies the font in which you want your output printed. Valid values depend on the value of the codePage attribute.

printNumSwapSupport
Specifies whether numeric swapping is enabled. This property applies to Arabic 3270 sessions only, when printRTLSupport is enabled. English numerals are replaced by Arabic numerals in right-to-left screens and Arabic numerals are replaced by English numerals in right-to-left Screens. Valid values are `true` and `false`. The default value is `true`.

printOrientation

Specifies how your printed output is positioned on the page. Valid values for printOrientation are:

PDF_ORIENTATION_PORTRAIT
Orients the paper vertically.

PDF_ORIENTATION_LANDSCAPE
Rotates the paper 90 degrees clockwise.

printPaperSize

Specifies the size of the paper on which to print your output. Valid values for printPaperSize are:

ISO_A3
ISO/DN & JIS A4, 297 x 420 mm

ISO_A4
ISO/DN & JIS A4, 210 x 297 mm

ISO_A5
ISO/DN & JIS A4, 148 x 210 mm

ISO_B4
ISO/DN B4, 250 x 353 mm

ISO_B5
ISO/DN B5, 176 x 250 mm

JIS_B4
JIS B4, 257 x 364 mm

JIS_B5
JIS B5, 182 x 257 mm

ISO_C5
ISO/DN C5, 162 x 229 mm

ISO_DESIGNATED_LONG
ISO/DN Designated Long, 110 x 220 mm

EXECUTIVE
Executive, 7 1/4 x 10 1/2 in

LEDGER
Ledger, 11 x 17 in

NA_LETTER
North American Letter, 8 1/2 x 11 in

NA_LEGAL
North American Legal, 8 1/2 x 14 in

NA_NUMBER_9_ENVELOPE
North American #9 Business Envelope, 3 7/8 x 8 7/8 in

NA_NUMBER_10_ENVELOPE
North American #10 Business Envelope, 4 1/8 x 9 1/2 in

MONARCH_ENVELOPE
Monarch Envelope, 3 7/8 x 7 1/2 in

CONTINUOUS_80_COLUMNS
Data Processing 80 Columns Continuous Sheet, 8 x 11 in

CONTINUOUS_132_COLUMNS
Data Processing 132 Columns Continuous Sheet, 13 1/5 x 11 in

printRTLSupport
Specifies whether right-to-left print support is enabled. This property applies to Arabic 3270 sessions only. Bidirectional files can be either RTL or LTR files. Valid values are `true` and `false`. The default value is `true`.

printSupport
Specifies whether your project includes print capability. Valid values for printSupport are `true` and `false`. The initial default is `false`.

printSymSwapSupport
Specifies whether symmetric swapping is enabled; swapping characters are swapped in right-to-left screens. This property applies to Arabic 3270 sessions only, when printRTLSupport is enabled. Valid values are `true` and `false`. The default value is `true`.

printURL
Specifies the URL for a System i® Access for Web Printer Output window on a 5250 server. The default URL is http://*hostname*/webaccess/iWASpool, where *hostname* is the name of the 5250 server.

The customizable settings for the com.ibm.hats.common.NextScreenSettings class are:

default.appletDelayInterval
Specifies the maximum time (in milliseconds) that the server waits until a full host screen has arrived for a session running in asynchronous update mode. The initial default value is 400 milliseconds.

default.blankScreen
Specifies how to handle a blank screen received at connection startup. Valid values are:

normal
Display the blank screen.

sendkeys
Send the host key defined on the default.blankScreen.keys setting.

timeout
Wait for the connection to time out before issuing an error message.

The default is `normal`.

default.blankScreen.keys
Specifies the host key to send when default.blankScreen is set to sendkeys.

default.delayInterval
Specifies the maximum time, in milliseconds, that the server waits for the arrival of screen updates after the initial screen update. The initial default value is 1200 milliseconds.

default.delayStart
Specifies the minimum time (in milliseconds) that the server waits until the first full host screen has arrived after the host connection becomes ready. The initial default value is 2000 milliseconds.

nextScreenClass
Specifies a class that turns off the default, speed-optimized, algorithm in favor of accuracy. The class for the value attribute is com.ibm.hats.runtime.TimingNextScreenBean. As a result, screen transitions might be slower. The setting `default.delayInterval` is now the minimum amount of time (in milliseconds) per screen transition. The `default.delayInterval` value has a default of 1200 milliseconds, but you can customize it for your network and your host application. If you raise this value, remember that HATS waits at least this long for the host screen to settle.

oiaLockMaxWait
Specifies the maximum time (in milliseconds) that HATS should wait after the host screen has settled to ensure that the OIA system lock status has been released. The value can be in the range of 0–600000 milliseconds. The initial default value is 300000 milliseconds.

value The values for the settings are included in the description of the individual settings.

<poolsettings> tag

The <poolsettings> tag defines pooling parameters for the connection.

The attributes of the <poolsettings> tag are:

enabled
Specifies whether pooling is enabled for this connection. Valid values for enabled are `true` and `false`. The initial default is `false`.

maxbusytime
The number of seconds before a connection that is in use by an end user will be terminated. If you do not want active connections to end, set this field to -1. This setting is available for connections that have pooling enabled as well as for connections that have pooling disabled. For a connection with pooling enabled, the connection returns to the pool if the number of available connections in the pool is less than the minimum number of connections you specified to remain connected. Otherwise, this connection is discarded. For a connection with pooling disabled, the connection is discarded. Valid number of seconds is -1 or in the range of 60-2147483647. The default is -1 (no maximum busy time).

maxconnections
The maximum number of connections in the pool that can be active. This setting is available only for connections that have pooling enabled. Valid number of connections is in the range of 1-2147483647. The default is 1. When you reach the maximum specified and an additional request for a connection is received, HATS can either wait for the next available connection or create a new connection.

maxidletime
The number of seconds before a connection that is not in use by an end user will be terminated and removed from the pool. If you do not want inactive connections to end, set this field to -1. This setting is available

only for connections with connection pooling enabled. The minimum number of connections you specify remain connected, whether or not they are used. Valid number of seconds is -1 or in the range of 60-2147483647. The default is -1 (no maximum idle time).

minconnections
The number of idle connections in the pool that remain connected. This setting is available only for connections that have pooling enabled and have the maxidletime before disconnection set to some value other than -1. Valid number of connections is between 0 and 2147483647. The default is 0 (do not keep connections connected).

overflowallowed
Whether a new, non-pooled connection should be created if the maximum limit of connections has been reached. If this value is false, you must specify the number of seconds to wait for a pooled connection to become available. If the time to wait elapses and a connection does not become available, HATS returns an error. If this value is true, a new, non-pooled connection will be created. When the end user finishes with this type of connection, it is not put back in the pool, but discarded.

waittimeout
The number of seconds to wait for a pooled connection to become available once the maximum limit of connections has been reached, and another request comes in. Valid number of seconds is between 0 and 2147483647, or -1 if you want to wait forever. The default is 120.

<webexpresslogon> tag

The <webexpresslogon> tag indicates whether the Web Express Logon function is enabled for this connection.

The attribute of the <webexpresslogon> tag is:

enabled
Specifies whether the Web Express Logon function is enabled for this connection. Valid values for enabled are `true` and `false`. The initial default is `false`.

<userconfig> tag

The <userconfig> tag defines a user list for the connection. The tags and data within the <userconfig> tag are complex and can be corrupted by manual editing. To protect the integrity of your user list, do not manually edit the <userconfig> data. Instead, use the **User List** tab on the Connection editor to create or modify a user list. By default, a host connection does not specify this tag and does not have a user list.

Template and transformation files (.jsp)

These JavaServer Pages (JSP) files contain HTML and JSP tagging to define how your project appears in the end user's browser.

The template .jsp files are stored in the *project_name*/**Web Content/Templates** directory. The transformation .jsp files are stored in the *project_name*/**Web Content/Transformations** directory. You can view and edit the source of the .jsp files by double-clicking on the name of the template or transformation in the **HATS Project View** to open the JSP editor. The source for the file can be viewed by clicking on the **Source** tab.

