IBM Db2 Analytics Accelerator for z/OS
Version 7.1.0

Installation Guide

SH12-7083-00

Note

Before you use this information and the product it supports, read the information in "Notices" on page 111.

First Edition, November 2017

This edition applies to version 7.1.0 of IBM Db2 Analytics Accelerator for z/OS (product number 5697-DA7), and to all subsequent releases and modifications until otherwise indicated in new editions..

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About this book

This book provides information about the following subjects:

- Installation of IBM® DB2® Analytics Accelerator support on a z/OS® data server
- Maintenance of accelerators (software update, starting and stopping the container)
- Installation of Db2 for z/OS Program Temporary Fixes (PTF), which include the Db2 software that is required to integrate this product into your Db2 environment
- Configuration of the product from Db2 for z/OS (invocation of stored procedures)
- Installation of the client software (IBM Db2 Analytics Accelerator Studio)
- Component updates

Who should read this book

This book is intended for the following audiences:

- IBM Customer Service Centers (support personnel) installing IBM Db2 Analytics Accelerator for z/OS at the client site
- Administrators who start and stop accelerators
- z/OS administrators who need to install the software for this product using SMP/E.
- Db2 for z/OS administrators who need to set up and configure this product for use with a Db2 for z/OS data server
- Other system administrators who need to install and maintain the client software for this product on Linux or Microsoft Windows computers.

What's new in version 7?

IBM Db2 Analytics Accelerator for z/OS Version 7.1.0 is a newly designed product rather than a major upgrade. It runs on different, more powerful hardware, which allows unprecedented acceleration rates. It also comes with a new deployment option, which does not require external hardware, but runs exclusively in a dedicated LPAR on your existing IBM Z hardware.

- Common Db2 in-memory, columnar SQL engine with BLU acceleration and SQL compatibility improvements, for example:
  - Native support for the EBCDIC MBCS and GRAPHIC data types (instead of a conversion to UTF-8 as in earlier versions)
  - Acceleration of all types of correlated sub-queries (only small subset was offloaded in version 5), including table expressions with sideway references
  - Support for timestamps of precision 12 (these were truncated to precision 6 in earlier versions
  - Native support for the FOR BIT DATA subtype, for all types of table encoding (EBCDIC, UNICODE, ASCII). This was available for EBCDIC only in earlier versions).
  - Native support for the TIMESTAMP value 24:00:00 (this was mapped to 23:59:59 in earlier versions)
  - Improved support for scalar functions that were previously not offloaded when applied to certain data types
  - Support for MIN, MAX, DAY, LAST_DAY, BIT*, TIMESTAMP_ISO, VARIANCE, and STDDEV with the UNIQUE clause
  - Support for the HEX function
  - Improved support for tables in mixed encoding
  - EBCDIC tables can be added to accelerator even if UNICODE tables are already present
  - Better time synchronization through use of system heartbeat
  - Improved accuracy for CURRENT_TIME, CURRENT_TIMESTAMP, and CURRENT_DATE special registers
- Smart Load, meaning that the SYSPROC.ACCEL_LOAD_TABLES stored procedures optimizes the workload and the degree of parallelism for load jobs.
- New software update approach: Updates for the accelerator are not part of the z/OS installation package, but can be downloaded individually from IBM FixCentral, which significantly reduces the installation effort.
- New and changed stored procedures and interfaces:
  - SYSPROC.ACCEL_UPDATE_SOFTWARE2 replaces SYSPROC.ACCEL_UPDATE_SOFTWARE
  - The GetActivationLog sub-function extends SYSPROC.ACCEL_CONTROL_SYSPROC.ACCELERATOR, which allows you to monitor software activations.
  - New monitoring interface extensions for query details
  - SYSPROC.ACCEL_GET_QUERIES2 extends the SYSPROC.ACCEL_GET_QUERIES interface by returning query statements in a result set rather than in an output parameter of limited size. Query statements in the result set are not truncated if they exceed 128 bytes in length.

- SYSPROC.ACCEL_GET_QUERY_DETAILS2 retrieves query plan information from the remote database management system in separate result sets. The information is not combined with the query text anymore.
- SYSPROC.ACCEL_GET_QUERY_EXPLAIN returns the Db2® EXPLAIN information in a compressed, base64-encoded format.
- The following stored procedures can write IFCID392 audit traces: SYSPROC.ACCEL_ADD_TABLES, SYSPROC.ACCEL_ALTER_TABLES, SYSPROC.ACCEL_REMOVE_TABLES

Chapter 1. Introduction and installation planning

Read a brief product description. See which components the product consists of, what needs to be considered before the installation, which preparations are necessary, and which steps must be completed by whom.

Solution overview

IBM Db2 Analytics Accelerator for z/OS V7.1.0 is a bundled solution package for the acceleration of database queries. It supports two deployment options: A mainframe-only solution where the accelerator is installed in a dedicated logical partition (LPAR). This is called IBM Db2 Analytics Accelerator for z/OS deployed on IBM Z. The short name is: Db2 Analytics Accelerator on Z. The second deployment option is a solution that runs on optimized appliance hardware. It is called IBM Db2 Analytics Accelerator for z/OS Version 7.1 deployed on the IBM Integrated Analytics System (IIAS). The short name for this option is: Analytics Accelerator on Integrated Analytics System.

Both deployment options can reduce query response times dramatically.

- The mainframe-only solution (Db2 Analytics Accelerator on Z) marks the beginning of a new era: A fully integrated solution that does not require external hardware. This solution is currently available for the IBM z14 only.
- IBM Db2 Analytics Accelerator on IBM Integrated Analytics System is the successor of IBM Db2 Analytics Accelerator for z/OS Version 5.1.0 (which runs on the IBM PureData® System for Analytics). The new solution runs on newly designed IBM POWER8® hardware.

Both solutions can be run individually or in combination. See Figure 1 on page 2 and Figure 2 on page 3 for an overview of the components involved in the setup. The overviews show examples; other, more sophisticated configurations are thinkable.

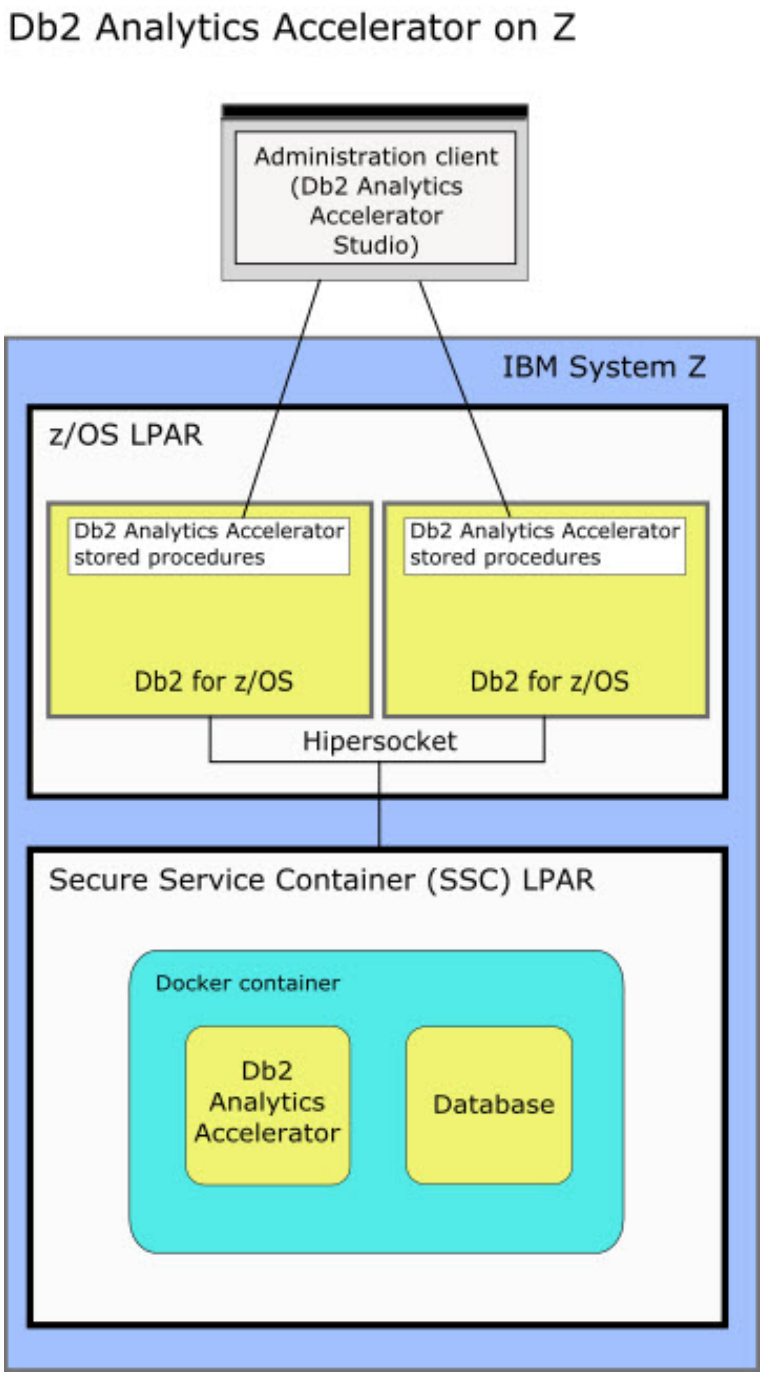


Figure 1. Solution overview of Db2 Analytics Accelerator on Z

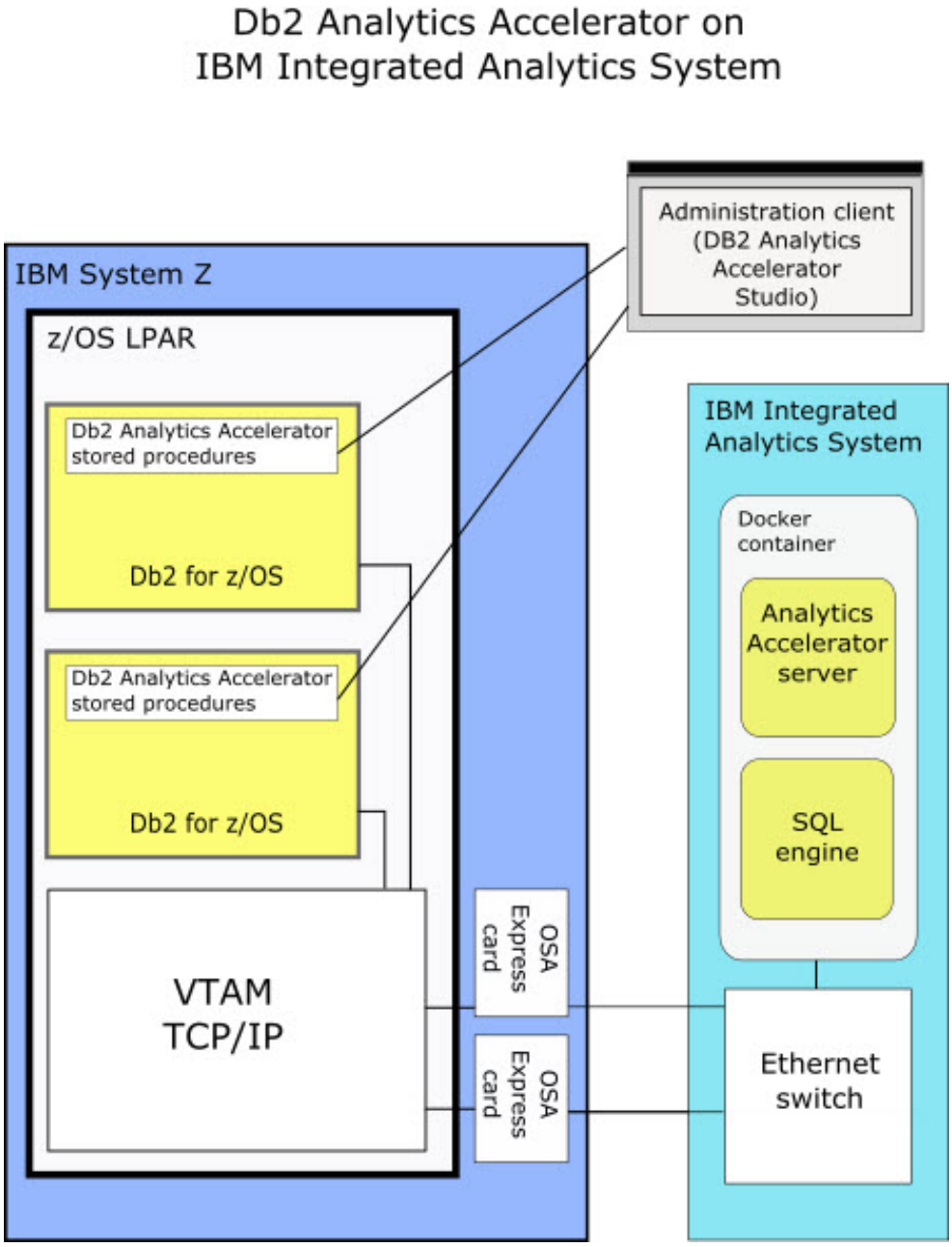


Figure 2. Solution overview of Db2 Analytics Accelerator on the IBM Integrated Analytics System

Multiple database subsystems and multiple accelerators

A single accelerator can be shared by multiple Db2 for z/OS subsystems. However, a single Db2 for z/OS subsystem can also be connected to more than one accelerator.

IBM Db2 Analytics Accelerator for z/OS supports the following subsystem configurations:

- Multiple subsystems, each of which in a separate logical partition (LPAR)
- Multiple subsystems in a common LPAR
- Multiple subsystems that make up a data sharing group (subsystems in different LPARs, on different Central Processing Complexes (CPCs))

Figure 3 shows that Db2 subsystems can share a single accelerator as well as connect to more than just one accelerator. The leftmost box in the figure, which represents a single subsystem in a separate LPAR, is connected to two accelerators. All Db2 subsystems (including the one in the leftmost box) share the one accelerator on the left.

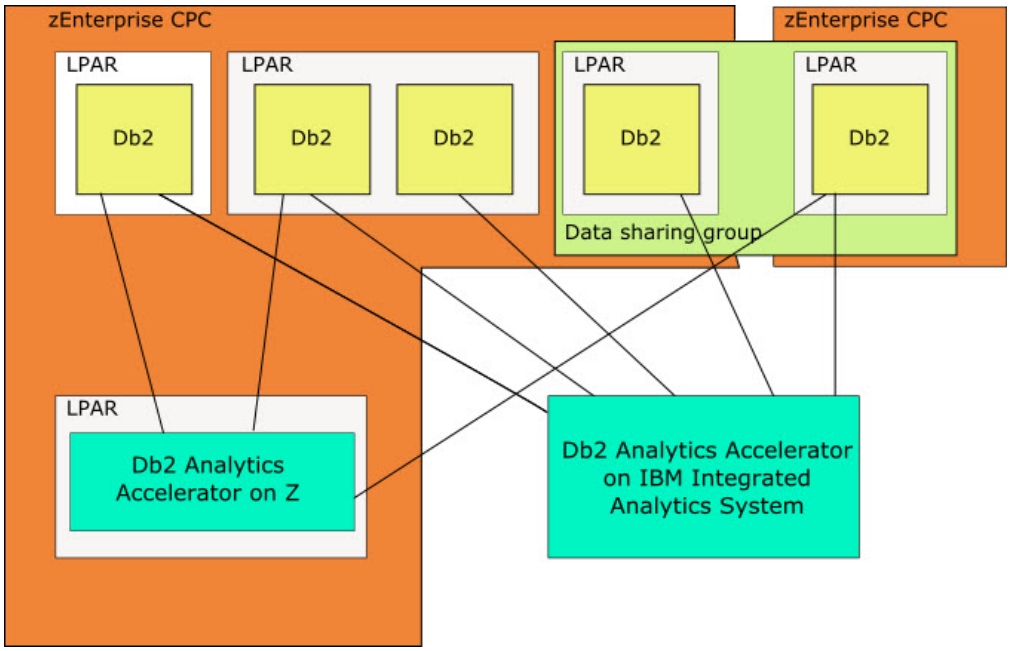


Figure 3. Possible connections

Product description

IBM Db2 Analytics Accelerator for z/OS Version 7.1.0 consists of the following components:

- IBM Db2 Analytics Accelerator for z/OS software that is preinstalled on your IBM Integrated Analytics System by a service engineer
- A Db2 Analytics Accelerator on Z software image for the deployment on IBM Z. This image is for deployment on an IBM z14 only. The software does not run on earlier models.
- IBM Db2 Analytics Accelerator stored procedures, which run on the attached IBM Z server. The stored procedures are provided on tape and are installed via SMP/E (details are described below)

- An administration client (GUI), called IBM Db2 Analytics Accelerator Studio, which runs on a workstation attached to IBM Z. IBM Db2 Analytics Accelerator Studio is an IBM Data Studio plugin and has to be downloaded from an IBM Web Membership page.

  If you already have IBM Data Studio, install just the plugin. You get the plugin from IBM Fix Central. See:

  – Prerequisites and Maintenance for IBM DB2 Analytics Accelerator for z/OS, V7.1
  – IBM DB2 Analytics Accelerator Studio (All releases, All platforms)

Product purchase and delivery

The product can be ordered from Shopz. The entire solution is available for download. The stored procedures can also be delivered on tape. The tape contains:

- IBM Db2 Analytics Accelerator for z/OS, Version 7.1.0 FMID HAQT710 (containing the stored procedures)

Documentation and product support

You find documentation and product support in an information center, on the IBM Db2 Analytics Accelerator for z/OS support website, and also on IBM Resource Link®.

IBM Knowledge Center

You find IBM Db2 Analytics Accelerator for z/OS in the IBM Knowledge Center at:

http://www.ibm.com/support/knowledgecenter/SS4LQ8_7.1.0/com.ibm.datatools.aqt.doc/idaa_kc_welcome.html

The IBM Knowledge Center is fully accessible, meaning that it supports tools and aids for users with disabilities.

IBM Db2 Analytics Accelerator for z/OS support website

Check the IBM Db2 Analytics Accelerator for z/OS support website regularly for the latest information and updates. This site also provides links to PDF product manuals:

http://www.ibm.com/support/entry/portal/Overview/Software/Information_Management/DB2_Analytics_Accelerator_for_z~OS

Service requests

If you encounter problems, you can report these problems here:

https://www.ibm.com/support/servicerequest

IBM zEnterprise® documentation

Read the appropriate manual for your IBM Z server:

- IBM z14 Technical Guide, SG24-8451
- IBM z13 Technical Guide, SG24-8251
- IBM zEnterprise 196: System Overview, SA22-1086
- IBM zEnterprise 114: System Overview, SA22-1087

- IBM zEnterprise EC12: System Overview, SA22-1088

Installation prerequisites

Check the installation prerequisites before you install IBM Db2 Analytics Accelerator for z/OS:

http://www-01.ibm.com/support/docview.wss?uid=swg27050161

Installation task flow

The chart in this section shows the individual installation tasks that you must complete for a new installation of IBM Db2 Analytics Accelerator for z/OS.

Each task is represented by a box and is assigned to the most appropriate user role. The sequence in which you must complete the tasks is indicated by the arrows and the task numbering (from A1 to D2), where capital letters are used to mark tasks that need to be carried out by a particular role. The time needed for a task is indicated on top of each box. At the bottom of a box, you find a reference to the document that tells you how to complete the task.