You can modify the template and transformation files using either the **Design** or the **Source** tabs in the JSP editor. When you make a change on one tab, the affected information on the other tab is automatically updated.

A template .jsp file contains HTML tagging to define links and images for the project page. The template .jsp file also contains a <HATS:Transform> tag that defines the transformation to be used with the template to present the page of your project.

A transformation .jsp file contains HTML tags to describe the layout of the information presented to the user of the project in a Web browser. The transformation .jsp file may also contain <HATS:Component> tags that define HATS components and widgets used to present the page of your project. For more information on the <HATS:Component> tag, see "HATS component tag and attributes" on page 17.

Screen combination files (.evnt)

The screen combination files defines how a host screen is recognized, the actions HATS performs when a screen is recognized, how to define the end of the screen combination, and how to navigate between screens. The screen combination (.evnt) files are stored in the *project_name*/**Web Content/WEB-INF/profiles/events/screencombinations** directory. You can view and edit the source of the screen combination files by double-clicking on the name of the screen combination in the HATS Projects view to open the screen combination editor. The source for the file can be viewed by clicking on the **Source** tab. You can modify screen combination files using the **Begin Screen**, **Render**, **Navigation**, **End Screen**, **Actions**, **Text replacement**, or **Source** tabs in the editor. HATS Toolkit updates the affected information on other tabs when you make changes on any tab. The screen combination event files contain tags to define how a host screen is recognized and the actions and navigations that will occur when the host screen is recognized.

Screen combination adds several tags to those found in screen customization (.evnt) files.

<combinations> tag

This is the container for the combination information. It consists of a type attribute and a rendering item detailing the screen combination component.

type The type parameter determines how the screen transformation will be aggregated.

If the string value is set to *dynamic*, the screen transformation can add screens to the combined area while the user is using the screen transformation.

If the string value is set to *normal* or is missing, the individual screens compound prior to allowing the user to interact with the screen transformation. Rich Client screen combinations are limited to normal processing.

<enddescription> tag

This is the description for the screen criteria used to determine if the screen combination end screen has been reached. The tags and details match the description tag. It has an attribute associatedScreen for the screen associated with the end screen.

associatedScreen
This is the screen capture associated with the end screen.

<navigation> tag

The navigation contains the commands needed to move between screens to gather and place data. It consists of a screenUp and screenDown tag.

<screenUp> tag

The commands necessary to traverse to a screen backward in the combination. This is used to return data to the correct place in a screen combination. It can consist of keyPress, setCursor, and sendText tags.

<screenDown> tag

The commands necessary to traverse to a screen forward in the combination. This is used to create the screen combination view as well as return data to the correct place in a screen combination. It can consist of keyPress, setCursor, and sendText tags.

<keyPress> tag

This navigation command is the equivalent of a sendKey. It has a value attribute, which must be a valid HOD key command, for the HOD command to send.

value The value attribute for the keyPress tag should be a valid HOD key command.

<setCursor> tag

This navigation command allows cursor positioning on the screen. It has a row and a column attribute for the cursor positioning.

row The row attribute should be a 1-based integer that equates to a position on the screen. This positions the vertical component of the cursor position.

column
The column attribute should be a 1-based integer that equates to a position on the screen. This positions the horizontal component of the cursor position.

<sendText>

This navigation command is the equivalent of a sendKey. It has a value attribute, which must be valid text for the host field, for the text to send.

value The value attribute for the sendText tag should be valid text for the host field.

Screen customization files (.evnt)

The screen customization files define how a host screen is recognized, and also defines the actions HATS performs when a screen is recognized.

The screen customization (.evnt) files are stored in the *project_name*/**Web Content/WEB-INF/profiles/events/screencustomizations** directory. You can view and edit the source of the screen customization files by double-clicking on the name of the screen customization in the **HATS Project View** to open the screen customization editor. The source for the file can be viewed by clicking on the **Source** tab.

You can modify screen customization files using the **Screen Recognition Criteria**, **Actions**, **Text replacement**, or **Source** tabs in the editor. HATS Toolkit updates the affected information on other tabs when you make changes on any tab.

The screen customization event files contain tags to define how a host screen is recognized and the actions that will occur when the host screen is recognized.

<event> tag

Begins the definition of the screen customization. The event tag has the following attributes:

description
If you supplied a description of the screen customization when you created it, that description is defined in this attribute.

type For a screen customization, type is always screenRecognize. For combined screens, type is screenCombination.

<actions> tag

This is the enclosing tag for all of the actions defined for a screen customization. It has no attributes.

<apply> tag

Defines the action for applying a transformation. The attributes of the <apply> tag are:

applyGlobalRules
Specifies whether HATS should look for global rules on this host screen. Default is `true`.

applyTextReplacement
Specifies whether HATS should look for text replacements on this host screen. Default is `true`. See the <replace> tag for further information on how to use text replacement.

enabled
Indicates whether this action is enabled for use. The default is `true`.

immediateKeyset
Defines the host keys sent to the host immediately when pressed by the end user of your project. If you did not define any host keys to be sent to the host immediately, this attribute has an empty value.

template
Names the template file that surrounds the transformation being applied. If the default template is being used to surround the transformation, this attribute has an empty value.

transformation
Names the transformation file that is to be applied for this action.

<insert> tag

Defines the action for inserting a global variable or a string. The attributes of the <insert> tag are:

enabled
Indicates whether this action is enabled for use. The default is `true`.

row Defines the starting row on the host screen where the value is to be inserted.

col Defines the starting column on the host screen where the value is to be inserted.

source Specifies whether the value to be inserted is a string or the value of a global variable. Valid values are string and variable.

value Specifies either the string to be inserted onto the host screen or the name of a global variable from which the value is taken.

fill If the source of the value to be inserted is an indexed global variable, fill specifies whether the indices of the global variable are to be concatenated and inserted at the specified position, or inserted into a rectangular region of the host screen. Valid values are concatenate and rectangular.

index If the source of the value to be inserted is an indexed global variable, index specifies the number of the index that is to be used as the value to be inserted onto the host screen.

shared
If the source of the value to be inserted is a global variable, shared specifies whether this global variable is shared between all the applications in the same EAR file.

<extract> tag

Defines the action for extracting a global variable. The attributes of the <extract> tag are:

enabled
Indicates whether this action is enabled for use. The default is `true`.

srow Defines the starting row on the host screen of the text being extracted.

erow Defines the ending row on the host screen of the text being extracted.

scol Defines the starting column on the host screen of the text being extracted.

ecol Defines the ending column on the host screen of the text being extracted.

name Specifies the name of the global variable to which the text is extracted. This can be an existing global variable or a new global variable.

overwrite
Specifies whether the text extracted is to overwrite the value of an existing global variable. Valid values are `true` and `false`.

indexed
Specifies whether the text extracted is a single string or a list of strings, where each string in the list corresponds to a single row of text from the extracted region. Valid values are true and false.

index If an existing global variable is indexed, this attribute specifies the index number to which the extracted value is to be written. The effect of this attribute is dependent on the value of the **overwrite** attribute. If `overwrite=true`, the extracted value overwrites the existing variable, starting at the specified index. If `overwrite=false`, the extracted value is inserted into the existing variable, beginning at the specified index.

shared
Shared specifies whether the global variable is shared between all the applications in the same EAR file.

<set> tag

Defines the action for setting a global variable. The attributes of the <set> tag are:

enabled
Indicates whether this action is enabled for use. The default is true.

name Specifies the name of the global variable being set. This can be an existing global variable or a new global variable.

shared
Specifies whether the global variable being set is shared between all the applications in the same EAR file.

type Specifies whether the value of the global variable being set comes from a fixed constant or a calculated value. Valid values are `string` and `calculate`.

value Specifies the value being assigned to the global variable.

overwrite
Specifies whether the value being set is to overwrite the value of an existing global variable. Valid values are `true` and `false`.

index If the value being set is being written to an existing indexed global variable, this attribute specifies the index number to which the value being set is written. The effect of this attribute is dependent on the value of the **overwrite** attribute. If `overwrite=true`, the value being set overwrites the existing variable, beginning at the specified index. If `overwrite=false`, the value being set is inserted into the existing variable, beginning at the specified index.

op1 Specifies whether the first operand of a calculated value is a fixed constant or the value of an existing global variable. Valid values are a fixed constant or the name of a global variable.

op1_type
Specifies whether the value of the first operand of a calculated value is set as a fixed constant or from an existing global variable. Valid values are `string` and `variable`.

op1_index
If the source of the value of the first operand of a calculated value is an indexed global variable, op1_index specifies the number of the index used as the value for the calculation.

op1_shared
If the value of op1 is a global variable, shared specifies whether this global variable is shared between all the applications in the same EAR file.

op Specifies the type of operation to occur between the first and second operands of a calculated value. Valid values are concatenate, + (add), - (subtract), * (multiply), / (divide), and % (modulo).

op2 Specifies whether the second operand of a calculated value is a fixed constant or the value of an existing global variable. Valid values are a fixed constant or the name of a global variable.

op2_type
Specifies whether the value of the second operand of a calculated value is set as a fixed constant or from an existing global variable. Valid values are `string` and `variable`.

op2_index
If the source of the value of the second operand of a calculated value is an indexed global variable, op2_index specifies the number of the index used as the value for the calculation.

op2_shared
If the value of op2 is a global variable, shared specifies whether this global variable is shared between all the applications in the same EAR file.

dec Specifies the number of decimal places to which a calculated value is rounded. Valid values are 0–999.

<execute> tag

Defines the action for executing business logic. The attributes of the <execute> tag are:

enabled
Indicates whether this action is enabled for use. The default is `true`.

class Names the Java class that contains your business logic. The class value is required.

method
Names the method inside the class that executes the business logic. The method value is required.

package
Names the package that the Java class resides in on your file system. The package value is optional.

<show> tag

Defines the action for showing a URL. The <show> tag has the following attributes:

enabled
Indicates whether this action is enabled for use. The default is `true`.

template
Specifies the template to be used for this action.

url Identifies the Uniform Resource Locator (URL) of the Web page to show. This attribute is required.

<forwardtoURL> tag

Defines the action for passing control from a project to a JSP that invokes an Integration Object. The <forwardtoURL> tag has the following attributes:

enabled
Indicates whether this action is enabled for use. The default is `true`.

startStateLabel
If forwarding control to a JSP with an Integration Object chain, specifies the start state label of the first Integration Object in the chain to be executed.

url Specifies the URL of the Integration Object JSP.

<disconnect> tag

Disconnects the default connection. Use this action carefully and only for events from which you cannot recover. The <disconnect> tag has the following attribute:

enabled
Indicates whether this action is enabled for use. The default is `true`.

<play> tag

Defines the action for playing a macro. The <play> tag has the following attributes:

enabled
Indicates whether this action is enabled for use. The default is `true`.

macro Names the macro to be played. This attribute is required.

<perform> tag

Defines the action for playing a macro on any connection, not necessarily the default connection. This action does not affect the current host screen. The <perform> tag has the following attributes:

connection
The connection on which the macro is to be played. The default is `main`.

enabled
Indicates whether this action is enabled for use. The default is `true`.

macro The name of the macro to be played.

<pause> tag

Defines the action for waiting for some time before continuing with normal processing. The <pause> tag has the following attributes:

enabled
Indicates whether this action is enabled for use. The default is `true`.

time Specifies the time, in milliseconds, to pause before continuing with normal processing.

<sendkey> tag

Defines the action for sending a specified key to the host screen to perform an action. The <sendkey> tag has the following attributes:

enabled
Indicates whether this action is enabled for use. The default is `true`.

key Indicates key to send to the host screen.

row Defines the starting row on the host screen where the key is to be inserted.

col Defines the starting column on the host screen where the key is to be inserted.

<globalRules> tag

The <globalRules> tag is the enclosing tag for any global rules you define for screen events. It has no attributes.

<rule> tag

The <rule> tag defines a global rule.

The attributes of the <rule> tag for screen customization-level rules are the same as for project-level global rules. However, when you create a screen

customization-level and a project-level global rule using the same input field, the screen customization-level rule will have a higher priority. The <rule> tag attributes are:

associatedScreen
The name of a screen capture in the project, from which the global rule is defined.

componentSettings
Any settings configured for the global rule, such as recognition criteria.

description
The description entered when the global rule was created.

enabled
Indicates whether this global rule is enabled. Reflects the state of the check box on the Rendering page of Project Settings.

endCol
The last column of the host screen to which this global rule should be applied. -1 means the rightmost column of the host screen.

endRow
The last row of the host screen to which this global rule should be applied. -1 means the bottom row of the host screen.

name The name that will be shown in the list of global rules on the Rendering page of Project Settings.

startCol
The first column of the host screen to which this global rule should be applied.

startRow
The first row of the host screen to which this global rule should be applied.

transformationFragment
The name of the transformation fragment file associated with this global rule. This file contains the information specifying how to transform the host component. It will be included in a transformation if the appropriate input fields are present in the host screen.

type The pattern type component for this global rule, taken from the first page of the Create Global Rule wizard. The type can be one of the following:

com.ibm.hats.transform.components.InputFieldByTextPatternComponent
This pattern component recognizes input fields on the host screen based on text near the fields.

com.ibm.hats.transform.components.AllInputFieldsPatternComponent
This pattern component recognizes all input fields on the host screen.

com.ibm.hats.transform.components.InputFieldBySizePatternComponent
This pattern component recognizes input fields on the host screen based on the size of the input fields.

The following tags are also included in each specific global rule:

componentSettings

The <componentSettings> tag is the enclosing tag for any settings defined for the pattern type component specified on the type attribute of the <rule> tag. This tag has no attributes.

setting

The <setting> tag is the enclosing tag for any settings defined for the pattern type component specified on the type attribute of the <rule> tag.

The attributes of the <setting> tag are:

name Specifies the name of a customizable setting for the pattern type component. The available settings depend on the component.

- For the com.ibm.hats.transform.components.InputFieldByTextPattern Component, the settings for the name attribute are:

  caseSensitive
  Specifies whether the case of the text on the text setting must match before the pattern is recognized. Valid values are `true` and `false`. The default is `true`.

  immediatelyNextTo
  Specifies which input fields you want to transform.Valid values are:

  true Specifies that only the nearest input field should be transformed.

  false Specifies that all input fields should be transformed.

  The default is `false`.

  location
  Specifies where text in a protected field, as specified on the text setting, must be in relation to input fields for this global rule to be applied. Valid values are:

  ABOVE
  Specifies that the text must be above the input field.

  BELOW
  Specifies that the text must be below the input field.

  LEFT Specifies that the text must be to the left of the input field.

  RIGHT
  Specifies that the text must be to the right of the input field.

  The default is RIGHT.

  text Specifies some text in a protected field of the host screen. Valid values are any text in a protected field on the host screen.

- For the com.ibm.hats.transform.components.AllInputFieldsPattern Component, there are no component settings.

- For the com.ibm.hats.transform.components. InputFieldBySizePattern Component, the setting for the name attribute is fieldSize.Valid values are the sizes of any input fields on the host screen.

<associatedScreens> tag

The <associatedScreens> tag encompasses the screen tag that follows.

<screen> tag

Defines a screen associated with the screen customization. The <screen> tag has the following attribute:

name Specifies the name of a captured screen, for which the screen recognition criteria and actions have been defined.

<description> tag

The <description> tag is the enclosing tag for the description associated with the screen customization, which consists of the <oia> tag and the <string> tag. There are no attributes for the description tag.