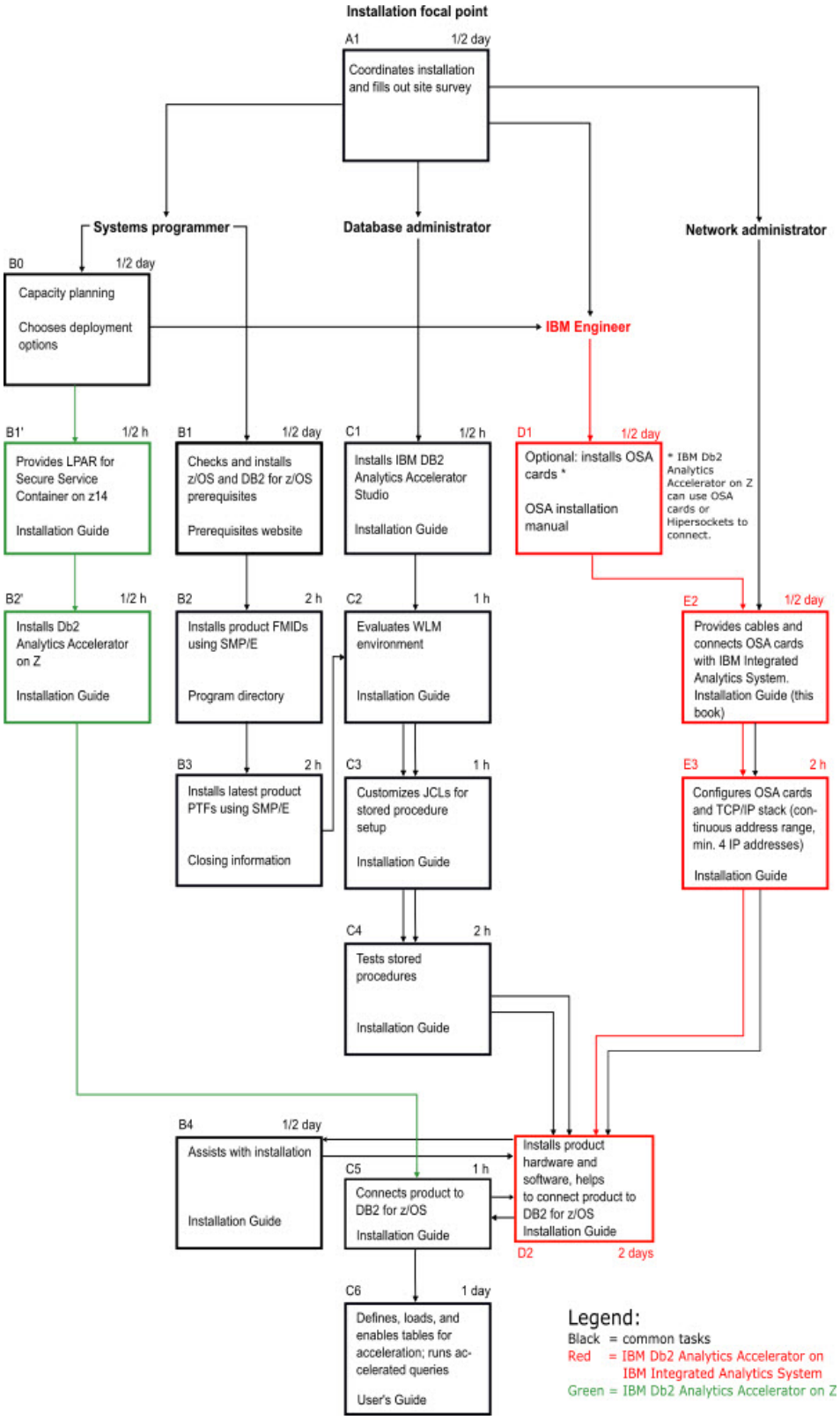


Figure 4. Installation task-flow diagram

For an update of an existing installation, refer to *Installing updates* in the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.

Preparation tasks

Complete the following tasks before IBM service personnel visits your site to install the IBM Integrated Analytics System:

Procedure

1. *A1*: The installation focal point assigns the installation tasks to the members of the IT team and fills out the site survey.
2. *B0*: The systems programmer does the capacity planning for IBM Z. She or he also decides which options to install: IBM Db2 Analytics Accelerator on an IBM Integrated Analytics System, Db2 Analytics Accelerator on Z, or both. If the product is to be installed on an IBM Integrated Analytics System, the systems programmer gets in touch with the IBM Engineer.
3. *B1*: The systems programmer must check the prerequisites and ensure that all requirements are met. See "Installation prerequisites" on page 6 for more information.
4. *C1*: The database administrator installs IBM Db2 Analytics Accelerator Studio on a client workstation. This needs to be done up-front so that license agreements can be accepted for all products involved. IBM Db2 Analytics Accelerator Studio is the administration software of IBM Db2 Analytics Accelerator for z/OS. It is installed on a Linux or Microsoft Windows workstation that is connected to Db2 for z/OS. See: *Installing IBM Db2 Analytics Accelerator Studio* in the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*, SH12-7083.
5. *B1 cont. - B3*: The systems programmer needs to complete the following steps so that IBM Db2 Analytics Accelerator for z/OS can be used by a Db2 subsystem on your Db2 for z/OS data server:
   a. Apply the required z/OS and Db2 Program Temporary Fixes (PTFs).
   b. Install the IBM Db2 Analytics Accelerator for z/OS FMIDs using SMP/E.
   c. Install the latest PTFs for the product using SMP/E. PTFs might be delivered with a major product release or separately. For information on how to install the PTFs and how to handle the various components in the package, see the closing information for the PTF, which is published as a support document on the web.
6. *B1' and B2'*: If Db2 Analytics Accelerator on Z was selected as a deployment option, the systems programmer provides an LPAR for an IBM Secure Services Container on the IBM z14. In a subsequent step, the systems programmer installs Db2 Analytics Accelerator on Z.
7. *C2-C4*: The database administrator completes the following steps:
   a. The database administrator evaluates, and, if necessary, customizes the Workload Manager (WLM) application environment.
   b. The database administrator customizes and runs JCLs for the setup of IBM Db2 Analytics Accelerator for z/OS stored procedures.

   For instructions, see *Enabling an existing Db2 subsystem for IBM Db2 Analytics Accelerator for z/OS* in the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.
8. *D1*: The Central Processing Complexes (CPCs) that are supposed to interact with the IBM Integrated Analytics System must be equipped with one or two OSA-Express® cards each. Call IBM if the cards have not been ordered or delivered yet. For information on how to choose the proper cards, see:

   Network requirements for System z®

9. *E2*: The network administrator needs to provide cables for the connections between the OSA-Express cards and the IBM Integrated Analytics System. The cables must be ready to be plugged in by IBM service personnel. Therefore, the network administrator needs to run and label the cables properly.

   Data sharing groups: All Db2 subsystems in the same Central Processing Complex (CPC) share the network connectivity between that CPC and the accelerator. It does not matter if these Db2 subsystems are independent, belong to the same data sharing group, or belong to different data sharing groups. Each CPC, however, must be wired individually to the accelerator.
10. *E3*: Although a connection to the IBM Integrated Analytics System does not exist yet, the network administrator should configure the OSA cards and the TCP/IP stack for IBM Db2 Analytics Accelerator for z/OS beforehand. Information is found in *Chapter 1: Configuring TCP/IP for connections between IBM Z and the IBM Integrated Analytics System* of the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.

Installation of the IBM Integrated Analytics System

D2: These tasks are completed by IBM service personnel or one of IBM's business partners, with the assistance of the systems programmer.

Procedure

1. The service engineer installs the hardware (IBM Integrated Analytics System).
2. The service engineer installs the product software on the IBM Integrated Analytics System.
3. The service engineer plugs in the cables to connect the IBM Integrated Analytics System with the IBM Z server.

Post-installation tasks

For new installations, the database administrator must complete a number of post-installation tasks. The systems programmer might have to assist.

Procedure

1. *C5*: The database administrator associates the product with Db2 for z/OS to authenticate IBM Db2 Analytics Accelerator for z/OS as an entitled extension of Db2 for z/OS. If Db2 Analytics Accelerator on Z was installed, this step is carried out by the systems programmer. The product association is based on a proper authentication. The *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*, SH12-7083, contains two sections that describe how to complete this task:
   - *Obtaining the pairing code for accelerator authentication*
   - *Creating the authentication token using the Add New Accelerator wizard*
2. *C6*: The database administrator tests the entire setup. To do so, the database administrator needs to complete the steps in *Testing query acceleration* of the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.

Results

IBM Db2 Analytics Accelerator for z/OS is ready for use.

What to do next

- The version of IBM Db2 Analytics Accelerator for z/OS that the service engineer has installed on the IBM Integrated Analytics System might not be the version

that you want to use in production. If this is the case, first update the software. Refer to *Updating accelerator software* in the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.

- The database administrator can start to define tables on the accelerator in order to accelerate queries. More detailed information can be found in the help topics or in the *IBM Db2 Analytics Accelerator for z/OS: User's Guide*.

Chapter 2. Configuring TCP/IP connections

To transfer data between your database management system and an accelerator, you must provide several IP addresses and establish a TCP/IP connection between your IBM Z server and the IBM Integrated Analytics System or Db2 Analytics Accelerator on Z.

IBM Db2 Analytics Accelerator on IBM Integrated Analytics System

- Appropriate cable connections must exist between the OSA-Express ports of your IBM Z server and your IBM Integrated Analytics System.
- IBM Z and z/OS must be operational.
- The IBM Integrated Analytics System must be operational.

A private network must exist between the IBM Z server and your IBM Integrated Analytics System. This means that you cannot reuse existing subnets that are already defined on other interfaces. The number of required TCP/IP addresses depends on the configuration. For the minimum configuration, provide at least two TCP/IP addresses in the same subnet. For the recommended configuration, provide four IP addresses.

- One IP address for the IBM Integrated Analytics System.
- One IP address for the OSA-Express card facing the IBM Integrated Analytics System.

  The recommended configuration uses two OSA-Express cards, each of which using its own IP address in combination with a virtual IP address (VIPA).

Db2 Analytics Accelerator on Z

Db2 Analytics Accelerator on Z requires a TCP/IP network to connect Db2 for z/OS subsystems with the accelerator. This network connection can be defined through OSA Express interfaces on the IBM z14 or through Hipersockets (if the Db2 subsystem runs in an LPAR on the same Central Processing Complex).

Network bandwidth and speed impacts the overall solution performance. For OSA interfaces, a dedicated OSA Express card and 10 GbE connectivity with Jumbo Frames are recommended.

During the network configuration for Db2 Analytics Accelerator on Z, an interface needs to be tagged that accepts incoming connection requests from Db2 for z/OS subsystems. This is done by editing the network interface name and changing it to *DB2*.

Note: Only a single interface can be tagged in this way. If you plan to connect the accelerator to multiple Db2 subsystems, all these subsystems must be accessible through this interface.

Chapter 3. Security considerations

The accelerator contains a copy of Db2 data for selected tables. It is important to protect that data against unauthorized access. A properly configured system environment makes it very hard for attackers from the outside to get into the system and manipulate, damage, or steal data. See which security measures are in place and which measures you can take to increase the system security.

Product security

The system environment of IBM Db2 Analytics Accelerator for z/OS can be considered safe for the following reasons:

- If properly configured, the IBM Z server and the IBM Integrated Analytics System (accelerator) are connected over a private data network (PDN), which does not allow access from the internet or your organization's intranet.
- Db2 Analytics Accelerator on Z can use Hipersockets to connect to Db2 subsystems. This is a very secure option because the data never leaves the mainframe.
- Only TSO users with sufficient access rights for the relevant logical partition (LPAR) in z/OS can establish a TCP/IP connection from the LPAR to the accelerator over the PDN. A system authorization facility (SAF) like RACF® allows you to restrict this right to just a few selected users.
- The transfer, manipulation or extraction of data from the accelerator is carried out by the stored procedures that come with the product. The authorizations required to execute these tasks lie, to a large extent, with the stored procedures, so that the rights of the user executing the stored procedures can be restricted.
- The pairing mechanism exclusively links a Db2 subsystem to an accelerator. A user with access to one subsystem cannot view or otherwise access data from another subsystem just because the other subsystem is linked to the same accelerator.
- The Linux system on the accelerator does not allow a direct remote connection. The built-in private authentication module (PAM) is configured to prevent this. On-site access is possible, but limited through the use of service passwords with temporary validity. In addition, the service passwords can only be used for a single machine, as they are bound to the serial number.

  The facility to request a password is not publicly available on the internet. For your first service request requiring access to the machine, you have to submit an encrypted token to IBM, which secures the machine password. The token is stored in an IBM service database with limited access (authorized personnel only). IBM support uses the token and the serial number of the machine to generate a service password that can be used during a service session. For the next service request, you need not submit the token again. You just have to provide the machine serial number.

  You can change (rotate) the secret machine password if you think it has been compromised. In this case, you have to submit the encrypted token again for your next service request.

What you can do to guarantee maximum system security

Security-related fixes and APAR information are published in the z Systems® Security Portal. To guarantee maximum system security, IBM issues the z Systems

Security Portal Security Vulnerability Bulletins. Apply the fixes recommended there. The z Systems Security Portal is intended to help you stay current with security and system integrity fixes by providing current patch data and also provides Associated Common Vulnerability Scoring System (CVSS) V2 ratings for new APARs. For instructions on how to access the z Systems Security Portal, see **Enterprise security** > **Integrity**. You find a link to the website at the end of this topic.

Many security features are provided by the product, by the hardware, by Db2 for z/OS, by z/OS, or by your system authorization facility (SAF). Often, these features cannot be enabled automatically, but require an intervention on your part. Check the following list carefully, especially for production systems, and take appropriate action if one of the items reveals a security gap:

- Because TSO users, Db2 users, and users of IBM Db2 Analytics Accelerator Studio can be seen as the highest security risks, select these users carefully. Grant users access rights as required by the roles that they play. Do not give them more rights than needed. Where advantageous, combine access rights with user groups and grant access rights to users via group membership.

  For example, restrict the rights of the installer. This is the user who runs the AQTTIJSP job to create and bind stored procedures. The access rights that this user needs are listed in a separate section.

  Grant users of IBM Db2 Analytics Accelerator Studio just the minimum set of access rights.

  Rights for the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure can be granted for each XML input element of the **command** parameter because each element invokes a user-defined function. Make use of this feature.

  A power user is helpful for first-time installations and system verification tests, but not necessarily required after that. Consider removing power users or revoking some of their access rights.
- Change the password for the IBM Db2 Analytics Accelerator Console at the first logon.

  If more than a single person needs access to the console, create additional user IDs on the console, each with a different password. Do not share a single console password.
- Make sure that the hardware is located in an access-controlled area. Although direct remote connections to the accelerator are not possible, someone who knows the machine details might enter the premises and use a false identity to open a service session with IBM support.
- If available, use an access auditing solution that protocols access to the z/OS system. Access auditing can be enabled in RACF.
- Protect the PDN against unauthorized access. Follow the **Related information** link at the end of this topic for instructions.
- Make sure that regular Db2 users do not have SELECT authorization for the SYSIBM.USERNAMES catalog table in Db2 for z/OS because this would allow them to read the authentication tokens, which are created as a result of the pairing process.
- The data on damaged hard drives of the IBM Integrated Analytics System is encrypted. Hence there is no need to degauss or physically destroy a damaged disk after a replacement.
- IBM recommends two redundant PDN cable connections to support failover scenarios. For these connections, two network switches are required. Usually, such switches are configured from a web-browser interface. Make sure that access to this interface is limited, that the switches restrict routing to the confines

of the PDN, and that the initial password has been changed. Someone with access to the interface can change the configuration of the network and might, for example, open the PDN to the intranet or internet.

- The trace function of the product allows you to select components for tracing that disclose sensitive information in the trace file or result set. Make sure to only send this data to parties with a need to know.
- To be able to trace a manipulation of accelerator-shadow tables, enable auditing for the SYSIBM.SYSACCELERATEDTABLES table by adding a corresponding row to the SYSIBM.SYSAUDITPOLICIES table. This way, the Db2 transaction log will tell you which accelerator-shadow tables have been modified. Consider adding SYSIBM.USERNAMES as well.

Related reference:

"Setting access rights for the user who runs AQTTIJSP" on page 37

"Access rights for power users" on page 51

Related information:


Protecting the private data network against unauthorized access


Enterprise security > Integrity > Subscription Process

Chapter 4. Data encryption

Read some information about the encryption features provided with the product and the hardware.

IBM Integrated Analytics System

The IBM Integrated Analytics System uses flash storage. The flash cards in the flash storage compartment are always encrypted using AES encryption. However, the encryption keys can currently not be changed or managed on an external key management server. The encryption of data at rest provides a safety net if a single flash card is removed. The data on the card cannot be read because it is encrypted, but is not protected against an attacker who gains access to the complete system because the keys are stored within the appliance on the IBM Integrated Analytics System. So you can safely replace flash cards in case of a failure without the risk of exposing the data on the card.

Db2 Analytics Accelerator on Z

The Secure Services Container used by Db2 Analytics Accelerator on Z employs LUKS AES encryption to encrypt all persistent storage. That is, both, the storage used by the container image and the customer-supplied storage for user data are encrypted.

Chapter 5. Installing IBM Db2 Analytics Accelerator Studio

Follow the steps in this section to install the administration client, IBM Db2 Analytics Accelerator Studio.

About this task

The procedure described here will download a package that contains all required software components. It does not matter whether one or more of these components are already installed on a target system. If one or more components are already present, only the remaining components will be installed. Sometimes, an update is offered for already installed components. Currently, the installation requires 1.5 GB of free disk space.

If you already have an installation of IBM Data Studio, and just need the IBM Db2 Analytics Accelerator Studio plugin, you can also download and add the plug-in by using the update function of IBM Installation Manager. To do this, follow the link to *Updating* IBM Db2 Analytics Accelerator Studio at the end of this topic.

Attention: If possible, let users install the components on a local disk. Installing these on a shared network drive bears the potential risk of damaging or even destroying the Eclipse workspace.

A damage is likely to occur if you update or uninstall components while instances of the program are still running on connected computers. So if an installation on a shared network drive cannot be avoided, make sure that users close all running instances of IBM Installation Manager, IBM Data Studio, or IBM Db2 Analytics Accelerator Studio before they update or uninstall components.

Your operating system might issue several security warnings while you are following the steps in this procedure. Always grant permission, that is, click **Accept**, **OK**, or **Run** when asked whether you want to allow programs or processes to make changes to your system or to access the internet.

Procedure

1. From a workstation with a direct internet connection, download the installation package, which is found at:

   https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=swg-db2aas
2. Type your IBM ID and password in the appropriate fields and click **Sign in**. If you do not have an IBM ID, click **Get an IBM ID** and follow the registration instructions on the form. After finishing this task, you return to this page where you can sign in using your new IBM ID and password.

   http://www-01.ibm.com/support/docview.wss?uid=swg27046305#AAS   und nur das neuste Fixpack für IDAA Studio von Fixcentral runterzuladen https://www-945.ibm.com/support/fixcentral/swg/selectFixes?product=ibm/Information+Manage\

   ment/DB2+Analytics+Accelerator+Studio&release=All&platform=All &function=all

Evtl. könntest du nur schreiben:

If you have an existing installation of Data Studio you only need to add the Db2 Analytics Accelerator Studio p\

lug-ins to the existing installation. See link "Updating Db2 Analytics Accelerator Studio" at the and of this topic.

Note: Sometimes, you are asked to provide information such as your first name, last name, email address and your preferred business contact method although you have already signed in with your IBM ID. In that case, just provide the requested information again to proceed.

3. On the following page, under **License**, select **I agree** to agree to the terms and conditions.
4. Click **I Confirm**.
5. Download the installation package using one of these methods:
   - **Download using Download Director**
   - **Download using http**
6. Depending on how you want to proceed, follow one of these methods.
   - If you want users to start the installation from a remote machine, extract the downloaded, compressed archive.
   - If you want users to copy the package so that they can start a local installation, provide them with information on the package location, how to access it, how to extract the package, and how to start the installation.
7. Depending on your choice in step 6, extract the package on the download machine, or let your users extract it on their local machines.
8. Let your users start one of the installation programs, that is, **launchpad.exe** or **launchpad_win_noadmin64.exe** The **launchpad.exe** program allows you to launch an administrative installation and a restricted installation. The **launchpad_win_noadmin64.exe** program only allows you to launch a restricted installation and only works on 64-bit Windows operating systems. Description of these installation types:

   Administrative installation
   Selecting this installation, users can install the product for all users of their local workstation, and in any folder they prefer. This installation requires administrative rights on the workstation.

   Restricted installation
   Selecting this installation, users can install the product only for a single user of their local workstation (the user who is logged in and starts the installation program). The choice of an installation folder is restricted to the folders that this user has write access to. This installation does not require administrative rights on the workstation.
9. After selecting an installation method, IBM Installation Manager starts and lists the installable packages. Your users must select the following packages:
   - IBM Data Studio client
   - IBM Db2 Analytics Accelerator Studio

   If any of these are already installed, they will be greyed out or not be listed. Sometimes, IBM Installation Manager will offer to install a newer version.
10. Let your users complete the IBM Installation Manager wizard.

Related tasks:

"Updating IBM Db2 Analytics Accelerator Studio" on page 75

Chapter 6. Enabling an existing Db2 subsystem for IBM Db2 Analytics Accelerator for z/OS

To add IBM Db2 Analytics Accelerator for z/OS to your Db2 for z/OS environment, you must update the Db2 libraries supporting IBM Db2 Analytics Accelerator for z/OS as well as create and bind several stored procedures.

Software prerequisites for the Db2 data server

Before you begin with the installation, make sure that you meet the software requirements for the Db2 data server.

The prerequisites are listed at:

http://www.ibm.com/support/docview.wss?uid=swg27046305

Installing libraries with IBM Db2 Analytics Accelerator support

Use SMP/E to install the product packages. Follow the installation steps in the package description.

Before you begin

Make sure that Db2 for z/OS is at the proper maintenance level. For information, see

About this task

In the following text, <HLQBASE> is used as a placeholder for the high-level qualifier (HLQ) of your Db2 libraries. Replace it with the actual HLQ that is used in your system.

Procedure

To set up the stored procedures and related libraries for the product, use the SMP/E *Apply* function to install the following packages:

FMID HAQT710
Includes the stored procedures of IBM Db2 Analytics Accelerator.

Attention: An SMP/E installation of HAQT710 will delete all previous versions of IBM Db2 Analytics Accelerator, for example HAQT510..To retain older installations, install HAQT710 into a separate SMP/E environment.

FMID JAQT711
Includes the license library for IBM Db2 Analytics Accelerator on an IBM Integrated Analytics System.

FMID JAQT712
Includes the license library for Db2 Analytics Accelerator on Z.

FMID HCHCA21
Includes IBM InfoSphere® Data Replication for z/OS components

Creating the IBM Db2 Analytics Accelerator database

Customize and submit the DSNTIJAS job to create the database and tables for IBM Db2 Analytics Accelerator for z/OS in Db2 for z/OS.

About this task

Complete this task before you create the IBM Db2 Analytics Accelerator stored procedures by following the steps in "Customizing and running AQTTIJSP" on page 37.

Procedure

1. Copy and customize the DSNTIJAS sample job member in the <HLQBASE>.<SDSNSAMP> library according to your needs.
2. Submit DSNTIJAS.

Setting ZPARMs for IBM Db2 Analytics Accelerator for z/OS

Set the ZPARMs for IBM Db2 Analytics Accelerator for z/OS according to your needs.

Note: You can also set, change, or override most of the ZPARMS that are discussed here in one of the following ways:

- Online, during a query session
- In the BIND options for packages (static SQL)
- As part of connection properties

Setting ZPARMs for IBM Db2 Analytics Accelerator in Db2 11 for z/OS

In Db2 11 for z/OS, you can set the ZPARMs for query acceleration on the DSNTIP82 and DSNTIP8A installation panels.

About this task

The following ZPARMs are available:

ACCEL=COMMAND | AUTO | NO

COMMAND
To start the accelerator by manually invoking the **-start ACCEL <name>** command, where **<name>** is the name of the accelerator.

AUTO To automatically start the accelerator when the Db2 for z/OS subsystem starts.

NO To specify that the accelerator cannot be used with this Db2 subsystem.

QUERY_ACCELERATION
The treatment of incoming queries depends, among other factors, on the setting of the CURRENT QUERY ACCELERATION special register, which is a Db2 for z/OS special register that was introduced for IBM Db2 Analytics Accelerator for z/OS.

The value of the QUERY_ACCELERATION ZPARM provides the default setting for the CURRENT QUERY ACCELERATION special register. Both, the ZPARM and the special register accept the following values:

1 (NONE)
No routing of dynamic SQL queries to an accelerator. Queries will be processed by Db2 for z/OS only (inhouse query processing).

2 (ENABLE)
A dynamic SQL query will be routed to an accelerator if it fulfills all required conditions. An incoming query is tested against a set of heuristics, which include the table size and a response time estimate based on cost information from the SYSIBM.DSN_PROFILE_ATTRIBUTES table. Both tests ensure that a query will only be routed to an accelerator if the query can be expected to run faster than in Db2 for z/OS. However, if an error occurs while the query is being processed by the accelerator, Db2 for z/OS will return a negative SQLCODE to the application and query processing will stop.

3 (ENABLE WITH FAILBACK)
Dynamic queries are accelerated only if Db2 for z/OS determines that it is advantageous to do so. If an accelerator returns an error during the PREPARE phase or when first opening (OPEN) the query, the query is processed by Db2 for z/OS rather than sent to the accelerator. If the accelerator returns an error during a FETCH operation or a subsequent OPEN operation, Db2 for z/OS returns an error to the user and the query ends abnormally.

4 (ELIGIBLE)
Dynamic queries are accelerated if they are eligible for acceleration. Db2 for z/OS does not use cost information to determine whether to accelerate the queries. Queries that are not eligible for acceleration are executed by Db2 for z/OS. If an accelerator fails while a query is running, or if the accelerator returns an error, Db2 for z/OS returns a negative SQL code to the application.

5 (ALL)
A dynamic query will always be routed to an accelerator, no matter if it fulfills the conditions or not. If processing cannot start or continue because an incoming query fails to fulfill all the conditions for accelerated query processing, Db2 for z/OS returns a negative SQLCODE to the application and query processing ends abruptly. That is, the query will not be processed at all.

QUERY_ACCEL_OPTIONS = NONE | 2
The following options are currently available for this ZPARM.

NONE (default)
Means that option 2 is disabled.

2 For an INSERT operation that includes a SELECT statement, this option causes the SELECT portion of the statement to be routed to and the INSERT operation to be performed by Db2 for z/OS.

Notes:

- It is not necessary to set `QUERY_ACCEL_OPTIONS= 2` for in-database transformation with accelerator-only tables because transactions on this type of table can only be executed on an accelerator. The processing location is automatically determined by the type of the table.
- The referenced tables on the accelerator might not be in sync with the tables in Db2 for z/OS.

- Db2 for z/OS does not route the SELECT portion of the statement if the target table in the INSERT statement uses an encoding scheme that is different from the scheme of the tables in the SELECT statement.

Important:

- You can change the value of QUERY_ACCEL_OPTIONS online.
- If you use IBM Db2 Analytics Accelerator with a Db2 for z/OS data sharing group, make sure that all members of the data sharing group use the same setting for QUERY_ACCEL_OPTIONS.

Procedure

1. Set the ZPARMs for query acceleration on the DSNTIP82 and DSNTIP8A panels. The DSNTIP82 panel looks like this:

```
DSNTIP82 INSTALL Db2 - QUERY ACCELERATOR PREFERENCES
===>
Enter query accelerator options below:
 1 ACCELERATOR STARTUP  ===> NO       NO, COMMAND, or AUTO
 2 GET ACCEL ARCHIVE    ===> NO       NO or YES
 3 ACCELERATION OPTIONS ===> NONE     NONE or YES

Enter CURRENT QUERY ACCELERATION special register option:
 4 CURRENT QUERY ACCEL  ===> 1        1 = NONE
                                      2 = ENABLE
                                      3 = ENABLE_WITH_FAILBACK
                                      4 = ELIGIBLE
                                      5 = ALL

PRESS: ENTER to continue    RETURN to exit    HELP for more information
```

   DSNTIP8A is a pop-up panel that opens on top of DSNTIP82 and allows you to select values for the QUERY_ACCEL_OPTIONS parameter. It is not available if NONE is specified for 3 ACCELERATION OPTIONS.
2. Stop Db2.
3. Restart Db2 so that the changes can take effect.
4. Run sample queries or a test load to verify the proper functioning of Db2.

Related information:

CURRENT QUERY ACCELERATION

Subsystem parameters that are not on installation panels

Using a sample job to set ZPARMs for IBM Db2 Analytics Accelerator for z/OS

If you do not use Db2 11 for z/OS or prefer a different method, you can customize and run a sample job to modify the ZPARM settings for IBM Db2 Analytics Accelerator for z/OS.

About this task

The following ZPARMs are available:

ACCEL=COMMAND | AUTO | NO

COMMAND
To start the accelerator by manually invoking the **-start ACCEL <name>** command, where **<name>** is the name of the accelerator.

AUTO To automatically start the accelerator when the Db2 for z/OS subsystem starts.

NO To specify that the accelerator cannot be used with this Db2 subsystem.

QUERY_ACCELERATION

The treatment of incoming queries depends, among other factors, on the setting of the CURRENT QUERY ACCELERATION special register, which is a Db2 for z/OS special register that was introduced for IBM Db2 Analytics Accelerator for z/OS.

The value of the QUERY_ACCELERATION ZPARM provides the default setting for the CURRENT QUERY ACCELERATION special register. Both, the ZPARM and the special register accept the following values:

1 (NONE)
No routing of dynamic SQL queries to an accelerator. Queries will be processed by Db2 for z/OS only (inhouse query processing).

2 (ENABLE)
A dynamic SQL query will be routed to an accelerator if it fulfills all required conditions. An incoming query is tested against a set of heuristics, which include the table size and a response time estimate based on cost information from the SYSIBM.DSN_PROFILE_ATTRIBUTES table. Both tests ensure that a query will only be routed to an accelerator if the query can be expected to run faster than in Db2 for z/OS. However, if an error occurs while the query is being processed by the accelerator, Db2 for z/OS will return a negative SQLCODE to the application and query processing will stop.

3 (ENABLE WITH FAILBACK)
Dynamic queries are accelerated only if Db2 for z/OS determines that it is advantageous to do so. If an accelerator returns an error during the PREPARE phase or when first opening (OPEN) the query, the query is processed by Db2 for z/OS rather than sent to the accelerator. If the accelerator returns an error during a FETCH operation or a subsequent OPEN operation, Db2 for z/OS returns an error to the user and the query ends abnormally.

4 (ELIGIBLE)
Dynamic queries are accelerated if they are eligible for acceleration. Db2 for z/OS does not use cost information to determine whether to accelerate the queries. Queries that are not eligible for acceleration are executed by Db2 for z/OS. If an accelerator fails while a query is running, or if the accelerator returns an error, Db2 for z/OS returns a negative SQL code to the application.

5 (ALL)
A dynamic query will always be routed to an accelerator, no matter if it fulfills the conditions or not. If processing cannot start or continue because an incoming query fails to fulfill all the conditions for accelerated query processing, Db2 for z/OS returns a negative SQLCODE to the application and query processing ends abruptly. That is, the query will not be processed at all.

QUERY_ACCEL_OPTIONS = NONE | 2

The following options are currently available for this ZPARM.

NONE (default)
Means that option 2 is disabled.

2 For an INSERT operation that includes a SELECT statement, this option causes the SELECT portion of the statement to be routed to and the INSERT operation to be performed by Db2 for z/OS.

Notes:

- It is not necessary to set QUERY_ACCEL_OPTIONS= 2 for in-database transformation with accelerator-only tables because transactions on this type of table can only be executed on an accelerator. The processing location is automatically determined by the type of the table.
- The referenced tables on the accelerator might not be in sync with the tables in Db2 for z/OS.
- Db2 for z/OS does not route the SELECT portion of the statement if the target table in the INSERT statement uses an encoding scheme that is different from the scheme of the tables in the SELECT statement.

Important:

- You can change the value of QUERY_ACCEL_OPTIONS online.
- If you use IBM Db2 Analytics Accelerator with a Db2 for z/OS data sharing group, make sure that all members of the data sharing group use the same setting for QUERY_ACCEL_OPTIONS.

Procedure

1. Add or change the listed parameters on the DSN6SPRM panel of the DSNTIJUZ sample job in your working libraries.
2. Stop Db2.
3. Submit DSNTIJUZ to assemble the new ZPARM load member.
4. Restart Db2 so that the changes can take effect.
5. Run sample queries or a test load to verify the proper functioning of Db2.

Related information:


CURRENT QUERY ACCELERATION


Subsystem parameters that are not on installation panels

Chapter 7. Setting up IBM Db2 Analytics Accelerator for z/OS

Set up the IBM Db2 Analytics Accelerator for z/OS by completing the following tasks.

Setting up a WLM application environment for IBM Db2 Analytics Accelerator

Follow the steps here to set up a suitable Workload Manager (WLM) application environment for the stored procedures of the product.

Before you begin

Make sure that the required Db2 program temporary fixes (PTF) for IBM Db2 Analytics Accelerator for z/OS support have been installed.

If you have not installed all of these components yet, follow the **Related tasks** link at the end of this section for instructions.

About this task

The following placeholders are used for specific high-level qualifiers in the steps and examples that follow. Replace these with the actual high-level qualifiers used in your system.

<HLQBASE>
HLQ for your Db2 libraries

<HLQSP>
HLQ for the IBM Db2 Analytics Accelerator stored-procedure libraries

<HLQSP>.SAQTLICI
Contains information about the deployment options that you are entitled to use:

AQTLICP
A member for IBM Db2 Analytics Accelerator on an IBM Integrated Analytics System

AQTLICZ
A member for Db2 Analytics Accelerator on Z

<HLQDb2SSN>
HLQ for Db2 subsystem-specific libraries

<HLQACTIVE>
A suggested HLQ for copies of <HLQSP>. To work on copies is recommended because these are independent of the original libraries under SMP/E control. If needed, you can create new copies from the unchanged originals.

Having completed the SMP/E *Apply* steps, the parts for the stored procedures can be found in the following libraries:

<HLQSP>.SAQTSAMP
Contains a job for the installation of the stored procedures, installation

verification jobs, sample jobs for calling stored procedures, and XML samples as input for the stored procedures.

<HLQSP>.SAQTDBRM
Contains database request modules (DBRMs) that must be bound to Db2.

<HLQSP>.SAQTMOD
Contains shared libraries and load modules for the stored procedures.

Procedure

1. Copy the <HLQSP>.SAQTMOD load-module data-set as <HLQACTIVE>.SAQTMOD for reference in your WLM procedure. Also copy the <HLQSP>.SAQTSAMP(AQTENV) member as <HLQACTIVE>.SAQTSAMP(AQTENV). This way, you can install updates on the data sets that are controlled by SMP/E under <HLQSP> without affecting your running database environment.
2. Create a separate Workload Manager (WLM) environment for the IBM Db2 Analytics Accelerator stored procedures. Use the following properties:

```
Appl Environment Name . . DSNWLMV9
Description . . . . . . . Db2 V11 default Stored Procedures for IDAA
Subsystem type  . . . . . Db2
Procedure name  . . . . . DSNWLM
Start parameters  . . . . Db2SSN=&IWMSSNM,APPLENV=DSN
. . . . . . . . . . . . . WLMV9
```

Important:

- DSNWLMV9 is an example. The value that you must enter here is the one used for the !WLMENV! placeholder in the AQTTIJSP job.
- The procedure name (in this example: DSNWLM) must match the name of the defined procedure that you use to start the WLM-managed address space.
- The task that is started by the WLM-managed address space is run under a certain user ID. An OMVS segment must be defined for this user ID.
- Do not specify a value for NUMTCB in the Start parameters section of the definition because this value takes precedence, and thus makes it impossible to set the value by running the JCL that is discussed in the next paragraph.

You might want to modify the following template, which contains a procedure for the WLM-managed address space started task. The template includes the required STEPLIB and DD names.

```
//*************************************************************
//* PROCEDURE NAME = DSNWLM
//*
//*    JCL FOR RUNNING THE WLM-ESTABLISHED STORED PROCEDURES
//*    ADDRESS SPACE
//*       RGN     -- THE MVS REGION SIZE FOR THE ADDRESS SPACE.
//*       Db2SSN  -- THE Db2 SUBSYSTEM NAME.
//*       NUMTCB  -- THE NUMBER OF TCBS USED TO PROCESS
//*                  END USER REQUESTS.
//*       APPLENV -- THE MVS WLM APPLICATION ENVIRONMENT
//*                  SUPPORTED BY THIS JCL PROCEDURE.
//*
//*       Db2VERS -- Db2-VERSION (I.E. V110)
//*                  SET BY APPLICATION ENVIRONMENT
//*                      DSNWLMV9 ==> V110
//*
//*    The user ID that is used to start the task must have
//*    read access to the <HLQs> in the STEPLIB statement
//*
//*************************************************************
//DSNWLMV9  PROC RGN=0K,APPLENV=DSNWLMV9,NUMTCB=15
```

```
//IEFPROC  EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
//         PARM='&Db2SSN,&NUMTCB,&APPLENV'
//STEPLIB  DD  DISP=SHR,DSN=<HLQDb2SSN>.SDSNEXIT
//         DD  DISP=SHR,DSN=<HLQBASE>.SDSNLOAD
//         DD  DISP=SHR,DSN=<HLQBASE>.SDSNLOD2
//         DD  DISP=SHR,DSN=<HLQACTIVE>.SAQTMOD
//SYSTSPRT DD    SYSOUT=A
//CEEDUMP  DD    SYSOUT=H
//OUT1     DD    SYSOUT=A
//UTPRINT  DD    SYSOUT=A
//DSSPRINT DD    SYSOUT=A
//SYSPRINT DD    SYSOUT=A
//AQTENV   DD    DSN=<HLQACTIVE>.SAQTSAMP(AQTENV),DISP=SHR
//AQTDEF6  DD    DSN=<HLQACTIVE>.SAQTSAMP(AQTDEF6),DISP=SHR
```

Important:

- To avoid conflicts with environment variables that are set for stored procedures of other applications, create a WLM application environment that is exclusively used by the IBM Db2 Analytics Accelerator stored procedures.

  The stored procedures occasionally use the SYSPRINT output for diagnostic messages. For example, restart attempts for DSNUTILU, which might indicate inappropriately configured workload classes, are recorded here. Make sure to define a valid destination for SYSPRINT that grants write access to all users of the stored procedures. Otherwise, authorization failures will be recorded even if SYSPRINT was not used at all.
- The IBM Db2 Analytics Accelerator stored procedures call the following Db2 for z/OS stored procedures:
  - SYSPROC.ADMIN_INFO_SYSPARM
  - SYSPROC.DSNUTILU

  In addition, the Db2 stored procedure SYSPROC.ADMIN_COMMAND_DB2 is called by the AQTTIJSP installation job and by IBM Data Studio.