<oia> tag

The <oia> tag in the screen customization .evnt file specifies an operator information area (OIA) condition to match. This tag is optional. The default is to wait for inhibit status. The attributes of the <oia> tag are:

status If `NOTINHIBITED`, the OIA must be uninhibited for a match to occur. If `DONTCARE`, the OIA inhibit status is ignored. This has the same effect as not specifying OIA at all. Valid values are NOTINHIBITED and `DONTCARE`. This is a required attribute.

optional
If `false`, this descriptor is considered non-optional during screen recognition. If the descriptors contain more than one non-optional descriptor, and more than one optional descriptor, the non-optional descriptors are checked first. If all of the non-optional descriptors match, the screen matches. If at least one of the non-optional descriptors does not match, the optional descriptors are checked. One of the optional descriptors must match for the screen to match. Otherwise, the screen fails to match. The value must be `true` or `false`. This attribute is optional. The default is `false`.

invertmatch
If `true`, recognition matching passes only if the screen does not match this description element (boolean not operation). The value must be `true` or `false`. This attribute is optional. The default is `false`.

<string> tag

The <string> tag describes the screen based on a string. The attributes of the <string> tag are:

value The string value. This value can contain any valid Unicode character. This is a required attribute.

row The starting row position for a string at an absolute position or in a rectangle. The value must be a number or an expression that evaluates to a number. This value is optional. If not specified, Macro logic searches the

entire screen for the string. If specified, col position is required. <erow> and <ecol> attributes can also be specified to specify a string in a rectangular area.

Note: Negative values are valid and are used to indicate relative position for the bottom of the screen (for example, -1 is the last row).

col The starting column position for the string at an absolute position or in a rectangle. The value must be a number or an expression that evaluates to a number. This attribute is optional.

erow The ending row position for string in a rectangle. The value must be a number or an expression that evaluates to a number. This attribute is optional. If both **erow** and **ecol** are specified, string is in a rectangle.

ecol The ending column position for string in a rectangle. The value must be a number or an expression that evaluates to a number. This attribute is optional. If both **erow** and **ecol** are specified, string is in a rectangle.

casesense
If `true`, string comparison is case sensitive. The value must be `true` or `false` or an expression that evaluates to true or false. This attribute is optional. The default is `false`.

optional
If `false`, this descriptor is considered non-optional during screen recognition. If the descriptors contain more than one non-optional descriptor, and more than one optional descriptor, the non-optional descriptors are checked first. If all of the non-optional descriptors match, the screen matches. If at least one of the non-optional descriptors does not match, the optional descriptors are checked. One of the optional descriptors must match for the screen to match. Otherwise, the screen fails to match. The value must be `true` or `false` or an expression that evaluates to true or false. This attribute is optional. The default is `false`.

invertmatch
If true, recognition matching passes only if the screen does not match this description element (boolean not operation). The value must be true or false or an expression that evaluates to true or false. This attribute is optional. The default is false.

<nextEvents> tag

The <nextEvents> tag encompasses the <event> tag that follows. The <nextEvents> tag has the following attribute:

defaultEvent
Specifies the default screen customization (event) used as the next screen to occur, if there are no matching screen customizations named on the event tags. If defaultEvent does not specify an event, the normal event priority list in the project settings is used. Valid values are:

- `unmatchedScreen`
- `error`
- `disconnect`
- `stop`
- (no value)

<event> tag

Defines another screen customization in the project that is the probable next screen to occur. The <event> tag has the following attributes:

enabled
Indicates whether the screen customization (event) defined on the name attribute is enabled for use. The default is true.

name Specifies the name of a screen customization that is the probable next screen to occur.

<remove> tag

The <remove> tag removes global variables previously added to the screen customization (event). The <remove> tag has the following attributes:

enabled
Indicates whether the global variable defined on the name attribute is enabled for removal. The default is true.

name Specifies the name of the global variable to be removed.

remove Type
Specifies the type of the global variable to be removed. Types include oneLocal, oneShared, allLocal, allShared, and all.

Macro files (.hma)

Macro files are stored in the *project_name*/**Web Content/WEB-INF/profiles/macros** directory. You can view and edit the source of the macro files by double-clicking on the name of the macro in the **HATS Project View** to open the macro editor. The source for the file can be viewed by clicking on the **Source** tab. For more information about macros, see Advanced Macro Guide.

Macro files contain tags that define a set of screens. The tags are described in the sections that follow.

<macro> tag

Begins the definition of the macro. The macro tag has no attributes.

<associatedConnections> tag

The <associatedConnections> tag encompasses the <connection> tag that follows. The attribute of the <associatedConnections> tag is:

default
Identifies the default connection for this macro.

<connection> tag

The <connection> tag identifies the connection with which this macro is associated. The attribute of the connection tag is:

name Identifies the name of the connection with which this macro is associated.

<extracts> tag

The <extracts> tag encompasses the extract tag that follows. The <extracts> tag has no attributes.

<extract> tag

The <extract> tag defines the extraction to occur. The attributes of the extract tag are:

name Specifies the name of the extraction.

handler
You can select a .jsp file to display the extracted information to the end user. A default macro handler is shipped with HATS, and it is named default.jsp. You can find this file by clicking the **HATS Project View** tab of the HATS Toolkit and expanding the project name, and then expanding **Macros > Macro Event Handlers**. If you want to create your own handler, ensure that you return control to the HATS runtime.

showHandler
Specifies whether the extracted information should be shown to the end user. Valid values are true and false.

shared
Specifies whether a global variable being extracted is shared between all the applications in the same EAR file.

save Specifies whether the extracted information is saved to a global variable. Valid values are `true` and `false`.

variableName
If the extracted information is being saved to a global variable, variableName specifies the name of a new or existing global variable.

overwrite
If the extracted information is being saved to an existing global variable, overwrite specifies whether the extracted information is to overwrite the current value of the existing global variable, or whether the extracted information is to be appended to the current value. Valid values are `true` and `false`. `True` specifies that the value of the existing global variable is overwritten.

index If the value being extracted is being written to an existing indexed global variable, this attribute specifies the index number to which the value being set is written. The effect of this attribute is dependent on the value of the **overwrite** attribute. If overwrite=true, the value being extracted overwrites the existing variable, beginning at the specified index. If `overwrite=false`, the value being extracted is inserted into the existing variable, beginning at the specified index.

indexed
Specifies whether the extracted information is a single string or a list of strings. Valid values are `true` and `false`. `True` specifies that the extracted information is a list of strings.

isBidi Specifies whether the connection used in recording the macro is bidirectional. Valid values are `true` and `false`.

isRtlScreen
Specifies whether the bidirectional screen is right-to-left. Valid values are `true` and `false`.

screenorientation
Specifies the orientation of the extract action. Valid values are `ltr` and `rtl`.

<prompts> tag

The <prompts> tag encompasses the prompt tag that follows. The prompts tag has no attributes.

<prompt> tag

The <prompt> tag defines the prompt to occur. The attributes of the <prompt> tag are:

name Specifies the name of the prompt.

handler
You can select a .jsp file to prompt the end user for the necessary information, and include a button for the user to submit the information. A default macro handler is shipped with HATS, and it is named default.jsp. You can find this file by clicking the **HATS Project View** tab of the HATS Toolkit and expanding the project name, and expanding **Macros > Macro Event Handlers**. If you want to create your own handler, ensure that you return control to the HATS runtime.

source Specifies whether the value of the prompt is set to a string or the value of a global variable. Valid values are `string` and `variable`.

variableName
If the value of the prompt is being saved to a global variable, variableName specifies the name of a new or existing global variable.

variableIndex
If the value of the prompt is being saved to an indexed global variable, variableIndex specifies to which index the value should be assigned. This value is always `0`.

variableIndexed
Specifies whether the information for the prompt is coming from an indexed global variable. Valid values are `true` and `false`. `True` specifies that the global variable is indexed.

value Specifies either the string to be used for the prompt or the name of a global variable from which the value is taken.

welApplID
Specifies the application ID to use with the WEL logon macro.

welIsPassword
Specifies whether this is a password field to use with the WEL logon macro.

LTRImpicitOrient
Specifies whether the implicit bidirectional screen orientation is left-to-right. Valid values are `true` and `false`.

isBidi Specifies whether the connection used in recording the macro is bidirectional. Valid values are `true` and `false`.

isRtlField
Specifies whether the bidirectional field is right-to-left. Valid values are `true` and `false`.

isRtlScreen
Specifies whether the bidirectional screen is right-to-left. Valid values are `true` and `false`.

screenorientation
Specifies the orientation of the prompt action. Valid values are `ltr` and `rtl`.