  Run these Db2-supplied stored procedures in a separate WLM application environments that is not shared with the IBM Db2 Analytics Accelerator stored procedures. For more information, follow the appropriate links under **Related information**.
- If your system has more than one IP stack, you must unequivocally identify the stack that the IBM Db2 Analytics Accelerator stored procedures are supposed to use. To do so, add the following statement to the procedure that starts the address space:

  ```
  //SYSTCPD DD    DISP=SHR,DSN=<TCPIP.DATA file>
  ```

  For more information about the TCPIP.DATA data set, follow the **Related information** link at the end of this section.

  Make sure that the z/OS UNIX System Services are configured to use the same IP stack. Connectivity from UNIX System Services to the accelerator is required for diagnostic and service purposes.
- You might want to change the default settings for IBM Db2 Analytics Accelerator stored procedures, especially if you want to use parallel processing for loading tables. To do so, you must set the environment variables in the AQTENV data set accordingly.

  Notes:

  - If you must set environment variables, use the sample AQTENV data set member that came with this version of the product. Do not re-customize an older version of AQTENV because fundamental settings might have changed and using an old configuration might lead to problems.

– The value of NUMTCB must be in the range between 15 and 30 (inclusively), so as not to exceed the 31-bit memory limits of the stored procedures.

For more information, in particular about the relationship between NUMTCB and AQT_MAX_UNLOAD_IN_PARALLEL, follow the **Related reference** link at the end.

Related tasks:

"Installing libraries with IBM Db2 Analytics Accelerator support" on page 21

Chapter 5, "Installing IBM Db2 Analytics Accelerator Studio," on page 19

Related reference:

Appendix B, "Environment variables," on page 97

Related information:

Creating TCPIP.DATA

Using the DB2 command line processor

Java packages for JDBC support

DB2 11 for z/OS: DB2-supplied stored procedures and user-defined functions

Specifying how long utilities wait for resources

Setting up a WLM application environment for different product versions

To run IBM Db2 Analytics Accelerator for z/OS Version 7.1.0 (Db2 Analytics Accelerator on Z or IBM Db2 Analytics Accelerator on IBM Integrated Analytics System) and an older version side-by-side, like IBM Db2 Analytics Accelerator for z/OS Version 5.1.0 PTF-2 or later, the Workload Manager (WLM) application environment must be set up to accommodate two sets of stored procedures.

Before you begin

Make sure that the following components have been installed:

- Db2 for z/OS with the required Db2 program temporary fixes (PTFs) for both product features
- Db2 command line processor for calling and verifying the WLM environment from the local environment

  Note: The Db2 command line processor is a Java™ application that requires IBM Data Server drivers for JDBC.

If you have not installed all of these components yet, follow the **Related tasks** link at the end of this section for instructions.

About this task

The following placeholders are used for specific high-level qualifiers in the steps and examples that follow. Replace these with the actual high-level qualifiers used in your system.

<HLQBASE>
HLQ for your Db2 libraries

<HLQSP>
HLQ for the IBM Db2 Analytics Accelerator stored-procedure libraries

<HLQDb2SSN>
HLQ for Db2 subsystem-specific libraries

<HLQXML4C1>
HLQ for the XML toolkit

<HLQACTIVEV7>
A suggested HLQ for copies of the IBM Db2 Analytics Accelerator for z/OS Version 7.1.0 libraries. To work on copies is recommended because these are independent of the original libraries under SMP/E control. If needed, you can create new copies from the unchanged originals.

<HLQACTIVEV5>
A suggested HLQ for copies of the libraries for IBM Db2 Analytics Accelerator for z/OS Version 5.1.0.

Having completed the SMP/E *Apply* steps, the parts for the stored procedures can be found in the following libraries:

<HLQSP>.SAQTSAMP
Contains a job for the installation of the stored procedures, installation verification jobs, sample jobs for calling stored procedures, and XML samples as input for the stored procedures.

<HLQSP>.SAQTDBRM
Contains database request modules (DBRMs) that must be bound to Db2.

<HLQSP>.SAQTMOD
Contains shared libraries and load modules for the stored procedures.

Procedure

1. Copy the <HLQSP>.SAQTMOD load-module data-set as <HLQACTIVE>.SAQTMOD for reference in your WLM procedure. Also copy the <HLQSP>.SAQTSAMP(AQTENV) member as <HLQACTIVE>.SAQTSAMP(AQTENV). This way, you can install updates on the data sets that are controlled by SMP/E under <HLQSP> without affecting your running database environment.
2. Create a separate Workload Manager (WLM) environment for the IBM Db2 Analytics Accelerator stored procedures. Use the following properties:

```
Appl Environment Name . . DSNWLMV9
Description . . . . . . . Db2 V11 default Stored Procedures for IDAA
Subsystem type  . . . . . Db2
Procedure name  . . . . . DSNWLM
Start parameters  . . . . Db2SSN=&IWMSSNM,APPLENV=DSN
. . . . . . . . . . . . . WLMV9
```

Important:

- DSNWLMV9 is an example. The value that you must enter here is the one used for the !WLMENV! placeholder in the AQTTIJSP job.
- The procedure name (in this example: DSNWLM) must match the name of the defined procedure that you use to start the WLM-managed address space.
- The task that is started by the WLM-managed address space is run under a certain user ID. An OMVS segment must be defined for this user ID.
- Do not specify a value for NUMTCB in the Start parameters section of the definition because this value takes precedence, and thus makes it impossible to set the value by running the JCL that is discussed in the next paragraph.

You might want to modify the following template, which contains a procedure for the WLM-managed address space started task. The template includes the required STEPLIB and DD names.

Important: The STEPLIB DD statement for the Db2 Analytics Accelerator on Z libraries ([...] <HLQACTIVEV6>.SAQTMOD) must come before the statement for the IBM Integrated Analytics System libraries ([...] <HLQACTIVEV5>.SAQTMOD).

```
//*************************************************************
//* PROCEDURE NAME = DSNWLM
//*
//*    JCL FOR RUNNING THE WLM-ESTABLISHED STORED PROCEDURES
//*    ADDRESS SPACE
//*       RGN     -- THE MVS REGION SIZE FOR THE ADDRESS SPACE.
//*       Db2SSN  -- THE Db2 SUBSYSTEM NAME.
//*       NUMTCB  -- THE NUMBER OF TCBS USED TO PROCESS
//*                  END USER REQUESTS.
//*       APPLENV -- THE MVS WLM APPLICATION ENVIRONMENT
//*                  SUPPORTED BY THIS JCL PROCEDURE.
//*
//*       <HLQXML4C1.10> is the HLQ where you have installed the
//*                  XML Toolkit for z/OS//*
//*       Db2VERS -- Db2-VERSION (I.E. V910)
//*                  SET BY APPLICATION ENVIRONMENT
//*                      DSNWLMV9 ==> V910
//*
//*    The user ID that is used to start the task must have
//*    read access to the <HLQs> in the STEPLIB statement
//*
//*************************************************************
//DSNWLMV9  PROC RGN=0K,APPLENV=DSNWLMV9,NUMTCB=15
//IEFPROC  EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
//         PARM='&Db2SSN,&NUMTCB,&APPLENV'
//STEPLIB  DD  DISP=SHR,DSN=<HLQDb2SSN>.SDSNEXIT
//         DD  DISP=SHR,DSN=<HLQBASE>.SDSNLOAD
//         DD  DISP=SHR,DSN=<HLQBASE>.SDSNLOD2
//         DD  DISP=SHR,DSN=<HLQACTIVE7>.SAQTMOD
//         DD  DISP=SHR,DSN=<HLQACTIVE5>.SAQTMOD
//         DD  DISP=SHR,DSN=<HLQXML4C1.10>.SIXMLOD1
//SYSTSPRT DD    SYSOUT=A
//CEEDUMP  DD    SYSOUT=H
//OUT1     DD    SYSOUT=A
//UTPRINT  DD    SYSOUT=A
//DSSPRINT DD    SYSOUT=A
//SYSPRINT DD    SYSOUT=A
//AQTENV   DD    DSN=<HLQACTIVE>.SAQTSAMP(AQTENV),DISP=SHR
//AQTDEF6 DD    DSN=<HLQACTIVE7>.SAQTSAMP(AQTDEF6),DISP=SHR
//AQTDEFTR DD   DSN=<HLQACTIVE5>.SAQTSAMP(AQTDEFTR),DISP=SHR
```

Important:

- If you are migrating from an earlier version of IBM Db2 Analytics Accelerator for z/OS, make sure to delete the reference to the AQTOSR data set from this template or procedure. The AQTOSR data set is no longer used.
- To avoid conflicts with environment variables that are set for stored procedures of other applications, create a WLM application environment that is exclusively used by the IBM Db2 Analytics Accelerator stored procedures.

  The stored procedures occasionally use the SYSPRINT output for diagnostic messages. For example, restart attempts for DSNUTILU, which might indicate inappropriately configured workload classes, are recorded here. Make sure to define a valid destination for SYSPRINT that grants write access to all users of the stored procedures. Otherwise, authorization failures will be recorded even if SYSPRINT was not used at all.

- The IBM Db2 Analytics Accelerator stored procedures call the following Db2 for z/OS stored procedures:
  - SYSPROC.ADMIN_INFO_SYSPARM
  - SYSPROC.DSNUTILU

  In addition, the Db2 stored procedure SYSPROC.ADMIN_COMMAND_Db2 is called by the AQTTIJSP installation job and by IBM Data Studio.

  Run these Db2-supplied stored procedures in a separate WLM application environments that is not shared with the IBM Db2 Analytics Accelerator stored procedures. For more information, follow the appropriate links under **Related information**.
- If your system has more than one IP stack, you must unequivocally identify the stack that the IBM Integrated Analytics System is supposed to use. To do so, add the following statement to the procedure that starts the address space:

  ```
  //SYSTCPD DD    DISP=SHR,DSN=<TCPIP.DATA file>
  ```

  For more information about the TCPIP.DATA data set, follow the **Related information** link at the end of this section.

  Make sure that the z/OS UNIX System Services are configured to use the same IP stack. Connectivity from UNIX System Services to the accelerator is required for diagnostic and service purposes.
- You might want to change the default settings for IBM Db2 Analytics Accelerator stored procedures, especially if you want to use parallel processing for loading tables. To do so, you must set the environment variables in the AQTENV data set accordingly.

  Notes:
  - If you must set environment variables, use the sample AQTENV data set that came with this version of the product. Do not re-customize an older version of AQTENV because fundamental settings might have changed and using an old configuration might lead to problems.
  - The value of NUMTCB must be in the range between 15 and 30 (inclusively), so as not to exceed the 31-bit memory limits of the stored procedures.
  - The update transfer function of IBM Db2 Analytics Accelerator Studio only works if the value of AQT_HOST_PACKAGE_DIRECTORY has been set correctly.

  For more information, in particular about the relationship between NUMTCB and AQT_MAX_UNLOAD_IN_PARALLEL, follow the **Related reference** link at the end.

  Note: Do not use the `NUM ON` option in the ISPF editor when modifying the AQTENV data set because this makes the line numbers in the columns from 72 to 80 part of the variable value. If this has happened, an error message similar to the following one is displayed when you run the **Transfer new** function in IBM Db2 Analytics Accelerator Studio:

  ```
  The ACCEL_UPDATE_SOFTWARE procedure invoked by the "Transfer new software"
  function in the GUI returns a file open error, because a line number
  (here: 00360003) was considered part of the file path name:

  AQT10206I - The OPEN operation on the
  "/SYSTEM/local/dwatest/swupdate_smpe 00360003/usr/lpp/aqt/packages" file,
  data set or pipe failed . Diagnostic information: Errno is 129
  ```

Related tasks:

"Installing libraries with IBM Db2 Analytics Accelerator support" on page 21
Chapter 5, "Installing IBM Db2 Analytics Accelerator Studio," on page 19
Related reference:
Appendix B, "Environment variables," on page 97
Related information:

- Creating TCPIP.DATA
- Using the DB2 command line processor
- Java packages for JDBC support
- DB2 11 for z/OS: DB2-supplied stored procedures and user-defined functions
- Specifying how long utilities wait for resources

Verifying the correct setup of Db2-supplied stored procedures

The Db2 for z/OS stored procedures SYSPROC.ADMIN_INFO_SYSPARM, SYSPROC.DSNUTILU, and SYSPROC.ADMIN_COMMAND_Db2 must run in different Workload Manager (WLM) environments that are separate from the one used by the IBM Db2 Analytics Accelerator stored procedures. Verify that this and a few other requirements are met by following the steps here.

Procedure

1. Verify that each Db2-supplied stored procedure, SYSPROC.ADMIN_INFO_SYSPARM, SYSPROC.DSNUTILU and SYSPROC.ADMIN_COMMAND_DB2, runs in a different WLM environment.
2. Make sure that NUMTCB is set to 1 (`NUMTCB=1`) for the SYSPROC.ADMIN_INFO_SYSPARM and SYSPROC.DSNUTILU WLM environments.
3. In the start-up JCL job for the WLM environment for SYSPROC.DSNUTILU, use the MNSPAS parameter. Set the parameter to a value that matches the maximum number of table partitions that are to be loaded in parallel. Set the value at least to 10, but to no more than 50. Mind that the number of parallel load operations (simultaneous runs of the SYSPROC.ACCEL_LOAD_TABLES stored procedure) and the maximum number of simultaneous unload operations per stored procedure call (determined by the AQT_MAX_UNLOAD_PARALLEL environment variable) influence the total number of parallel DSNUTILU calls.
4. Verify that all WLM environments include the following libraries in their STEPLIB statements:

```
//STEPLIB  DD  DISP=SHR,DSN=<HLQDb2SSN>.SDSNEXIT
//         DD  DISP=SHR,DSN=<HLQBASE>.SDSNLOAD
//         DD  DISP=SHR,DSN=<HLQBASE>.SDSNLOD2
```

Related information:

- DB2 11 for z/OS: DB2-supplied stored procedures and user-defined functions

Defining WLM performance goals for IBM Db2 Analytics Accelerator for z/OS stored procedures

It is important to define Workload Manager (WLM) performance goals in such a way that the WLM service class for the IBM Db2 Analytics Accelerator for z/OS stored procedures can provide a sufficient number of additional WLM address spaces in a timely manner when needed.

About this task

IBM Db2 Analytics Accelerator for z/OS stored procedures are called from a remote graphical user interface. This requires that a sufficient number of address spaces is available or can be started with minimum delay. To ensure such conditions, the goals of the service class for DDF transactions must be defined accordingly. Under favorable conditions, the starting of an address space takes two seconds. Under good conditions, this action takes about 10 seconds. However, if the workload is very high, the time needed to start an address space can be considerably longer.

Procedure

1. Classify your DDF transactions explicitly.
2. Assign the DDF transactions to a WLM service class.
3. Make sure that the performance objectives of this service class are in accordance with the objectives for the rest of the workload on your system. The service class for IBM Db2 Analytics Accelerator for z/OS stored procedures must have at least medium priority.

   Important: If classification rules do not exist to classify some or all of your DDF transactions into service classes, the unclassified transactions are assigned the SYSOTHER service class. This service class has no performance goal and is even lower in priority than a service class with a discretionary goal.
4. Assign the address spaces for the stored procedures to a separate service class for started tasks (STC). This ensures that the address spaces can be started before DDF transactions (stored procedures) start running. For more information, read Setting performance objectives for distributed workloads by using z/OS Workload Manager in the IBM Knowledge Center.

Adjusting WLM performance goals for SYSPROC.ACCEL_LOAD_TABLES

The SYSPROC.ACCEL_LOAD_TABLES stored procedure is a special case because it starts one or more instances of the SYSPROC.DSNUTILU stored procedure (the Db2 Unload Utility) in turn. To start these procedures without delay, you must classify their workload accordingly.

About this task

By default, all DDF transactions are assigned to the SYSOTHER service class. The priority of this service class is too low. The WLM would delay or even prevent the parallel start of nested calls of the Db2 Unload Utility.

In addition, special attention is required if one or all of the following conditions apply:

- Logical Partition (LPAR) CPU capping is active

- Million-of-service-units (MSU) capping is active

In all of these cases, you will see a performance degradation with regard to the SYSPROC.ACCEL_LOAD_TABLES stored procedure and possibly other IBM Db2 Analytics Accelerator for z/OS stored procedures. With SYSPROC.ACCEL_LOAD_TABLES, you might also run into `SQLCODE = -471 E790002` errors. This indicates that the time limit defined at installation time expired before the WLM could assign the request to a TCB in the address space for SYSPROC.DSNUTILU.

To avoid load processes that do not run to completion, adjust the WLM service class definitions or adjust the values of the following IBM Db2 Analytics Accelerator for z/OS environment variables:

AQT_MAX_UNLOAD_IN_PARALLEL
Decrease the value of this variable to reduce performance requirements

AQT_MAX_RETRIES_DSNUTILU
Increase the value of this variable to reduce performance requirements

AQT_SECONDS_BEFORE_RETRY_DSNUTILU
Increase the value of this variable to reduce performance requirements

Classifying the DDF workload for remote invocations of SYSPROC.ACCEL_LOAD_TABLES

To call the SYSPROC.ACCEL_LOAD_TABLES stored procedure from a remote environment, such as IBM Db2 Analytics Accelerator Studio, you must explicitly classify your DDF workload.

Procedure

1. Create an additional classification rule with the PR attribute, for example by creating a sub-rule to an already existing default rule.
2. To this classification rule, assign a service class with *medium-to-high* priority.

Example

In the following example, a sub-rule is assigned to an existing rule with the name DDFLOAD. The DDFLOAD service class already has medium-to-high priority. The name of the sub-rule is ACCEL_L*, which ensures that the sub-rule is applied when a stored procedure is invoked whose name starts with ACCEL_L, just like SYSPROC.ACCEL_LOAD_TABLES.

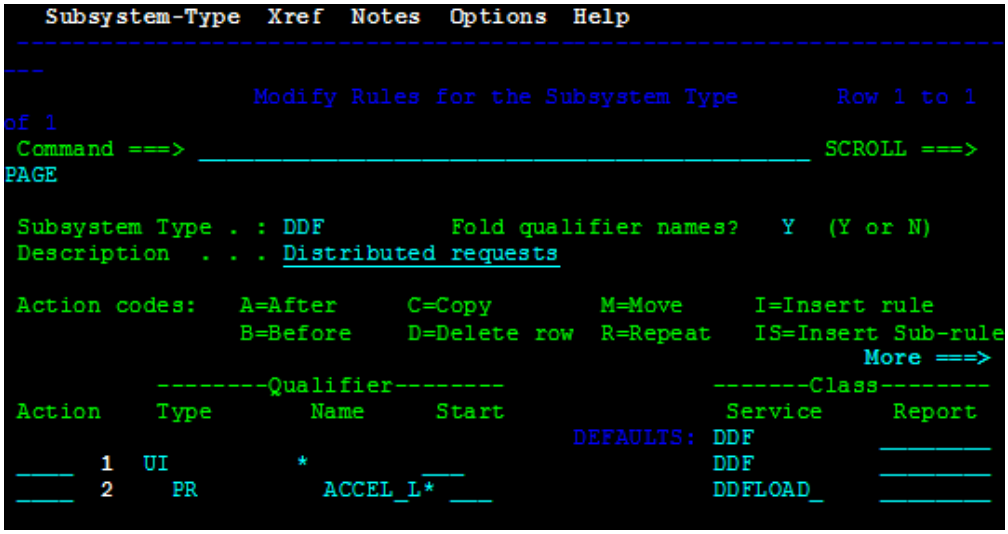


Figure 5. Assigning a medium-to-high priority service class to the SYSPROC.ACCEL_LOAD_TABLES stored procedure in the WLM ISPF application

Classifying the workload for local invocations of SYSPROC.ACCEL_LOAD_TABLES

If the SYSPROC.ACCEL_LOAD_TABLES stored procedure is called from a local z/OS environment, you must also ensure that a service class with medium-to-high priority is assigned to this stored procedure.