<HAScript> tag

The <HAScript> tag is the main enclosing tag for the other macro tags and attributes. See the *HATS Advanced Macro Guide* for more information about macro tags.

Screen capture files (.hsc)

Screen capture files are XML representations of host screens, used to create or customize screen customizations, screen combinations, transformations, global rules, or macros.

Screen capture files are stored in the *project_name*/Screen Captures directory. You can view these files by double-clicking on the name of the screen capture in the **HATS Project View**. You cannot edit screen capture files.

Note: Screen captures of video terminal (VT) host screens can be used to create or customize a macro using the Visual Macro Editor and as the check-in screen when configuring pooling. They cannot be used to create screen customizations, screen combinations, transformations, default rendering, or global rules.

BMS Map files (.bms and .bmc)

Basic Mapping Support (BMS) maps are screen definitions files for Customer Information Control System (CICS®). Each map defines all or part of a screen, and a CICS application typically displays one or more maps to create a complete screen image. The source for BMS maps is organized in groups called map sets. One map set contains one or more maps. Map sets exist in source form as one map set per source file.

BMS map set files can be imported into a project in HATS Toolkit. When HATS imports BMS maps, the import takes place at the map set level. It is not possible to import an individual map. Imported BMS map set files have a file extension of .bms, and the individual maps have a file extension of .bmc in HATS Toolkit.

Both the map set files (.bms) and the map files (.bmc) are stored in a separate **Maps** folder within the HATS project. By default, the **Maps** folder is not visible in the **HATS Project View** until there are maps imported.

HATS enables you to generate screen captures from map files. You can choose to generate the screen captures when you import map sets, or you can generate them from the maps after they are in the **Maps** folder. To generate screen captures from maps, right click on a map file to display the pop-up menu and select **Generate Screen Captures**. You can elect to create separate screen captures for each BMS map selected or merge selected BMS maps into a single screen capture. Maps cannot be merged if fields overlap. Once the screen captures are created, you can begin creating HATS screen customizations.

You can open a map set file in a HATS Toolkit editor by double-clicking on the file in the **HATS Project View**. See the *CICS Application Programming Reference* for information about the contents of the file. When a map set file is modified and saved in the text editor, the maps that make up the file are regenerated, with one

exception: map files in which the contents of fields defined with labels in the map set files have been modified. To regenerate those maps, you must import the source file again using the BMS map set import wizard.

When a CICS application runs, it can modify the contents of the fields defined with labels. You might need to create screen captures with the fields appearing as they will be when the CICS application runs. Since the labeled fields are changeable when the application runs, the map set file (and the map files that are in the map set) may not contain all the information needed to generate an actual screen capture. While you cannot edit map files, double-clicking on a file opens a file preview. The property sheet view in HATS Toolkit enables you to add missing information and manually set the contents of the fields. By modifying the contents of the fields, a single map can be used for multiple screen captures.

Notes:

1. When you are previewing a map file in HATS Toolkit, the fields displayed in the property sheet view are the fields for the map file highlighted in the **HATS Project View**, not the map file you see in the preview window.
2. You can also screen capture files using the property sheet view in HATS Toolkit, as long as the screen capture files were generated from BMS map files.

Image files (.gif, .jpg, or .png)

Image files are used in HATS Toolkit within template files to create the Web page displayed to the user of your project.

Image files are stored in the *project_name*/**Web Content/common/images** directory. You can view the image files by double-clicking on the name of the image.

Stylesheet files (.css)

Cascading Style Sheets (or style sheets) are used in HATS Toolkit within template files to specify appearance items such as colors, fonts, borders, whitespace, images, margins, and spacing between lines.

The stylesheet files provided by HATS can be grouped into categories.

Unique templates

Some HATS templates use individualized style sheets. The following style sheets are used by the Finance, Industry, Medical, Research, and Transport templates, respectively.

- finance.css
- industry.css
- medical.css
- research.css
- transport.css

In addition, you can use these style sheets in combination with the “Font” and “Unique” style sheets listed below. For example, you can use a font style sheet to override the default defined fonts. You should not use the “Main” or “Reverse video” style sheets listed below in combination with these unique template style sheets.

Main Some HATS templates use a combination of general purpose style sheets. These general purpose main style sheets determine the overall appearance of the template and other controls that you might add to a project.

Examples of these controls include buttons, input fields, tables, fields, and links. These style sheets are named with `theme` at the end, such as blacktheme, whitetheme, monochrometheme, and tantheme. The appearance of the controls in a project is determined by classes named in the style sheets, for example, HATSCHECKBOX, HATSRADIOBUTTON, and HATSDROPDOWN.

Reverse video
Templates that use a general purpose main style sheet, also use a general purpose secondary style sheet that determines the color scheme of any reverse video items in a project. These reverse video style sheets are named with `reverseVideo` at the beginning, such as reverseVideoGray, reverseVideoTan, reverseVideoBlack, and reverseVideoWhite. Some of the classes named in the style sheets are RHBLUE, RHGREEN, and RHMAGENTA.

Font Some of the style sheets provided by HATS are not named in the templates by default. However, you can apply these style sheets to the templates to change the font family (Arial, Tahoma) or font size of the text. The names of the style sheets give you an idea of their purpose:

- normalFont.css
- scaleableFont.css
- nonFixedFont.css
- largeFont.css
- smallFont.css
- xlargeFont.css
- xsmallFont.css

Unique
Three additional style sheets provided by HATS each have their own unique purpose. These are:

calendar.css
This style sheet controls the appearance of the calendar widget date picker when launched in a new browser window. This style sheet has no effect when the date picker is launched in the current Web page using the **Use inline calendar** setting on the Calendar widget.

inlinecalendar.css
This style sheet controls parts of the appearance of the calendar widget date picker when launched in the current Web page. To display the calendar in the same page, select the **Use inline calendar** setting on the Calendar widget. This style sheet has no effect when the date picker is launched in a new browser window, that is, when not using the **Use inline calendar** setting.

PrintJobWindow.css
This style sheet controls the appearance of a print job in a project, including the PrintJobHeading, ListHeader, and ListEntry.

Stylesheet files are stored in the *project_name*/**Web Content/common/stylesheets** directory. You can edit the stylesheet files by double-clicking on the name of the style sheet in the **HATS Project View** to open the stylesheet editor.

For more information on editing cascading style sheets, see “Using style sheets” in the *HATS User's and Administrator's Guide*.

Spreadsheet files (.csv or .xls)

Spreadsheet files in either .csv (comma separated values) or .xls (Microsoft Excel) format can be automatically generated from host screen data defined within the TableWidget. The spreadsheet files are created by the HATS SpreadsheetGeneratorServlet and can be displayed at runtime when the user clicks a defined button or link. A dialog popup displays, and the user can type the directory and file name where the spreadsheet files are to be stored.

For information about creating spreadsheet files, see the Table widget in the *HATS User's and Administrator's Guide*.

Host simulation trace files (.hhs)

Host simulation trace files can be saved and then used to run HATS in a simulated host connection environment instead of using a live host connection. Simulations are created by the Host Simulator Recorder, which acts as a proxy between the real host and the HATS terminal. The host simulation trace files are created in XML format with a file extension of .hhs and are stored in the following directories in the **Host Simulations** folder, which is accessed from the **HATS Projects** view:

- Web projects - *Project_name*/Web Content/WEB-INF/profiles/hostsimulations
- EJB projects - *Project_name*/ejbModule/hostsimulations

For information about creating host simulation trace files, see the *HATS User's and Administrator's Guide*.

ComponentWidget.xml

The ComponentWidget.xml file contains the definitions of all the host components and widgets provided with HATS. If you add your own host components or widgets, you will need to update this file. For an explanation and a small sample of the file, see "Registering your component or widget" on page 25. The ComponentWidget.xml file appears as the last item in your project in the **Navigator** view. To edit the file, double-click the file name in the **Navigator** view and select the **Source** tab.