Example

If you call the SYSPROC.ACCEL_LOAD_TABLES stored procedure from an application that is part of a batch process, and your TSO batch (JES) workload is assigned a service class with medium priority, you must create an additional classification rule that assigns a service class with medium-to-high priority to the batch jobs. (The batch jobs invoke the application that calls the SYSPROC.ACCEL_LOAD_TABLES stored procedure.)

Setting access rights for the user who runs AQTTIJSP

The main job for the installation of the stored procedures is AQTTIJSP. You must submit this job in a later step. The ID of the user who runs this job needs SYSADM authority. Make sure that this is the case.

Customizing and running AQTTIJSP

Customize the AQTTIJSP job member (JCL) for the installation of IBM Db2 Analytics Accelerator stored procedures before you run the job.

Before you begin

- Make sure that you have already created the IBM Db2 Analytics Accelerator database and tables by running the DSNTIJAS job.
- Make sure that the Workload Manager (WLM) application environment has been started. You can check this by running the following command from the TSO or ISPF command line:

  ```
  DISPLAY WLM,APPLENV=<env_name>
  ```

where <env_name> is the name of the WLM application environment that you configured for the IBM Db2 Analytics Accelerator stored procedures.

To enter this command from the ISPF primary menu, follow these steps:

1. Enter SD for System Display and Search Facility.
2. At the COMMAND INPUT prompt, enter /.
3. On the System Command Extension panel, type the **DISPLAY WLM,APPLENV=<env_name>** command next to one of the ===> prompts.
4. Press Enter.

Procedure

1. Replace the Db2 subsystem name and the other placeholders with the actual names as described in the customization notes within the AQTTIJSP job member.

   Important: The hyphen (-) is not a placeholder. Therefore, do not replace it with the name of a WLM environment in clauses like 'WLMENV(-)'. Replacing a hyphen in this way leads to SQL error -628 during the execution of the AQTTRIN job step. The actual placeholders are strings that start and end with an exclamation mark (!).
2. Review and optionally update the GRANT statements to conform to the authorization policy at your site.
3. Recommendation: Copy the AQTTIJSP job to complete the following steps on the copy.
4. Modify AQTTIJSP according to the instructions in the job.
   - If you want install new versions of the database objects, keep the value INSTALL for the MODE parameter in job step AQTTRIN.
   - If you just want to see the SQL statements that would be executed, but do not want to run these statements, change the value of the MODE parameter to INSTALL-PREVIEW or REINSTALL-PREVIEW. The JCL is then copied to the data set that is specified in the JCLOUT DD statement, but not executed.
   - If IBM support requests a trace file of the installation program, uncomment the following lines or blocks of code in the JCL:

     AQTTRACE
     Uncomment this step to allocate a trace data set.

     AQTTRACE DD
     Uncomment this statement in the AQTTRIN step to activate tracing.
5. Verify that you have created all required IBM Db2 Analytics Accelerator databases and tables before you submit the job. That is, check whether the DSNTIJAS job has been run successfully.
6. Submit the customized AQTTIJSP job.

Related tasks:

"Creating the IBM Db2 Analytics Accelerator database" on page 22

Verifying the installation of IBM Db2 Analytics Accelerator for z/OS stored procedures

An installation verification step is part of running the AQTTIJSP job. The following steps are relevant only if you encountered errors during the execution of AQTTIJSP. To verify the installation after the surfacing of AQTTIJSP errors, customize the AQTSJI00 job member (JCL) and run it.

Before you begin

Make sure that the user who will run AQTSJI00 has the privileges to read the following tables:
- Db2 catalog tables
- SYSACCEL.SYSACCELERATORS
- SYSACCEL.SYSACCELERATEDTABLES

About this task

To verify the installation of the stored procedures, you do not need a connection to IBM Db2 Analytics Accelerator for z/OS. The verification consists of the following steps:
- Collecting information about the environment and the setup
- Verifying that required Db2 stored procedures can be called
- Verifying that IBM Db2 Analytics Accelerator for z/OS stored procedures can be called in *versionOnly* mode.

Procedure

1. In the AQTSJI00 JCL, replace all instances of `DSN!!0` with the name of the library that contains SDSNLOAD.
2. Replace all instances of `DSNTEP!!` with the name of the plan of the DSNTEPx sample program.
3. Replace all instances of `!DSN!` with the name of the Db2 subsystem in which to run the IBM Db2 Analytics Accelerator for z/OS stored procedures.
4. Submit the AQTSJI00 JCL by running SAQTSAMP(AQTSJI00).

Results

The job returns the following information:
- The contents of the SYSACCEL.SYSACCELERATORS table.

  If the job was run immediately after the installation, the SYSACCEL.SYSACCELERATORS table is shown, but it does not contain entries for accelerators.

  If the job was run later to collect diagnostic information, the SYSACCEL.SYSACCELERATORS table lists all defined accelerators.
- Does the Db2 Communication Database (CDB) exist?
- Do the following tables exist?
  - ACCEL_NAMES
  - ACCEL_QUERY_INFO
  - ACCEL_TRACE_ACCELERATOR
- Have all stored procedures been defined that are used or provided by IBM Db2 Analytics Accelerator for z/OS, and if so, what are their run options (RUNOPTS) and Workload Manager (WLM) settings?

What to do next

Save the job output. It contains important information that might be required to solve installation problems.

Related reference:

Appendix A, “Members of SAQTSAMP,” on page 93

Chapter 8. Installing Db2 Analytics Accelerator on Z

This chapter deals with the definition of a logical partition (LPAR) for and the configuration of Db2 Analytics Accelerator on Z.

Restriction: Currently, Db2 Analytics Accelerator on Z is available only in connection with an IBM z14.

Architecture

Figure 6 shows what major components the product consists of and how it fits into an existing IBM Z environment. The block that represents Db2 Analytics Accelerator on Z has a pink shading to set it off from the existing IBM Z environment, which has a light blue shading.

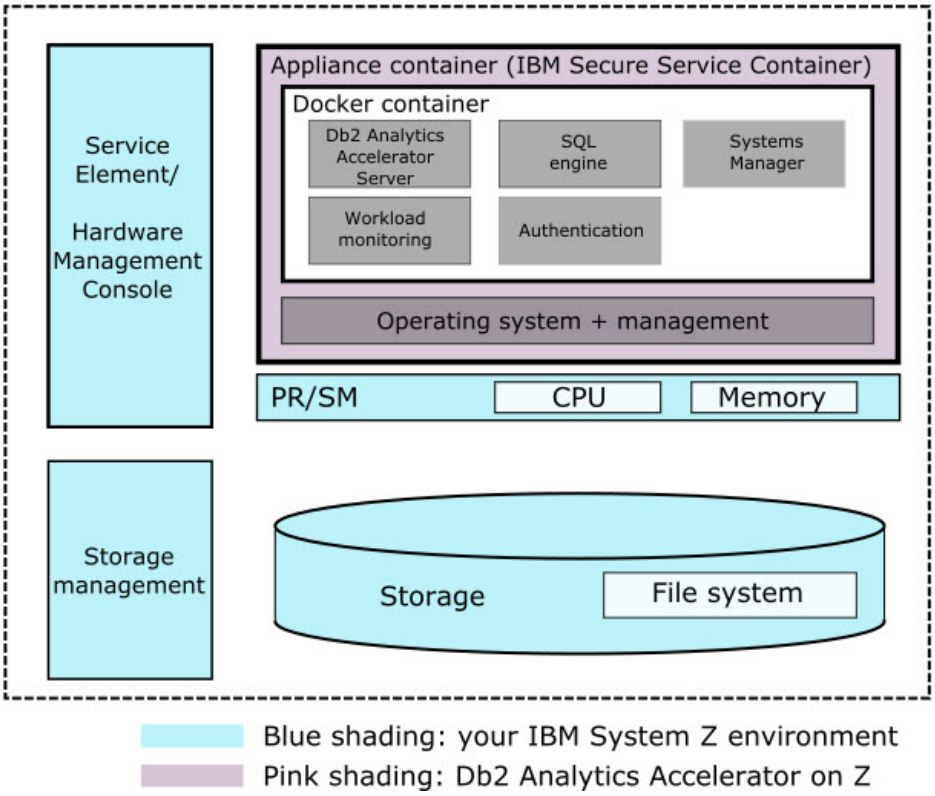


Figure 6. Architecture

Defining an LPAR for Db2 Analytics Accelerator on Z

Define a new, dedicated LPAR for Db2 Analytics Accelerator on Z from the Hardware Management Console (HMC).

Procedure

1. Open the Hardware Management Console (HMC) of your IBM Z.
2. Go to the Partitions tab.

3. Right-click a not yet activated partition (LPAR) and select **Operational Customization** > **Customize/Delete Activation Profiles**.

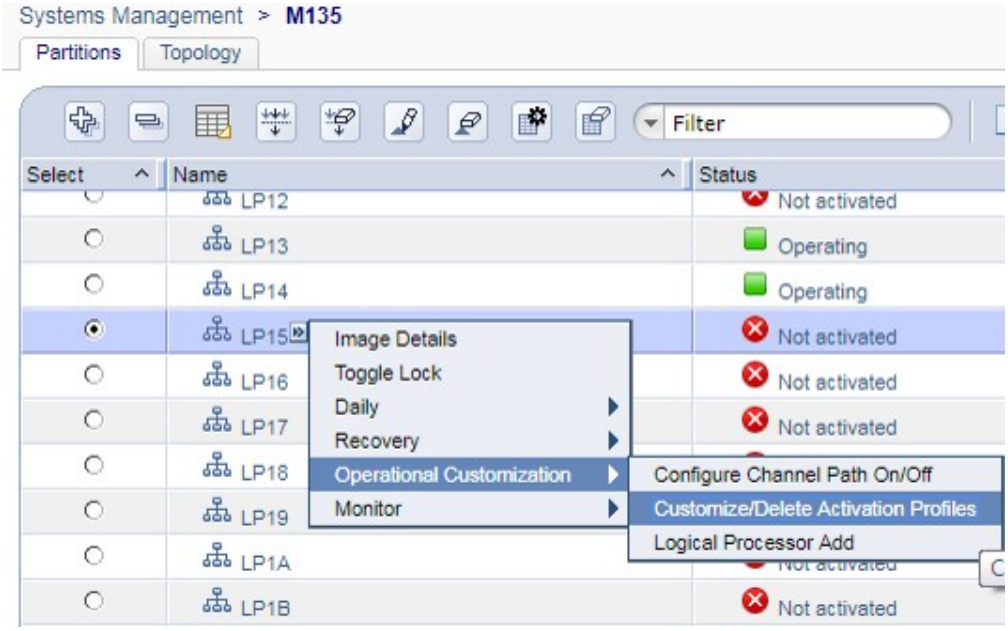


Figure 7. The Partitions window of the HMC

4. In the **General** section of the Customize Image Profiles window, select **Mode** > **SSC**. You might want to add a description for the profile in the **Description** field.

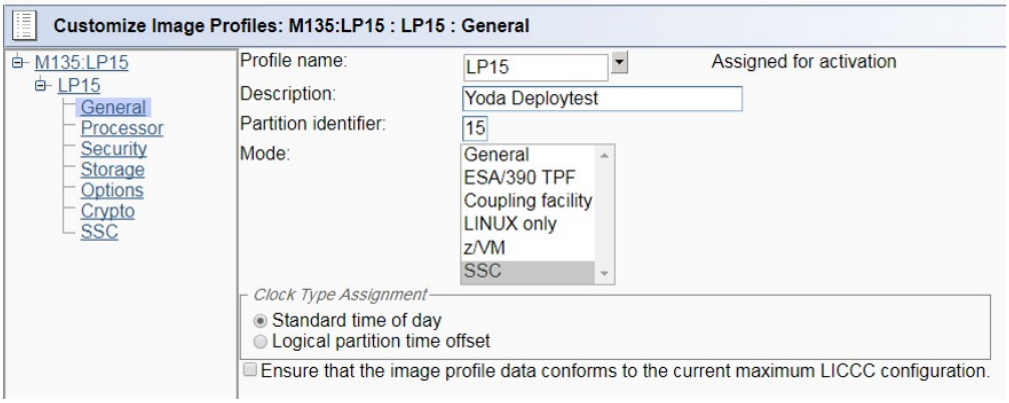


Figure 8. The Customize Image Profiles window of the HMC

5. In the navigation tree on the left, click **SSC** to go to that section.
6. In the Configure Management Network window, provide the following details:

Option	Description
CHPID	According to your environment, for example `10`
Port	**0**
VLAN ID	Any available ID

Option	Description
IP address type	**Static IPv4**
IP address	A valid, available IP address
Mask	22

7. Click **OK**. The SSC section looks as follows:

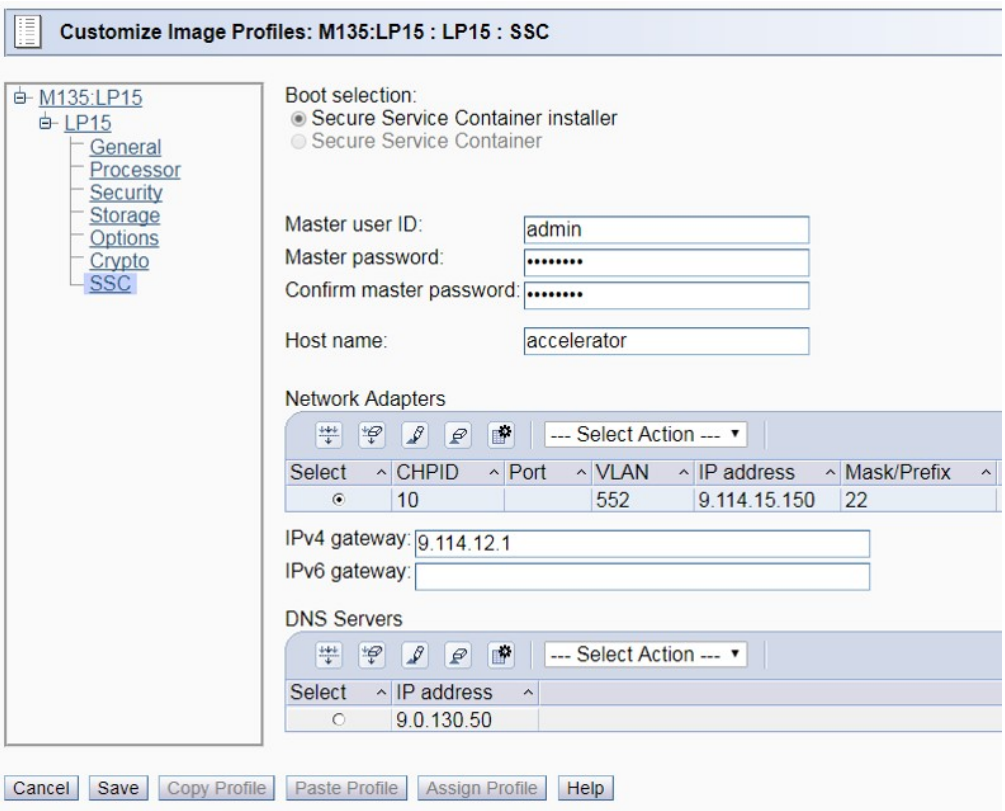


Figure 9. SSC network adapter details on the HMC

8. Provide a **Master user ID** and a **Master password**. You will need this later when you start the Appliance Installer.to configure and start the appliance (accelerator).
9. Click **Save**. You return to the Partitions tab.
10. Right-click the LPAR again. This time, select **Daily** > **Activate**. The system confirms the activation by displaying a window labeled Operating System Messages:

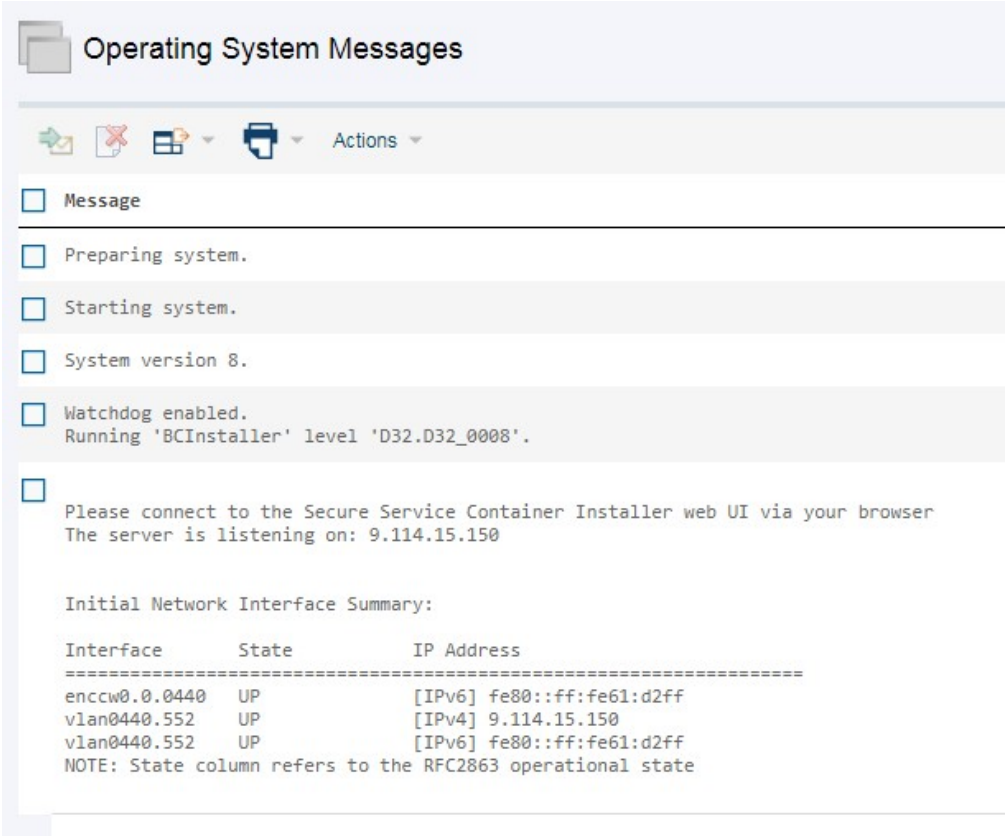


Figure 10. Confirmation: Operating System Messages

Installing and starting the appliance

The step after the LPAR definition for Db2 Analytics Accelerator on Z is the installation of the appliance.