For a description of the contents and use of this file, see "Registering your component or widget" on page 25.

Web Express Logon configuration file (hatswelcfg.xml)

Web Express Logon (WEL) credential mapping is configured in an XML file named hatswelcfg.xml, which is stored in the root directory of the EAR project for HATS servlet projects. To view the source of the WEL configuration, open the WEL editor from the **Security** tab of the Connection Editor, then click on the **Source** tab. However, you should modify the configuration using the **Network Security Plug-in** and **Credential Mapper Plug-ins** tabs of the WEL editor.

<credentialmapper> tag

The <credentialmapper> tag is the enclosing tag for the Web Express Logon configuration. The attribute of the <credentialmapper> tag is:

class Specifies the Java class to use as the WEL Credential Mapper. This value is not editable on the two plug-in tabs of the WEL Editor. Do not change this value unless directed to do so by IBM Service.

<networksecurity> tag

The <networksecurity> tag is a container for zero or one Network Security plug-in tag (<plugin>), and has no attributes.

<cmplugins> tag

The <cmplugins> tag is a container for a number of Credential Mapper plug-in tags (<plugin>), and has no attributes.

<plugin> tag

The <plugin> tag identifies either a Network Security plug-in or a Credential Mapper plug-in, and encloses the tags for the plug-in's parameters. The attributes of the <plugin> tag are:

class Specifies the Java class that contains the plug-in code.

authenticationtype
Specifies the types of hosts for which the plug-in can map credentials, and is used by Web Express Logon to determine which plug-in will handle a request. Valid values are `AuthType_All`, `AuthType_3270Host`, `AuthType_5250Host`, and `AuthType_VTHost`. Multiple values can be used, separated by vertical bar (`|`). This attribute is valid only for a Credential Mapper plug-in, when the <plugin> tag is enclosed by the <cmplugins> tag.

hostmask
Specifies the names of hosts for which the plug-in can map credentials, and is used by Web Express Logon to determine which plug-in will handle a request. The value of this attribute can contain one or more host addresses, with the vertical bar (`|`) to join multiple addresses, and the asterisk (*) as a wildcard at the beginning, end, or both, of a host address. This attribute is valid only for a Credential Mapper plug-in, when the <plugin> tag is enclosed by the <cmplugins> tag.

<param> tag

The <param> tag identifies a plug-in parameter's name and value. The attributes of the <param> tag are:

name Specifies the name of the plug-in parameter. Each plug-in Java class defines the set of parameter names it will accept.

value Specifies the value of the plug-in parameter. If the parameter is defined in the plug-in Java class to be an encrypted parameter, the value here must be encrypted.

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Glossary

action. A defined task that an application performs on a managed object as a result of an event, such as a host screen matching the screen recognition criteria specified for a screen event. A list of actions is part of the definition of each event.

ADB. See **application data buffer**.

administrative console. The HATS administrative console is a Web-based utility that provides views and functions to manage licenses and connections, set log and trace settings, view messages and traces, and perform problem determination for HATS Web applications.

application. See **HATS application**.

application data buffer. The format of data that is returned by the WebFacing Server for consumption by the WebFacing application.

application event. A HATS event that is triggered by state changes in the application's life cycle. Examples of application events include a user first accessing a HATS application (a Start event), or an application encountering an unrecognized screen (an Unmatched Screen event).

application keypad. A set of buttons or links representing HATS application-level functions. (Contrast with **host keypad**.)

artifact. See **resource**

background connection. Any connection defined in a HATS application other than the default connection. HATS does not transform screens from background connections. (Contrast with **default connection**.)

bidirectional (bidi). Pertaining to scripts such as Arabic and Hebrew that generally run from right to left, except for numbers, which run from left to right.

BMS map. A screen definition file used with Basic Mapping Support in CICS. A BMS map defines a set of fields which are to be displayed as a group by a CICS application

business logic. Java code that performs advanced functions, such as interacting with other applications, databases, or other systems accessible via Java APIs. Business logic is invoked as an action in an application or screen event.

checkin screen. The screen identifying the host screen that should be active for a connection to be considered ready to be returned to the connection pool. If the application is not on the screen specified by the checkin screen, the connection will be discarded or recycled in attempt to return the connection to the host screen specified by the checkin screen. The checkin screen is only meaningful if connection pooling is specified for a connection.

component. A visual element of a host screen, such as a command line, function key, or selection list. HATS applications transform host components into widgets.

connection. A set of parameters used by HATS, stored in an .hco file, to connect to a host application. (See also **default connection** and **background connection**.)

connection pool. A group of host connections that are maintained in an initialized state, ready to be used without having to create and initialize them.

credential mapper. The component of Web Express Logon that handles requests for host credentials, which have been previously authenticated by a network security layer. (See **network security layer**.)

DDS map. Data Description Specification map. These maps define the layout and behavior of the presentation space for IBM i terminal applications.

Debug. For rich client projects, the same as Run, and in addition enables you to:

- Use the display terminal to see host screens as they are navigated while testing your project
- See debug messages in the Rational SDP console

- See changes you make to your project, for example changing the template or a transformation, without having to restart your application
- Modify and test runtime settings, defined in the runtime-debug.properties file, without modifying the settings, defined in the runtime.properties file, that are deployed to the runtime environment
- Step through Java code, such as HATS business logic

Debug on Server. For Web projects, the same as Run on Server, and in addition enables you to:

- Use the display terminal to see host screens as they are navigated while testing your project
- See debug messages in the Rational SDP console
- See changes you make to your project, for example changing the template or a transformation, without having to restart your application on the test server
- Modify and test runtime settings, defined in the runtime-debug.properties file, without modifying the settings, defined in the runtime.properties file, that are deployed to the runtime environment
- Step through Java code, such as HATS business logic

default connection. The connection on which HATS transforms and presents host application screens to the user. Also referred to as **transformation connection**. (Contrast with **background connection**.)

default rendering. The method used by HATS to render parts of the host screen for which no specific transformation is specified.

deploy. To make a HATS application ready for use in a runtime environment. For HATS Web applications, this includes exporting the HATS project as a Java EE application, that is, as an .ear file, and installing it on WebSphere Application Server. For HATS rich client applications, this includes exporting the HATS project as an Eclipse feature and installing it on individual client systems, either as a stand-alone Eclipse application or from an update site to an existing Eclipse runtime environment.

descriptor. See **screen recognition criteria**.

developer. The person who uses HATS Toolkit to develop applications; also application developer or Web developer. (Contrast with **user**.)

Device Runtime Environment (DRE). A package containing other runtime environments, including the J2SE runtime, which is required to run HATS rich client applications in Lotus Expeditor Client V6.2.0 and earlier. The DRE installs into the runtime environment for Lotus Expeditor Client.

display terminal. A terminal window that displays host screens you can use while testing and debugging to observe interactions between a HATS application and a host application at runtime. You can also interact with the host application using host screens in the terminal window.

Eclipse. An open-source initiative that provides ISVs and other tool developers with a standard platform for developing plug-compatible application development tools. Eclipse is available for download from http://www.eclipse.org.

editor. An application that enables a user to modify existing data. In HATS Toolkit, editors are used to customize resources that have been created by wizards.

Enhanced Non-Programmable Terminal User Interface (ENPTUI). Enables an enhanced interface on non-programmable terminals (NPT) and programmable work stations (PWS) over the 5250 full-screen menu-driven interface, taking advantage of 5250 display data stream extensions.

enterprise archive (EAR). A specialized Java archive (JAR) file, defined by the Java EE standard used to deploy Java EE applications to Java EE application servers. An EAR file contains enterprise beans, a deployment descriptor, and Web archive (WAR) files for individual Web applications. (Sun)

Enterprise JavaBeans (EJB). A component architecture defined by Oracle for the development and deployment of object-oriented, distributed, enterprise-level applications. (Oracle)

event. A HATS resource that performs a set of actions based on a certain state being reached. There are two types of HATS events, application events and screen events.

export. To collect the resources of a HATS project, along with the necessary executable code, into an application EAR file (for Web applications) or Eclipse feature (for rich client applications) in preparation for deploying the application.