Procedure

1. Open the Appliance Installer in a web browser. Enter the IPv4 address of the Secure Service Container (SSC) LPAR (see Figure 9 on page 43)
2. On the Login page, log in with the **Master user ID** and **Master password** that you specified as you defined the SSC LPAR. (see Figure 9 on page 43) At the very first logon, your browser displays a certificate warning like the following:

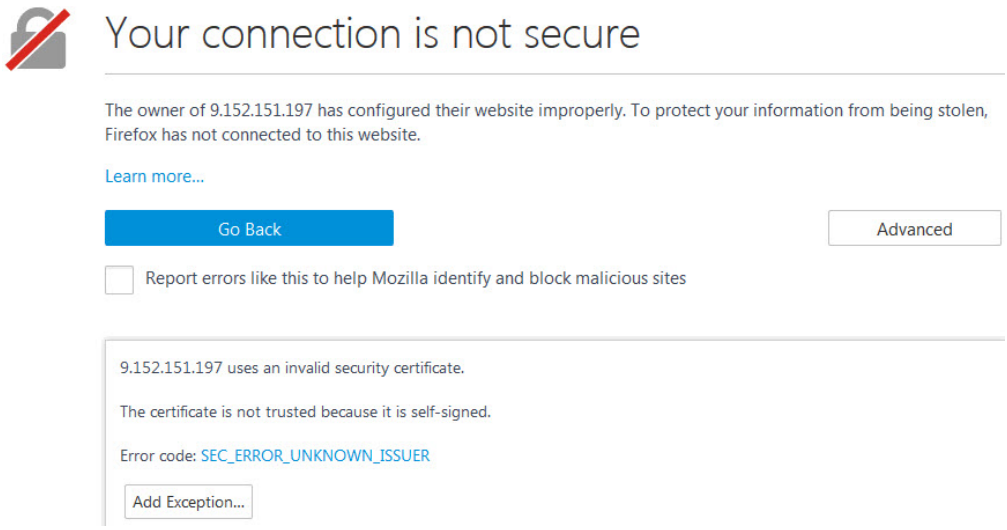


Figure 11. Browser certificate warning

This is because valid certificates require a trusted issuer (certificate authority or CA) and must have been defined before the domain is accessed. The Appliance Installer uses a non-trusted, self-signed certificate because specific customer domains are not known at the time the certificate is being created.

3. Click **Add Exception** (or whatever this button might be labeled in your browser) to accept the certificate and permit the connection.
4. If you use the Appliance Installer for the first time, you see the License Agreement Page. Click **I Agree** to continue.
5. On the Install Software Appliance page, upload the package (compressed file) that contains the appliance. Click **Browse** to navigate to the proper file on your local workstation.
6. Select the target disk from the **Target Disk on Server** drop-down list. The disk must be reachable from the previously defined LPAR. You page should look similar to the following:

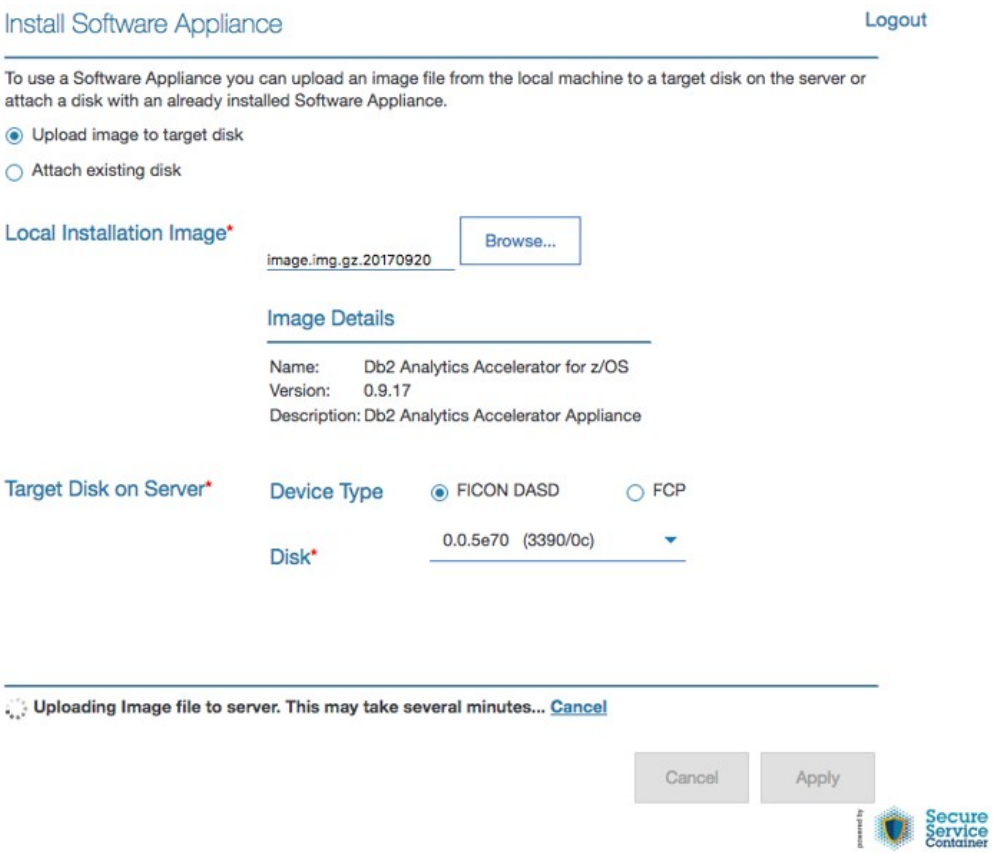


Figure 12. The Install Software Appliance window of the Appliance Installer

7. When finished, click **Apply**.
8. In the Confirm Appliance Installation window, leave the **Reboot automatically ...** check box selected and click **Yes**. After a successful completion of the installation, you see the Login page of the appliance user interface.
9. Enter your **Master user ID** and **Master password** once more to log in.
10. On the Welcome page, click **First-Time Setup**. The following page is displayed:

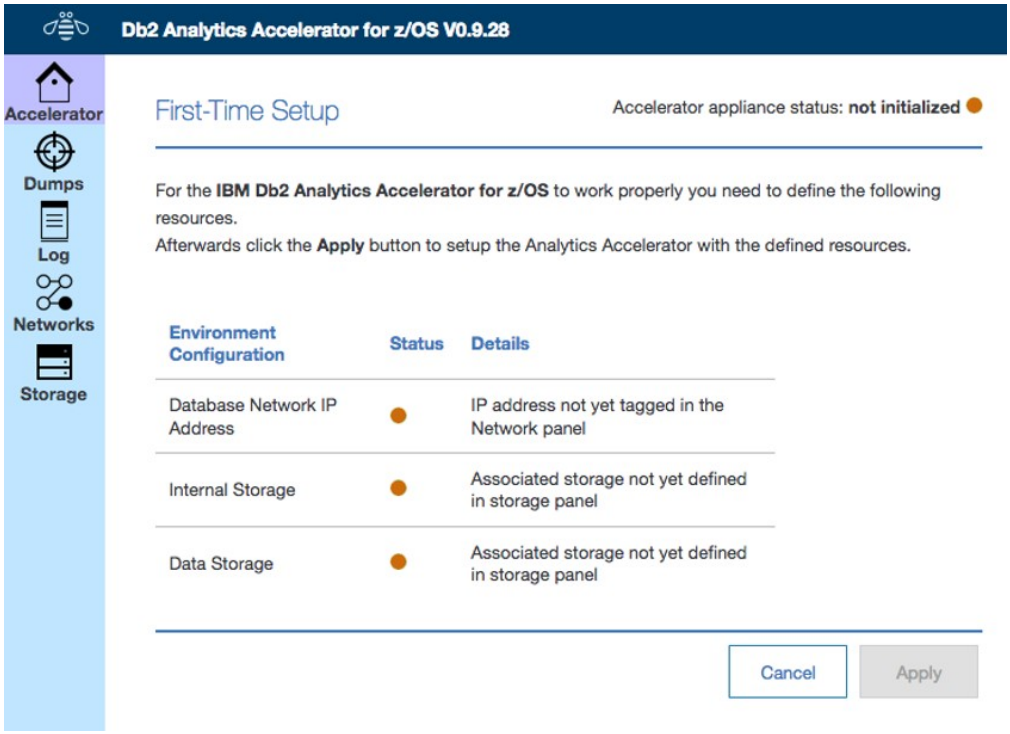


Figure 13. The First-Time Setup page of the Appliance Installer

11. In the navigator on the left, click **Networks** to show the Network Connections page.
12. Add a network connection based on the defined network interfaces. At least one interface has been defined during the LPAR setup (see . Additional connections (also VLAN connections) can be defined here. There can only be one interface which Db2 Analytics Accelerator on Z uses to connect to one or multiple Db2 subsystems. This network interface has to be "tagged" with the name `DB2`. To do so, select the network connection in the list, edit it (pencil icon), and change its name to `DB2`. The display on the Networks Connection page should look like this:

Figure 14. The Network Connections page of the appliance user interface

13. Click **Apply**.

14. In the Confirm Add Disk window, you see a message saying that several disks are about to be formatted and you are asked for confirmation. Click **Yes** to continue. Disk formatting takes between 10 and 15 minutes. When finished, the Storage Disks By Storage Pool page is displayed. You see the newly formatted disks listed under the heading **Appliance Data Pool**:

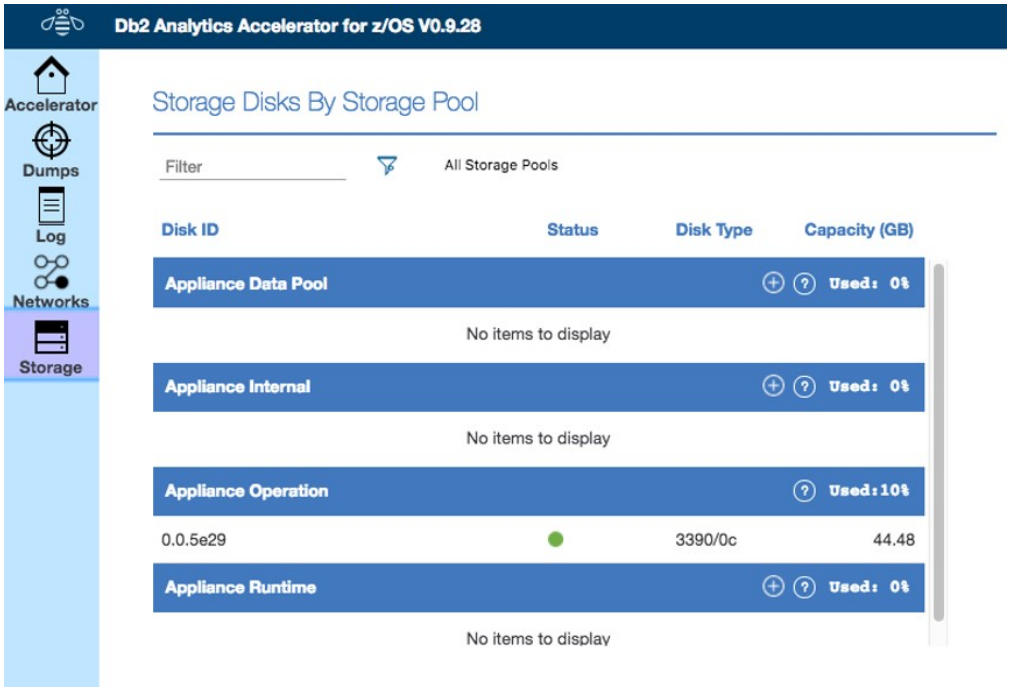


Figure 15. The Storage Disks by Storage Pool page of the appliance user interface

15. After specifying network and storage, click **Accelerator** in the navigation bar on the left. You can see that the display of the First-Time Setup page has changed. It now shows entries for the configured data network and the storage devices:

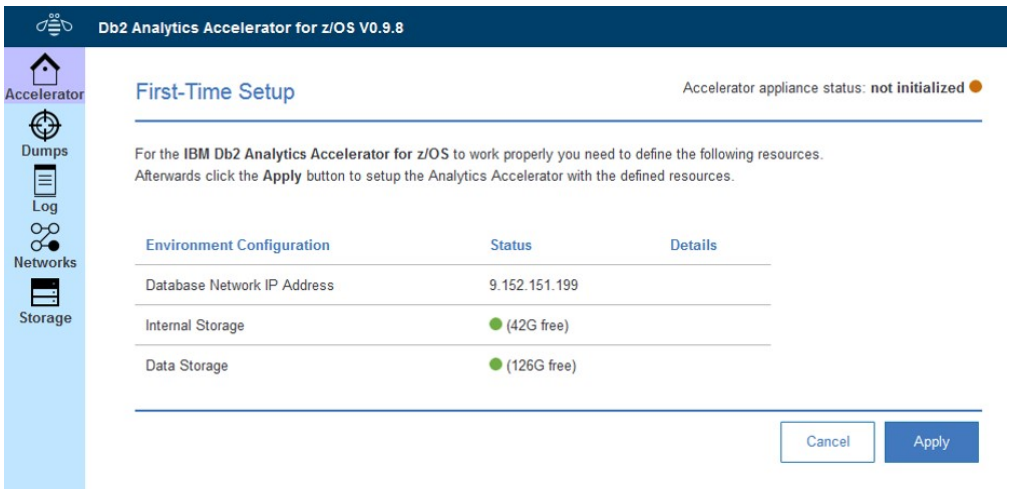


Figure 16. The First-Time Setup window after network and storage configuration

16. Check the information on the page. If it is correct, click **Apply**.

a. You see a message informing you that the appliance is initializing. The initialization takes about 20 minutes.
b. After that, you see another message saying that the appliance is starting. This takes another 20 minutes.

Results

When these processes have finished, the First-Time Setup page is displayed automatically. The page should now give you the following information:

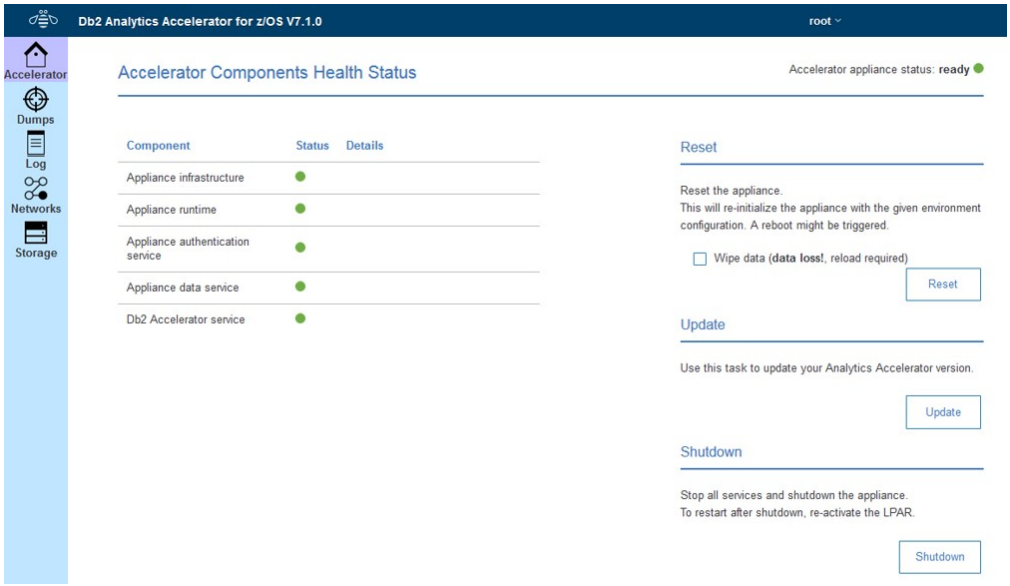


Figure 17. The final view of the First-Time Setup page

The message `Accelerator appliance status: ready` on the top right indicates that Db2 Analytics Accelerator on Z can now be paired with a Db2 subsystem.

Chapter 9. Connecting IBM Db2 Analytics Accelerator for z/OS and Db2

For security reasons, communication between a Db2 subsystem and an accelerator requires an authentication of the Db2 subsystem. Follow the steps here to enable communication between these components.

Access rights

The various IBM Db2 Analytics Accelerator for z/OS components require different authorizations. Which authorizations a user requires depends on the role that this user has to play. However, in nearly all cases, the rights that users need go beyond the obvious. Unfortunately, this information unit cannot list the required authorizations for all conceivable roles. It therefore restricts itself to two sets of authorizations, one that restricts access to the absolute minimum, and one that gives a user total access to all components (power user).

Access rights for power users

The various IBM Db2 Analytics Accelerator for z/OS components require different authorizations. It is useful to create at least one power user with extensive authorizations, that is, a user who can run all IBM Db2 Analytics Accelerator for z/OS functions and thus control all components. This section lists the required Db2, RACF, and file-system authorizations for such a power user. In subsequent chapters of this manual, it is expected that the required authorizations have already been granted.

If you want to create users who are permitted to run particular stored procedures only, look up the stored procedures in question in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures and Reference*.

Attention: Do not give ordinary users SELECT authorization on the SYSIBM.USERNAMES table because this allows the users to see the authentication information in the SYSIBM.USERNAMES.NEWAUTHID column.

Required power-user authorizations in Db2 for z/OS

A power user requires the following authorizations in Db2 for z/OS:

- EXECUTE on the SYSPROC.* stored procedures
- EXECUTE on the DSNAQT.* functions
- EXECUTE on the SYSACCEL.* packages
- MONITOR1 privilege (needed to call the ADMIN_INFO_SYSPARM stored procedure internally)
- TRACE privilege
- DISPLAY privilege
- SYSOPR authorization to start and stop accelerators
- Authorization to run the ACCESS DB command on the databases that the tables reside in (needed to refresh Db2 real-time statistics)

Required z/OS power-user access rights

A power user requires the following access rights in RACF and in the z/OS UNIX file system (zFS):

- An OMVS segment is required for the user ID.
- Write access to the `/tmp` directory (UNIX System Services pipes are created in this directory).
- Read access to `/usr/lpp/IBM/aqt/V7R1M0` and all of its subdirectories.

Db2 for z/OS power-user authorizations for IBM Db2 Analytics Accelerator Studio

You might want to enable your power user to run IBM Db2 Analytics Accelerator Studio. If so, give the power user the following authorizations in Db2 for z/OS:

- SELECT on the DSNAQT.ACCEL_NAMES view. This privilege is required for the enumeration of accelerators.
- SELECT on the SYSACCEL* tables. This privilege is required to associate the tables with an accelerator pairing code.
- SELECT on the following catalog tables of the database management system:
  - SYSIBM.SYSCOLUMNS
  - SYSIBM.SYSCONTROLS
  - SYSIBM.SYSDATABASE
  - SYSIBM.SYSDUMMY1
  - SYSIBM.SYSINDEXES
  - SYSIBM.SYSRELS
  - SYSIBM.SYSTABLEPART
  - SYSIBM.SYSTABLES
  - SYSIBM.SYSVIEWS

  Read access to these tables is required for the creation of accelerator-shadow tables and the calculation of the overall table size.

Minimum access rights

A user might only be required to view information about an accelerator, the accelerator-shadow tables on the accelerator and their status, or the query history. Such a user needs only minimal access rights. See which access rights such a user requires.

If you want to create users who are permitted to run particular stored procedures only, look up the stored procedures in question in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures and Reference*.

Attention: Do not give ordinary users SELECT authorization on the SYSIBM.USERNAMES table because this allows the users to see the authentication information in the SYSIBM.USERNAMES.NEWAUTHID column.