Extensible Markup Language (XML). A standard metalanguage for defining markup languages that was derived from and is a subset of SGML.

GB18030. GB18030 is a new Chinese character encoding standard. GB18030 has 1.6 million valid byte sequences and encodes characters in sequences of one, two, or four bytes.

global rule. A rule defining how the rendering of specific input fields should be modified based on certain criteria. Global rules are used in customized screens and screens rendered using default rendering. Global rules can be defined at the project level or at the screen event level.

global variable. A variable used to contain information for the use of actions. The values of global variables can be extracted from a host screen or elsewhere, and can be used in templates, transformations, macros, Integration Objects, or business logic. A global variable can be a single value or an array, and it can be shared with other HATS applications sharing the same browser session.

HATS. See **Host Access Transformation Services**.

HATS application. An application that presents a version of a host application to users, either as a Web-enabled application deployed to WebSphere Application Server, a portlet deployed to a WebSphere Portal, or as an Eclipse client-side processing plug-in deployed to an Eclipse rich client platform such as Lotus Notes or Lotus Expeditor Client. A HATS application is created in HATS Toolkit from a HATS project and deployed to the applicable environment. The deployed application might interact with other host or e-business applications to present combined information to a user.

HATS EJB project. A project that contains the HATS EJB and Integration Objects that other applications can use to get host data. A HATS EJB project does not present transformed screens from a host application.

HATS entry servlet. The servlet that is processed when a user starts a HATS Web application in a browser.

HATS project. A collection of HATS resources (also called artifacts), created using HATS Toolkit wizards and customized using HATS Toolkit editors, which can be exported to a HATS application.

HATS Toolkit. The component of HATS that runs on Rational SDP and enables you to work with HATS projects to create HATS applications.

Host Access Transformation Services (HATS). An IBM software set of tools which provides Web-based access to host-based applications and data sources.

host component. See **component**.

host keypad. A set of buttons or links representing functions typically available from a host keyboard, such as function keys or the Enter key. (Contrast with **application keypad**.)

host simulation. Host simulation enables you to record host simulation trace files that can be saved and then used instead of a live host connection. The recorded trace files can be played back to create screen captures, screen events, and screen transformations using the host terminal function, create and test macros using the host terminal function, test HATS applications using the Rational SDP local test environment, and, along with other traces and logs, aid in troubleshooting a failing scenario in a runtime environment.

host simulation trace. Host simulation trace files record host screens and transactions that can be saved and played back later instead of using a live host connection. Trace files can be recorded using the host terminal function or while in the runtime environment.

host terminal. A HATS Toolkit tool. A session tied to a particular HATS connection, which the HATS developer can use to capture screens, create screen customizations, and record macros.

HTML. Hypertext Markup Language.

HTML widget. See **widget**

Integration Object. A Java bean that encapsulates an interaction with a host screen or a series of host screens. Integration Objects are constructed from macros and can be included in traditional (WSDL-based) Web services, RESTful Web services, or HATS EJB projects. Integration Objects cannot be used in rich client platform applications.

interoperability. The ability of a computer or program to work with other computers or programs.

interoperability runtime. Common runtime used by a combined HATS/WebFacing application to provide management of common connection to the backend host. This runtime decides whether data being returned by the WebFacing server should be handled by the HATS or WebFacing part of the application.

Java Platform, Enterprise Edition (Java EE). An environment for developing and deploying enterprise applications, defined by Oracle. The Java EE platform consists of a set of services, application programming interfaces (APIs), and protocols that provide the functionality for developing multitiered, Web-based applications. (Oracle)

JavaServer Faces (JSF). A framework for building Web-based user interfaces in Java. Web developers can build applications by placing reusable UI components on a page, connecting the components to an application data source, and wiring client events to server event handlers. (Oracle)

JavaServer Pages (JSP). A server-side scripting technology that enables Java code to be dynamically embedded within Web pages (HTML files) and run when the page is served, returning dynamic content to a client. (Oracle)

JavaServer Pages Standard Tag Library (JSTL). A standard tag library that provides support for common, structural tasks, such as: iteration and conditionals, processing XML documents, internationalization, and database access using the Structured Query Language (SQL). (Oracle)

JSF. See **JavaServer Faces**.

JSP. See **JavaServer Pages**.

JSR 168. The Java Portlet Specification addresses the requirements of aggregation, personalization, presentation, and security for portlets running in a portal environment. Version 1.0 of the Java Portlet Specification, Java Specification Request 168 (JSR 168), defines standards to enable portlet compatibility between portal servers offered by different vendors. See **JSR 286**.

JSR 286. The Java Portlet Specification addresses the requirements of aggregation, personalization, presentation, and security for portlets running in a portal environment. Version 2.0 of the Java Portlet Specification, Java Specification Request 286 (JSR 286), defines standards to extend the capabilities of Version 1.0 (JSR 168) to include coordination between portlets, resource serving, and other advanced features. See **JSR 186**.

JSTL. See **JavaServer Pages Standard Tag Library**.

keyboard support. The ability for a developer to enable a user to use a physical keyboard to interact with the host when the application is running in a Web browser or rich client environment. The developer also decides whether to include a host keypad, an application keypad, or both, in a project. If keypads are included, the developer decides which keys are included and how those keys and the keypad appear in the client interface.

keypad support. The ability for a developer to enable a user to interact with the host as if the physical keys on a keyboard were pressed, or to perform tasks related to the application, such as viewing their print jobs or refreshing the screen. See also **application keypad** and **host keypad**.

linked HATS/WebFacing project. A project created by linking a single HATS Web project with a single WebFacing project for the purpose of creating an enterprise application that includes a HATS Web application interoperating with a WebFacing application and sharing a connection to a 5250 backend host.

Lotus Expeditor Client. A standalone client of the Lotus Expeditor product. It is installed on a user or development machine.

Lotus Notes Client. A standalone client of the Lotus Notes product. It is installed on a user or development machine.

macro. A macro, stored in a .hma file, automates interactions with the host. It can send commands to the host, enter data into entry fields, extract data from the host, and be used to navigate screens on behalf of the user.

Model 1 Web pages. A single JSP that contains the information to be presented to the user, formatting tags that specify how the information is displayed, and logic that controls the order in which pages are displayed. (Contrast with **Struts Web pages**.)

network security layer. Software that is responsible for authenticating users and authorizing them to access network resources, such as IBM Tivoli Access Manager.

Operator Information Area (OIA). OIA is the area at the bottom of the host session screen where session indicators and messages appear. Session indicators show information about the workstation, host system, and connectivity.

perspective. In the Rational SDP workbench, a group of views that show various aspects of the resources in the workbench. The HATS perspective is a collection of views and editors that allow a developer to create, edit, view, and run resources which belong to HATS applications.

pooling. See **connection pool**.

portal. An integrated Web site that dynamically produces a customized list of Web resources, such as links, content, or services, available to a specific user, based on the access permissions for the particular user.

print support. The ability for a developer to specify a printer session to be associated with a host session, and enable the user to view host application print jobs, send them to a printer, or save them to disk. Print support is available only for the default connection

Profile. For rich client projects, the same as Run, and in addition enables you to locate the operations that require the most time, and identify actions that are repeated, to eliminate redundancy. You can use this function for performance analysis, helping you to get a better understanding of your application.

Profile on Server. For Web projects, the same as Run on Server, and in addition enables you to locate the operations that require the most time, and identify actions that are repeated, to eliminate redundancy. You can use this function for performance analysis, helping you to get a better understanding of your application.

project. A collection of HATS resources (also called artifacts) that are created using HATS Toolkit wizards and customized using HATS Toolkit editors. These resources are exported as a HATS application. Types of HATS projects include Web, portlet, EJB, rich client, and for purposes of administering HATS Web (including portlet and EJB) applications, HATS administrative console projects. See **HATS project** or **HATS EJB project**.