Required minimum authorizations in Db2 for z/OS

A read-only user requires the following authorizations in Db2 for z/OS:

- EXECUTE on the SYSACCEL.* packages
- EXECUTE on the following functions:
  - DSNAQT.ACCEL_READFILE3
  - DSNAQT.ACCEL_GETVERSION
  - DSNAQT.ACCEL_CONTROL_GETACCELERATORINFO

- EXECUTE on the SYSPROC.ADMIN_INFO_SYSPARM stored procedure
- MONITOR1 privilege (needed to call the SYSPROC.ADMIN_INFO_SYSPARM stored procedure internally)
- DISPLAY privilege

Minimum Db2 for z/OS authorizations for IBM Db2 Analytics Accelerator Studio

You might want to enable your power user to run IBM Db2 Analytics Accelerator Studio. If so, give the power user the following authorizations in Db2 for z/OS:

- EXECUTE on the following IBM Db2 Analytics Accelerator stored procedures:
  - SYSPROC.ACCEL_TEST_CONNECTION
  - SYSPROC.ACCEL_CONTROL_ACCELERATOR
  - SYSPROC.ACCEL_GET_QUERY_DETAILS2
  - SYSPROC.ACCEL_GET_QUERY_DETAILS
  - SYSPROC.ACCEL_GET_QUERIES2
  - SYSPROC.ACCEL_GET_QUERIES
  - SYSPROC.ACCEL_GET_TABLES_INFO
  - SYSPROC.ACCEL_GET_TABLES_DETAILS
- SELECT on the DSNAQT.ACCEL_NAMES view. This privilege is required for the enumeration of accelerators.
- SELECT on the SYSACCEL.SYSACCELERATEDTABLES table.
- SELECT on the following catalog tables of the database management system:
  - SYSIBM.SYSCOLUMNS
  - SYSIBM.SYSCONTROLS
  - SYSIBM.SYSDATABASE
  - SYSIBM.SYSDUMMY1
  - SYSIBM.SYSRELS
  - SYSIBM.SYSTABLEPART
  - SYSIBM.SYSTABLES
  - SYSIBM.SYSVIEWS

  Read access to these tables is required for the calculation of the overall table size.

Binding Db2 packages and granting user privileges

To enable access to Db2 for z/OS from IBM Db2 Analytics Accelerator for z/OS, IBM Data Studio, or IBM Optim™ Query Tuner, you must create and bind certain Db2 packages and grant the EXECUTE privilege to the users of these applications.

About this task

The user ID under which the bind task is carried out automatically gains the EXECUTE privilege on the packages. However, at this stage, this is the only user having this privilege. Other users who run IBM Db2 Analytics Accelerator Studio or IBM Optim Query Tuner require the EXECUTE privilege as well. The creator or binder must therefore grant the EXECUTE privilege to the others users.

Note: The IBM Optim Query Tuner functions for single query tuning and Visual Explain (access plan graph) have been integrated into the IBM Data Studio, which serves as the basis for IBM Db2 Analytics Accelerator Studio. These modules can be used to compare the Db2 access plans with and without an accelerator, a functionality which allows you to see whether a query can be accelerated.

Procedure

1. To create and bind the Db2 packages, follow the instructions on this website:

   https://www.ibm.com/support/knowledgecenter/SS62YD_3.1.1/com.ibm.datatools.qrytune.configothers.doc/topics/enabledb2zfromclient_ds.html
2. To grant the EXECUTE privilege to other users, proceed as follows:
   a. Select **Analyze and Tune** > **Configure for Tuning** > **Advanced Configuration and Privilege Management** as described on the following website:

      https://www.ibm.com/support/knowledgecenter/SS7L9Q_4.1.0/com.ibm.datatools.qrytune.workloadtune.doc/topics/verify.html
   b. Click **Manage Package Privileges** to display and modify the authorization IDs that can execute the tuning packages.

Creating EXPLAIN tables

To be able to display an access plan graph of your queries (accelerated or not) in IBM Db2 Analytics Accelerator Studio, you must create certain EXPLAIN tables in the Db2 subsystems that you use.

About this task

The instructions on the following web pages were originally written for IBM Query Tuner. However, the steps can be applied to IBM Db2 Analytics Accelerator Studio likewise.

Procedure

1. To create the basic EXPLAIN tables, follow these the instructions on this web page:

   http://www.ibm.com/support/knowledgecenter/SS62YD_4.1.1/com.ibm.datatools.qrytune.configothers.doc/topics/db2z_configure_ds.html

In addition to these, you need an EXPLAIN table called DSN_QUERYINFO_TABLE. This table is described here:

http://www.ibm.com/support/knowledgecenter/SSEPEK_10.0.0/com.ibm.db2z10.doc.perf/src/tpc/db2z_dsnqueryinfotable.dita

2. To create it, you find a suitable CREATE TABLE statement in the DSNTESC member of the SDSNSAMP library. You can also copy the sample DDL statements in the appendix of the *IBM Db2 Analytics Accelerator Studio: User's Guide*.

Creating a database connection profile

Create a database connection profile to gain access to a Db2 subsystem on a database server. A Db2 subsystem houses one or more databases, in which the source data for query acceleration (schemas and tables) is kept. To authenticate the Db2 subsystem to IBM Db2 Analytics Accelerator for z/OS, you must start the Add New Accelerator wizard. However, you can only start this wizard after connecting to a Db2 subsystem.

About this task

In IBM Db2 Analytics Accelerator Studio, the connection information is stored in profiles for reuse. Having created a profile, you can reconnect to a database by

double-clicking the icon representing the profile in the Administration Explorer.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. If the Welcome screen is displayed, close it.
3. On the header of the Administration Explorer on the left, click the downward-pointing arrow next to **New** and select **New Connection to a Database**.
4. In the New Connection window, decide how to name the database connection profile:
   - To use the name of the database server that you want to connect to, leave **Use default naming convention** selected.
   - To choose a different name, clear **Use default naming convention**, and type the name in the **Connection Name** field.
5. From the **Select a database manager** list, select **Db2 for z/OS**.
6. Make sure that in the **JDBC driver** drop-down list, **IBM Data Server Driver for JDBC and SQLJ (JDBC 4.0) Default** is selected.
7. In the **Location** field, type the name of the database server that you want to connect to.

   Tip: To determine the **Location**, **Host** name, and **Port number**, a Db2 for z/OS systems programmer or database administrator can issue a `DIS DDF` command.
8. In the **Host** field, type the host name or IP address of the data server on which the database server is located.
9. In the **Port number** field, you see that port number `446` is selected by default. Leave this setting unless the database server uses another port.
10. Select **Retrieve objects created by this user only** if you want to restrict database access to the databases, schemas, tables, and other objects that were created by the logon user. If you do not select this option (default), IBM Db2 Analytics Accelerator Studio will show and make selectable all databases, schemas, and tables that the logon user has access to, including those to which this user might have only read access.
11. In the **User name** field, type the user ID that you want to use to log on to the database server. Note that you can only use IBM Db2 Analytics Accelerator Studio successfully if this user has sufficient rights to run the stored procedures behind the IBM Db2 Analytics Accelerator Studio functions. The section *Appendix C. Required access rights* in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference* lists the privileges that are required to run a particular stored procedure. If you are uncertain, use an ID with SYSADMIN authority.

    In many organizations, it is a common practice to have personal user IDs with restricted authority and special-purpose user IDs (groups in most cases) with extensive privileges in a certain field. IBM Db2 Analytics Accelerator Studio supports this practice in that you can specify a secondary user ID, which might have the privileges that your logon user ID lacks, such as the privilege to run stored procedures. If the secondary ID is a group user ID, the logon user must of course be a member of that group. To specify a secondary user ID, follow these steps:

    a. On the Connection Parameters page, click the **Optional** tab.
    b. In the **Property** field, type the following statement:
       `currentSQLID`

c. In the **Value** field, type the secondary user ID.
d. Click **Add**.
e. Click the **General** tab to return to that page and complete the logon.

12. In the **Password** field, type the password belonging to the logon user ID.
13. Leave the **Save password** check box deselected.

    Attention: You can select **Save password** to avoid having to enter the password each time that you want to work with the database server. This, however, is not recommended because only a lightweight encryption is applied when the password is stored on your local hard disk.
14. Leave the **Default schema** field blank.
15. Click **Test Connection** to check if you can log on to the database server.
16. Click **Finish**.

Results

After creating the profile, IBM Db2 Analytics Accelerator Studio automatically connects to the Db2 subsystem.

What to do next

If it takes too long to load all objects of the Db2 subsystem into the Administration Explorer (more than one minute), you can set a filter to limit the number of schemas to be loaded:

1. In the Administration Explorer, right-click the icon representing the Db2 subsystem (database symbol).
2. Select **Properties** from the menu.
3. In the Properties for ... window, select **Default Schema Filter**.
4. Clear the **Disable filter** check box. This activates the filter controls.
5. From the **Name** drop-down list, select a suitable filter mask. In the adjacent text field, type the filter string. For example, to exclude all schemas whose names starts with the characters `BLU`:
   a. From the **Name** drop-down list, select **Does not start with the characters**.
   b. In the text field, type `BLU`.
6. Click **Apply**.

Related reference:

"Access rights for power users" on page 51

Testing the connection from IBM Db2 Analytics Accelerator Studio

Follow the steps in this section to see if you can connect to a Db2 subsystem from IBM Db2 Analytics Accelerator Studio.

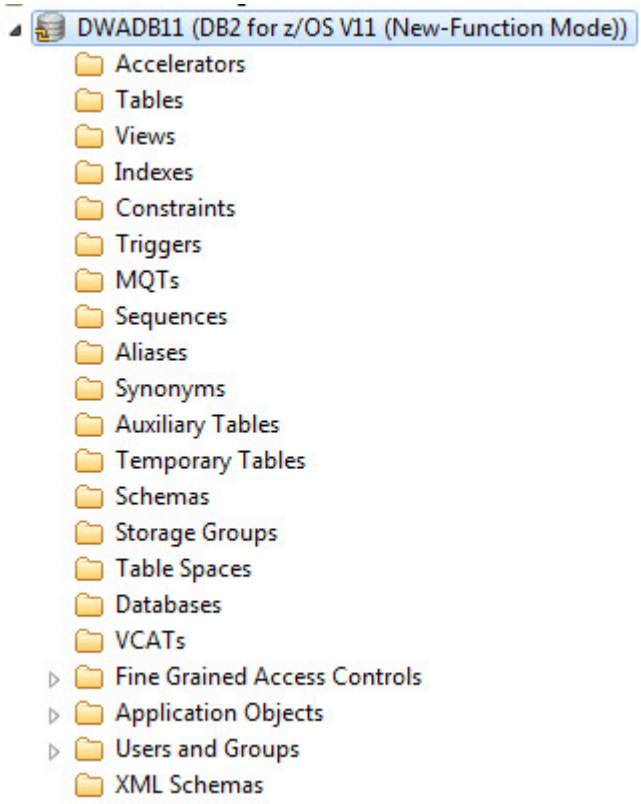
Procedure

Double-click the icon representing the database connection profile in the Administration Explorer of IBM Db2 Analytics Accelerator Studio. You find the Administration Explorer on the left.

Results

When the connection was successful, the icon representing the subsystem changes and the database object types, such as table spaces or tables, are displayed in a folder hierarchy in the Administration Explorer.

Example



What to do next

If you can connect to the database, check if you can navigate between the objects in the database. To do so, explore the folder structure in the Administration Explorer. For example, select the **Schemas** folder and check whether the schemas are displayed in the Object List Editor on the right.

Adding accelerators

Adding an accelerator to your configuration is a two-step process. First, you must obtain a pairing code from the IBM Db2 Analytics Accelerator Console. Second, you enter this paring code along with the IP address and the name of the accelerator in the Add Accelerator wizard of IBM Db2 Analytics Accelerator Studio.

Obtaining the pairing code for authentication

Communication between an accelerator and a Db2 subsystem requires both components to share credentials. These credentials are generated after you submit a temporarily valid pairing code. This step is required each time you add a new accelerator. The following steps describe how to obtain the pairing code.

About this task

Note: You can renew the authentication for an existing accelerator without having to use a new pairing code. To do so, click the **Update** link in the Accelerator view.

The steps *Obtaining the pairing code for accelerator authentication* and *Completing the authentication using the Add New Accelerator wizard* (next topic) belong together, but are seldom carried out by the same person. Since the pairing code obtained from the IBM Db2 Analytics Accelerator Console is only valid for a limited time (30 minutes by default), the persons operating the console and IBM Db2 Analytics Accelerator Studio must coordinate the steps.

Procedure

1. Ask the network administrator or the person who did the TCP/IP setup for the IP address of the accelerator. Make a note of this information. You need to enter it as you complete the steps that follow.

   For IBM Db2 Analytics Accelerator on an IBM Integrated Analytics System, this is the virtual IP or wall IP address.

   For Db2 Analytics Accelerator on Z, this is the IP address of the network that you labeled `DB2` in the Appliance Installer.
2. Start a client or emulator session (using, for example, IBM Personal Communications) to communicate with the z/OS system on which your Db2 subsystem is located.
3. Log on to TSO/ISPF.
4. Enter the following command:

   ```
   tso telnet <hostname> 1600
   ```

   where

   <hostname>
   Is the IP address of the accelerator that is connected to the Db2 for z/OS data server.

   1600
   Is the number of the port configured for accessing the IBM Db2 Analytics Accelerator Console using a telnet connection between the Db2 for z/OS data server and the accelerator.

   For example:

   ```
   tso telnet 10.101.8.8 1600
   ```
5. When prompted, enter `acceladm` as the user ID, followed by the console password. The initial password is `dwa-1234`. You must change this password at the first logon.

   The console also offers an option to create additional console users with different passwords.
6. Press the Pause key, then Enter to display the following screen:

```
*******************************************************************************
*         Welcome to the IBM Db2 Analytics Accelerator Console
*******************************************************************************

You have the following options:

 (1) - Change the Configuration Console Password
 (2) - (Menu) Run Accelerator Functions
 (3) - (Menu) Manage Hardware
 (4) - (Menu) Manage 'Call Home'

 ------------------------------------------------------------------------
 (x) - Exit the Configuration Console
```

7. Type 3 and press Enter to display the submenu:

```
main -> 3
 ------------------------------------------------------------
 You have the following options:

 (0) - Go back one level
 (1) - Obtain pairing code, IP address, and port
 (2) - List paired Db2 subsystems
 (3) - Set resource limits for Db2 subsystems
 (4) - Clear query history
 (5) - Specify the priority of maintenance tasks
 (6) - Set the Db2 subsystem for time synchronization
 (7) - Restart accelerator process
 (8) - Enable the conversion mode for 24:00:00 h values to 23:59:59 h
 (9) N/A: - Disable the conversion mode for 24:00:00 h values to 23:59:59 h
 (10) - Set a system-wide resource limit
```

8. Type 1 and press Enter:
9. When the message `Specify for how long you want the pairing code to be valid.` is displayed, enter an appropriate integer to specify the validity period in minutes. The time that you choose must be sufficient for you or a coworker to go to the workstation that runs IBM Db2 Analytics Accelerator Studio, start the Add New Accelerator wizard, and enter the information that is returned by the console. Values from 5 to 1440 are allowed. If you just press Enter, you accept the default of 30 minutes.

```
Press <return> to accept the default of 30 minutes.
 Cancel the process by entering 0.



 Accelerator pairing information:
   Pairing code  : 6048
   IP address    : 9.152.85.192
   Port          : 1400
   Valid for     : 30 minutes

 Press <return> to continue
```

   Important: A pairing code is valid for a single try only. Furthermore, the code is bound to the IP address that is displayed on the console.
10. Make a note of the following information on the console:
    - `Pairing code`
    - `IP address`
    - `Port`
11. Press Enter to return to the main menu of the console.
12. Type `x` and press Enter to exit the console and close the telnet session.

Completing the authentication using the Add Accelerator wizard

To complete the authentication, you specify the IP address, the port number, and the pairing code in the Add Accelerator wizard.

Before you begin

Make sure that the following conditions apply:

- You need privileges to run Db2 administration commands and stored procedures on z/OS. If you created a power user as suggested, the power user will have the required privileges. For more information, follow the **Related information** link at the end of this topic.
- You have a valid pairing code. The pairing code, which is of temporary validity, can be obtained by using the IBM Db2 Analytics Accelerator Console. For more information see the **Related tasks** section at the end of this topic.

Attention: Do not give ordinary users SELECT authorization on the SYSIBM.USERNAMES table because this allows the users to see the authentication information in the SYSIBM.USERNAMES.NEWAUTHID column.

About this task

You can renew the authentication for an existing accelerator without having to use a new pairing code. To do so, click the **Update** link in the Accelerator view.

Attention: Making a new backup of your Db2 catalog tables is strongly recommended after each authentication update because restoration processes in your Db2 subsystem can make an accelerator unusable. This happens if you must restore your Db2 catalog and the backup of the catalog was made before the last update of the accelerator credentials. In this case, the latest authentication information will not be in the catalog tables of the backup, and so the accelerator can no longer be used.

For the completion of this task, the following stored procedures are run on your data server:

- SYSPROC.ACCEL_TEST_CONNECTION
- SYSPROC.ACCEL_ADD_ACCELERATOR

For information about the privileges that are required to run these procedures and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related information** at the end of this section.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. Select the **Accelerators** folder in the Administration Explorer.
3. On the menu bar of the Object List Editor, click the downward-pointing arrow next to the green plus sign.
4. From the drop-down menu, select **Add Accelerator**.
5. In the **Name** field, type a name for the accelerator. This name is automatically copied to the **Location** field.

The location name is the unique name of the accelerator in the SYSIBM.LOCATIONS table. Mostly, this is the same name as the accelerator name.

Restriction: An accelerator cannot be shared between two or more Db2 subsystems if the subsystems use the same location name. If you copy an entire subsystem, make sure to change the location name of the copy afterwards.

6. In the **Pairing code** field, type the pairing code.
7. In the **IP address** field, type the IP address of the accelerator.
8. In the **Port** field, type `1400`. This is the fixed port for network communication between the z/OS data server and the accelerator.
9. Click **Test Connection** to check whether the accelerator with the given address can be connected to.
10. Click **OK**. A connection test is carried out. See the note in step 9. It also applies here because it is the same test.

Related tasks:

"Obtaining the pairing code for authentication" on page 57

Related reference:

"Access rights for power users" on page 51

Related information:

"DRDA connection does not work" on page 82

Chapter 10. Testing query acceleration

Run a test query to verify that all required installation and configuration steps have been completed successfully and that the entire system is in an operable state.

Related information:

Running an SQL script from IBM DB2 Analytics Accelerator Studio

Loading tables

Defining accelerator-shadow tables

Define the tables that are referenced in your test query on the accelerator.

Procedure

1. In the Administration Explorer (upper left) of IBM Db2 Analytics Accelerator Studio, select the Accelerators folder.
2. In the list of the Object List Editor on the right, double-click the name of the accelerator. This opens the Accelerator view. It is empty by default, that is, it does not contain any tables.
3. Click the **Add** button.
4. In the Add Tables wizard, select the tables that are referenced in your test query.
5. Click **OK**.

Results

The newly created accelerator-shadow tables are shown in the Accelerator view.

Loading and enabling tables

Before you can run your test query, you must load the currently empty accelerator-shadow tables with data and enable these for query acceleration.

About this task

Loading or updating the data in accelerator-shadow tables for query acceleration requires IBM Db2 Analytics Accelerator Studio to hold the network connection until the process has finished.

An option that circumvents this problem is to invoke IBM Db2 Analytics Accelerator for z/OS stored procedures directly from JCL batch jobs. Such jobs can even be scheduled by using a third-party tool.

Procedure

1. In the Accelerator view, select the tables that are referenced in your test query and click **Load**.
2. Do not change value of the **Lock original database tables while loading** drop-down list. Leave the setting **None**.
3. Leave **After the load, enable acceleration for disabled tables** selected.
4. Click **OK**.