Rational Software Delivery Platform (Rational SDP). A family of IBM software products that are based on the Eclipse open-source platform and provide a consistent set of tools for developing e-business applications.

rendering set. A rendering set is configured by creating a prioritized list of rendering items. Each rendering item defines a specific region in which a specified host component is recognized and then rendered using a specified widget.

resource. Any of several data structures included in a HATS project. HATS resources include templates, screen events, transformations, screen captures, connections, and macros. Other Rational SDP plug-ins sometimes call these "artifacts."

RESTful Web service. See **Web service, RESTful**.

rich client. A plug-in designed to run on the Eclipse Rich Client Platform in a client environment, and designed to provide an enhanced user experience by the appearance and behavior native to the platform on which it is deployed.

Run. For rich client projects, a function in Rational SDP that enables you to test your HATS rich client projects in an Eclipse, Lotus Notes, or Lotus Expeditor Client instance. In this mode you can modify and test the runtime settings, defined in the runtime.properties file, that are deployed to the runtime environment. Be aware that any changes made to the runtime settings while testing in this mode are retained and become effective when you deploy the HATS application to a runtime environment.

Run on Server. For Web projects, a function in Rational SDP that enables you to test your HATS Web and portlet projects in a WebSphere Application Server as appropriate. In this mode you can modify and test the runtime settings, defined in the runtime.properties file, that are deployed to the runtime environment. Be aware that any changes made to the runtime settings while testing in this mode are retained and become effective when you deploy the HATS application to a runtime environment.

runtime settings. Log, trace, and problem determination settings defined in the runtime.properties file that are deployed to the runtime environment.

screen capture. An XML representation of a host screen, stored in a .hsc file, used to create or customize a screen customization, screen combination, transformation, global rule, or macro. Screen captures are useful because they enable you to develop a HATS project even when not connected to the host. They are also useful in creating macros which are the core of HATS Integration Object and Web services support.

Screen captures of video terminal (VT) host screens can be used to create or customize a macro using the Visual Macro Editor and as the check-in screen when configuring pooling. They cannot be used to create screen customizations, screen combinations, transformations, default rendering, or global rules.

screen combination. A type of HATS screen event designed to gather output data from consecutive, similar host screens, combine it, and display it in a single output page. The screen combination definition, stored in a .evnt file, includes a set of screen recognition criteria for both the beginning and ending screens to be combined, how to navigate from screen to screen, and the component and widget to use to recognize and render the data gathered from each screen.

screen customization. A type of screen event designed to perform a set of actions when a host screen is recognized. A screen customization definition, stored in a .evnt file, includes a set of criteria for matching host screens, and actions to be taken when a host screen matches these criteria.

screen event. A HATS event that is triggered when a host screen is recognized by matching specific screen recognition criteria. There are two types of screen events, screen customizations and screen combinations.

screen recognition criteria. A set of criteria that HATS uses to match one or more screens. When a host displays a screen, HATS searches to determine whether the current host screen matches any of the screen recognition criteria defined for any screen event in your project. If HATS finds a match, the defined actions for the screen event are performed.

Screen recognition criteria are also used in the process of recording a macro; in this context they are sometimes called **descriptors**.

Secure Sockets Layer (SSL). A security protocol that provides communication privacy. SSL enables client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, and message forgery. SSL was developed by Netscape Communications Corp. and RSA Data Security, Inc.

source. The files containing the markup language that define a HATS project or one of its resources. Also the name of a folder contained in each HATS project.

SSL. See **Secure Sockets Layer**.

standard portlets. Portlets that comply with the standard portlet APIs defined by Java Portlet Specifications JSR 168 or JSR 286. See **JSR 168** and **JSR 286**. .

Standard Widget Toolkit (SWT). An Eclipse toolkit for Java developers that defines a common, portable, user interface API that uses the native widgets of the underlying operating system.

Struts Web pages. Web pages built using the Apache Software Foundation's Struts open-source framework for creating Java web applications. This method of building Web pages creates class files that set values and contain getters and setters, input and output JSPs, and a Web diagram to display the flow and logic of the Web pages. (Contrast with **Model 1 Web pages**.)

SWT. See **Standard Widget Toolkit**.

system screen. An IBM i screen for which data description specification (DDS) display file source members are not available. System screen is specific to an application on an IBM i platform that has been WebFaced.

template. A template, stored in a .jsp file (for Web projects) or a .java file (for rich client projects), controls the basic layout and style, such as color and font, of the application. It also defines the appearance of areas that are common in your GUI, such as a banner and a navigation area.

text replacement. A HATS function used to transform text on a host system into images, HTML code, or other text on a HATS screen transformation,

theme. A theme groups a set of common appearance and behavior characteristics for a project. These attributes can be individually modified later.

transfer. To copy an application EAR file to the server, typically by FTP.

transformation. A transformation stored in a .jsp file (for Web projects) or a .java file (for rich client projects) defines how host components should be extracted and displayed using widgets in your GUI.

transformation connection. See **default connection**.

transformation fragment. A HATS resource that contains the content with which to replace all occurrences of a pattern in any given transformation.

Unicode. A universal character encoding standard that supports the interchange, processing, and display of text that is written in any of the languages of the modern world. It also supports many classical and historical texts in a number of languages. The Unicode standard has a 16-bit international character set defined by ISO 10646.

user. Any person, organization, process, device, program, protocol, or system that uses the services of a computing system.

user list. A list containing information about accounts (user IDs) that a HATS application can use to access a host or database. User lists contain user IDs, passwords, and descriptions for the accounts.

UTF-8. Unicode Transformation Format, 8-bit encoding form, which is designed for ease of use with existing ASCII-based systems.

Web archive (WAR). A compressed file format, defined by the Java EE standard, for storing all the resources required to install and run a Web application in a single file.

Web Express Logon (WEL). A HATS feature that enables users to log onto several hosts using a set of credentials that are authenticated by a network security layer. (See **network security layer**.)

Web service. A self-contained, self-describing modular application that can be published and invoked over a network using standard network protocols.

Web service, RESTful. A Web service that uses a stateless architecture and is viewed as a resource rather than a function call. Well-formatted URIs are used to identify the Web service resource, HTTP method protocols are used to do create, retrieve, update, and delete (CRUD) activities, and HTTP header information is used to define the message format.

Web service, traditional, WSDL-based. A Web service where typically, XML is used to tag data, SOAP is used to transfer data, WSDL is used for describing the services available, and UDDI is used for listing what services are available.

WebFacing feature. The IBM WebFacing Tool for IBM i feature of the HATS Toolkit. The WebFacing feature provides the ability to convert IBM i data description specification (DDS) display file source members into a Web-based user interface for existing 5250 programs.

WebFaced application. A Web application produced by the WebFacing feature of the HATS Toolkit.

WebSphere. An IBM brand name that encompasses tools for developing e-business applications and middleware for running Web applications. Sometimes used as a short name for WebSphere Application Server, which represents the runtime half of the WebSphere family of products.

WebSphere Application Server. Web application server software that runs on a Web server and that can be used to deploy, integrate, run, and manage e-business applications. HATS applications, when exported and transferred to a server, run as WebSphere Application Server applications.

WEL. See **Web Express Logon**.

widget. A reusable user interface component such as a button, scrollbar, control area, or text edit area, that can receive input from the keyboard or mouse and can communicate with an application or with another widget. HATS applications transform host components into widgets.

wizard. An active form of help that guides users through each step of a particular task.

workbench. The user interface and integrated development environment (IDE) in Eclipse-based products such as Rational SDP.

XML. See **Extensible Markup Language**.

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Index

Special characters

A

B

C

D

E

F

G

P

R

S

T

U

V

W

X

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IBM Host Access Transformation Services
Rich Client Platform Programmer's Guide
Version 9.6

Publication No. SC27-5903-02

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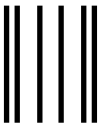

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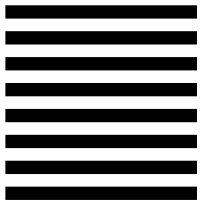

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