Note: The processes can take a couple of minutes to complete. If the load fails, first check whether DSNUTIL was started in Db2 for z/OS.

Running a test query

Run a simple test query against the selected tables to see whether the setup works.

Before you begin

1. Make sure that the tables referenced by the query exist on the accelerator, are loaded, and enabled for query acceleration.
2. Make sure that the accelerator has been started and is online. The status of the accelerator is shown on top of the Accelerator view.

About this task

If you followed the instructions in the previous sections, the query should run successfully, that is, it should not fail and return the intended result.

Procedure

1. On the toolbar of the Administration Explorer, click the downward-pointing arrow next to the **New** button.
2. Select **New SQL Script** from the menu.
3. In the blank space of the `Script<x>.sql` workspace that opens on the upper right, type the following statement on the first line:
   - `SET CURRENT QUERY ACCELERATION = ELIGIBLE;`

   Note: `<x>` stands for a counting number (integer). This means that your first SQL script is named `Script1.sql`, the second `Script2.sql`, and so on.
4. Type your query. Use a simple query, such as `SELECT SUM(QUANTITY) FROM SALES.FIGURES_FACT`.
5. Select **Script** > **Run SQL** from the main menu. The SQL Results pane in the lower left shows you whether the query ran successfully.
6. To check whether the accelerator was used, follow these steps:
   a. Return to the accelerator view by clicking the tab with the name of the accelerator.
   b. Click the twistie next to the heading **Query Monitoring**.

   The section that unfolds shows a table that lists the most recent queries. These are only the queries that were run on the accelerator. Inhouse Db2 queries are not listed. Your test query should appear at the top of the table. Your query might not be listed there for various reasons, for example:
   - The installation of IBM Db2 Analytics Accelerator for z/OS is incomplete.
   - The Db2 optimizer did not route the query to the accelerator because the query does not qualify.
   - One of the tables in the query is not defined on the accelerator.

   To determine the cause for the failure, use the Db2 EXPLAIN function and look up the reason code in DSN_QUERYINFO_TABLE. For more information, read the section *EXPLAIN information* in the *IBM Db2 Analytics Accelerator Studio: User's Guide*. You find a link under **Related information** at the end of this topic.

Chapter 11. Beyond the basics

This chapter contains information about resource allocation and job prioritization, including tips on how to fine-tune IBM Db2 Analytics Accelerator for z/OS with regard to these issues.

Logging on to the IBM Db2 Analytics Accelerator Console

All functions or features discussed in this section are accessed from the IBM Db2 Analytics Accelerator Console, so that a console log-on is required.

Procedure

1. Ask the network administrator or the person who did the TCP/IP setup for the IP address of the accelerator. Make a note of this information. You need to enter it as you complete the steps that follow.

   For IBM Db2 Analytics Accelerator on an IBM Integrated Analytics System, this is the virtual IP or wall IP address.

   For Db2 Analytics Accelerator on Z, this is the IP address of the network that you labeled `DB2` in the Appliance Installer.
2. Start a client or emulator session (using, for example, IBM Personal Communications) to communicate with the z/OS system on which your Db2 subsystem is located.
3. Log on to TSO/ISPF.
4. Enter the following command:

   ```
   tso telnet <hostname> 1600
   ```

   where

   <hostname>
   Is the IP address of the accelerator that is connected to the Db2 for z/OS data server.

   1600
   Is the number of the port configured for accessing the IBM Db2 Analytics Accelerator Console using a telnet connection between the Db2 for z/OS data server and the accelerator.

   For example:

   ```
   tso telnet 10.101.8.8 1600
   ```
5. When prompted, enter `acceladm` as the user ID, followed by the console password. The initial password is `dwa-1234`. You must change this password at the first logon.

   The console also offers an option to create additional console users with different passwords.

Enabling queries against system-temporal and bi-temporal tables

Temporal tables, introduced with Db2 10 for z/OS, are fully supported, which means that you can run accelerated queries against all columns of these tables, including the timestamp columns that define the time interval. System-temporal and bi-temporal tables are special because they create history tables. Accelerated

queries can succeed only if both, the base and the history tables are defined and loaded on the accelerator. IBM Db2 Analytics Accelerator therefore checks for their presence. This is why queries against these two types of temporal tables must be enabled explicitly.

About this task

- To enable accelerated queries, you must define the base tables and the related history tables separately as accelerator-shadow tables and also load both types of tables.

  Business-temporal tables need not be enabled.
- Keep the base table and the related history table in sync on the accelerator. You might get confusing results if the load times of these tables do not match.

Procedure

To enable accelerated queries against system-temporal or bi-temporal accelerator-shadow tables, set or include option 5 in the value of the QUERY_ACCEL_OPTIONS parameter or ZPARM. For more information, follow the appropriate link at the end of this topic.

Chapter 12. Installing updates

Refer to the appropriate sections to update individual components or migrate from one version to another.

It is rarely necessary to update all components. However, if you must update more than one component, follow the suggested order.

Order in which to update components

1. IBM Db2 Analytics Accelerator software. When in doubt: It is better if the accelerator software is at a newer level than the stored procedures. See "Updating IBM Db2 Analytics Accelerator software."
2. Prerequisite PTFs for Db2 11 for z/OS or Db2 12 for z/OS. See Installing prerequisite PTFs for Db2 10 for z/OS or Db2 11 for z/OS.
3. Stored procedures. See "Updating the IBM Db2 Analytics Accelerator stored procedures" on page 71
4. Db2 Analytics Accelerator on Z. See *Updating Db2 Analytics Accelerator on Z* in the *Installation Guide*..
5. IBM Db2 Analytics Accelerator Studio. Actually, the order does not matter for IBM Db2 Analytics Accelerator Studio. You can update it any time. See "Updating IBM Db2 Analytics Accelerator Studio" on page 75

Installing prerequisite PTFs for Db2 for z/OS

When you update your existing installation, first apply the prerequisite program temporary fixes (PTFs) for Db2 for z/OS.

Before you begin

- Make sure that the database management system is at least Db2 11 for z/OS. Db2 10 is not supported.
- Make sure that you meet the software requirements of Db2 for IBM Db2 Analytics Accelerator for z/OS Version 7.1.0. For more information, click the link at the end of this topic.

About this task

The product continues to work after installing Db2 for z/OS PTFs, meaning that you can update and work with your accelerators without also having to update the accelerator stored procedures.

Procedure

Install the latest prerequisite Db2 for z/OS PTFs for the product.

Related information:

Prerequisites and Maintenance for IBM DB2 Analytics Accelerator for z/OS 7.1

Updating IBM Db2 Analytics Accelerator software

These are software components that run on the accelerator hardware, that is, the IBM Integrated Analytics System. This chapter does not apply to updates for Db2 Analytics Accelerator on Z. Components on the IBM Integrated Analytics System are the IBM Db2 Analytics Accelerator, the SQL engine, and the operating system of the accelerator.

Installing update packages for the accelerator

IBM Db2 Analytics Accelerator for z/OS software includes specific libraries and other code to be installed on the IBM Integrated Analytics System.

Before you begin

Make sure that the following conditions apply:

- Make sure that IBM Db2 Analytics Accelerator for z/OS has been successfully connected to Db2 for z/OS.
- IBM UNIX System Services is installed on your z/OS data server.
- You have a user ID and a password to log on to your z/OS data server. The user ID has read access to the z/OS UNIX file system (zFS).
- The user ID is authorized to run the SYSPROC.ACCEL_UPDATE_SOFTWARE2 stored procedure.

About this task

The entire installation or update procedure consists of the following steps:

1. Downloading the fix pack or update package.
2. Transferring the update packages to the accelerator. You start this process from IBM Db2 Analytics Accelerator Studio, the remote client application of IBM Db2 Analytics Accelerator for z/OS.
3. Activating the newly installed software. This step is also executed from IBM Db2 Analytics Accelerator Studio.

This topic covers step 1 only.

Procedure

Downloading the fix pack or update package. You have two options here:

- Download the fix pack or update package from IBM Fix Central to your workstation and then upload the package from your workstation using IBM Db2 Analytics Accelerator Studio. Place the checksum file for installation verification in the same directory on your workstation.

  There is a checksum file for every supported algorithm. Supported algorithms are SHA256, SHA1 and MD5. The corresponding files on IBM Fix Central are:
  - `sha256sums.txt`
  - `sha1sums.txt`
  - `md5sums.txt`

  Any of these files contains one line for each package. Every line consists of two values. The first value is the hash used for verification; the second value is the corresponding package name.
- Download the fix pack or update package from IBM Fix Central and save it directly in the directory specified by the AQT_HOST_PACKAGE_DIRECTORY environment variable. To use this second option, you must:
  1. Log on to your z/OS data server using a remote client, such as IBM Personal Communications.
  2. Set the AQT_HOST_PACKAGE_DIRECTORY environment variable to a directory path in the z/FS. Then save the update packages in this directory. Place the checksum file for installation verification in the same directory on your workstation (for details, see the previous description of the first download option.

Important: The directory that AQT_HOST_PACKAGE_DIRECTORY points to requires multiple gigabytes (GB) of disk space. For example, if you work with multiple accelerators in a rolling upgrade scenario, you must have multiple instances of the installation packages in the file system. So make sure that the directory can accommodate all the files.

Results

Your local workstation or z/FS directory (as set by the AQT_HOST_PACKAGE_DIRECTORY environment variable) on your z/OS data server now contains the accelerator update package *version*.tar.z.

Transferring update packages for the accelerator

Transfer update packages for IBM Db2 Analytics Accelerator for z/OS on an IBM Integrated Analytics System by completing the steps in this section.

Before you begin

Make sure that the following conditions apply:

- You have downloaded suitable accelerator installation packages and their respective checksum files to a workstation that is connected to your z/OS data server, or such packages exist in a z/FS directory on that server. For the latter option, the AQT_HOST_PACKAGE_DIRECTORY environment variable must point to the z/FS directory.
- The value of the AQT_HOST_PACKAGE_DIRECTORY environment variable determines where IBM Db2 Analytics Accelerator Studio looks for software updates. If it is not set correctly, the packages cannot be located and thus cannot be transferred or installed.
- The user ID has read and write access to the directory that the AQT_HOST_PACKAGE_DIRECTORY environment variable points to and to all its subdirectories. You specify this variable in the AQTENV data set. The AQTENV data set must be referenced by the Workload Manager (WLM) environment that was set up for the IBM Db2 Analytics Accelerator for z/OS stored procedures. To avoid a setup with obsolete or wrong entries, use the sample AQTENV data set that comes with IBM Db2 Analytics Accelerator for z/OS Version 7.1.0.

About this task

You can transfer update packages from the z/OS UNIX file system (zFS) to the accelerator, or from a workstation on which IBM Db2 Analytics Accelerator Studio is installed, and which is connected to the z/OS data server. The first method requires that the packages have been placed in the proper z/FS directory by SMP/E. The second method requires that the update packages have been downloaded to the client workstation before. To actually use a transferred package, you must activate it. How to do this is described in a later topic. See the hint at the end of this description.

Installing a software update invokes the **SYSPROC.ACCEL_UPDATE_SOFTWARE2** stored procedure on your data server. For information about the privileges that are required to run this procedure and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related reference** at the end of this section.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. In the Administration Explorer, select the **Accelerators** folder.
3. In the Object List Editor on the right, double-click the accelerator.
4. If necessary, expand the **About** section.
5. In the **About** section, click the **Transfer updates** link.
6. In the Transfer Updates window, you can see all software packages that are available in the zFS of your z/OS data server. Select the appropriate check boxes in the first column of the table to mark the packages that you want to transfer.

Attention:

- Make sure that you select the proper packages, that is, packages belonging to the release level that you want to upgrade to. The list in the Transfer Updates window might be confusing, especially if it also contains older packages. To find the correct package numbers, see the closing information or the release notes for the latest program temporary fix (PTF). You find the closing information or the release notes for a PTF on the support home page, in the category *Plan and install documentation* (see link under **Related information** at the end of this topic). If a PTF was shipped with a major product release, then, in general, you must transfer the packages included in the PTF rather than the packages in the base version.
- If the list contains too many packages so that selecting the proper ones becomes awkward, select unwanted package names and click **Remove**. This will just remove the packages from the list or view, but won't delete the package files from the z/FS or your client workstation.

7. Choose the appropriate method to transfer the selected packages:

   Transfer file from client
   To transfer one or more downloaded packages from the connected client workstation.

   Transfer file from IBM Z
   To transfer one or more packages from the z/FS of your z/OS data server.

What to do next

To save space in the SMP/E target directory of the zFS, consider deleting sub-directories that contain already transferred packages. Be careful, however, if you have more than one accelerator. Do not delete packages if these are still needed for other accelerators.

If the AQT_HOST_PACKAGE_DIRECTORY environment variable does not point directly to the SMP/E target directories but to a copy, you might also want to delete the copy.

Activating an updated accelerator software version

To use a recently transferred software package, you must first activate that package by selecting the version that the package contains.

Before you begin

You cannot activate a software version as long as a IBM Db2 Analytics Accelerator Console window is open. Therefore, close all console windows. If you are not sure whether there are any open console windows, click **List Tasks** in the relevant Accelerator view of IBM Db2 Analytics Accelerator Studio and cancel all active console tasks from the List Tasks window.

About this task

- Earlier product versions allow you to switch between older and newer versions of the IBM Db2 Analytics Accelerator software. This is not possible with IBM Db2 Analytics Accelerator for z/OS Version 7.1.0. Once you have activated a particular version, you cannot go back to an older one.
- The application of an update affects all Db2 subsystems that are connected to an accelerator.
- The activation of a different accelerator software version causes a restart of the accelerator.

Activating a software update invokes the **SYSPROC.ACCEL_UPDATE_SOFTWARE** stored procedure on your data server. For information about the privileges that are required to run this procedure and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related reference** at the end of this section.

Attention:

- The activation of a new version of IBM Db2 Analytics Accelerator for z/OS software components might delete the query history from the accelerator if the new version introduces changes to the query history function.
- The sequence in which you activate the different software components is important. The sequence depends on the source and on the target version. To find the proper sequence for your particular update, see "Order in which to update components" on page 67.
- When the accelerator is restarted with a new accelerator software version, accelerated queries cannot be processed on that accelerator before it reaches the *online* state. The only way to avoid a delay is to use a second accelerator in a workload balancing setup. That is, a second accelerator which is connected to the same Db2 subsystem, and which contains the same set of tables. Note that the tables must be loaded and enabled.

Procedure

1. In the Administration Explorer, select the **Accelerators** folder.
2. In the Object List Editor on the right, double-click the accelerator.
3. In the Accelerator view, from the **Refresh** drop-down list in the upper right, select **Automatic off**. Otherwise, you might see warnings during the activation of the new software saying that the accelerator cannot be contacted.
4. If necessary, expand the **About** section.
5. In the **About** section, click the **Apply other software version** link.
6. In the Apply Software Version wizard, you can see all software packages on the accelerator that are currently available for the selected component. To read information about a particular version before you activate it, select the appropriate entry in the list. The information is provided in the **Details of selected version** text box at the bottom.
7. Activate a version by selecting the appropriate radio button in the **Switch To** column.
8. Click **Finish**.

Results

When the process has been completed successfully, a message similar to the following is displayed:

```
New software version was successfully activated.
```

Note: In some cases, migration processes are still ongoing even though the success message was displayed, for example after a restart of the database container. In a situation like this, it might take additional time until the accelerator is ready to process queries. You can check the status of an accelerator at the top of the corresponding Accelerator view. The status must be *online* for an accelerator to process queries.

What to do next

To avoid a cluttered Apply Software Version window, you can remove packages from the accelerator that you no longer need.

For instructions on how to complete this task, follow the appropriate link under **Related tasks**.

Updating the IBM Db2 Analytics Accelerator stored procedures

Read how to update the Db2 for z/OS components of IBM Db2 Analytics Accelerator for z/OS.

Procedure

1. If you intend to accelerate static SQL queries, verify that the table SYSACCEL.SYSACCELERATEDPACKAGES and related indexes exist in the relevant Db2 subsystems.

If not, create this table and the related indexes in each connected subsystem by running the Db2 for z/OS job DSNTIJAS. You find instructions in the section *Creating the IBM Db2 Analytics Accelerator for z/OS database*. Follow the link under **Related tasks** tasks at the end of this topic.

2. For the configuration, revisit the sections that are listed at the end of this topic. Consider the following:
   a. When you set up the WLM application environment:
      1) Reuse the existing WLM JCL procedure, that is, the procedure that was used to set up the WLM for the stored procedures of the previous version.
      2) Edit the JCL and change the high-level qualifier (HLQ) in the following statements so that the production HLQ for the data sets of this version is used:
         - `DD <HLQACTIVEV7>.SAQTMOD`

           To run IBM Db2 Analytics Accelerator for z/OS Version 5.1.0 alongside version 7.1.0, also specify:

           `DD <HLQACTIVEV5>.SAQTMOD`
         - `AQTENV DD <HLQACTIVE>.SAQTSAMP(AQTENV)`
         - `AQTDEF6 DD <HLQACTIVEV7>.SAQTSAMP(AQTDEF6)`

           To run IBM Db2 Analytics Accelerator for z/OS Version 5.1.0 alongside version 7.1.0, also specify:

           `AQTDEFTR DD <HLQACTIVEV5>.SAQTSAMP(AQTDEFTR)`
   b. Copy the customized settings from your old version AQTENV production member (the member that you previously referred to in the `AQTENV DD` statement of the JCL for the WLM setup) to the new AQTENV data set member this version. Do not refresh your WLM application environment yet.
   c. Customize the AQTTIJSP job as documented in the ++HOLD information of the base package and run just the necessary job steps. Unless instructed otherwise, use the `INSTALL` parameter for AQTTRIN in AQTTIJSP. Do not use `REINSTALL` because this parameter invalidates previous installations in the same Db2 subsystem. If a previous installation, such as IBM Db2 Analytics Accelerator for z/OS Version 5.1.0 exists, and `REINSTALL` is used, the previous version will have to be installed again.

      Refresh the WLM application environment for the stored procedures. This ensures that all new stored procedure calls run with the updated code. You might want to verify this by starting IBM Db2 Analytics Accelerator Studio. If the stored procedure code was updated successfully, the graphical user interface shows the features of the new version.
   d. You might want to free the older packages unless you want to run old and new versions in parallel for some time in a data sharing environment. The names of older packages start with `SYSACCEL.AQTDB` or `SYSACCEL.AQT03` and contain a version string like `IDAA4`.

Related tasks:

"Creating the IBM Db2 Analytics Accelerator database" on page 22

"Setting up a WLM application environment for IBM Db2 Analytics Accelerator" on page 27

"Setting up a WLM application environment for different product versions" on page 30

"Verifying the correct setup of Db2-supplied stored procedures" on page 34

"Customizing and running AQTTIJSP" on page 37

"Verifying the installation of IBM Db2 Analytics Accelerator for z/OS stored procedures" on page 38

Related reference:

"Setting access rights for the user who runs AQTTIJSP" on page 37

Updating Db2 Analytics Accelerator on Z

Follow the steps in this section to upload a new image (appliance) for Db2 Analytics Accelerator on Z and activate it.

Procedure

1. Open the Appliance Installer in a web browser. Enter the IPv4 address of the Secure Service Container (SSC) LPAR (see Figure 9 on page 43)
2. On the Login page, log in with the **Master user ID** and **Master password** that you specified as you defined the SSC LPAR. (see Figure 9 on page 43) You see the Accelerator page:

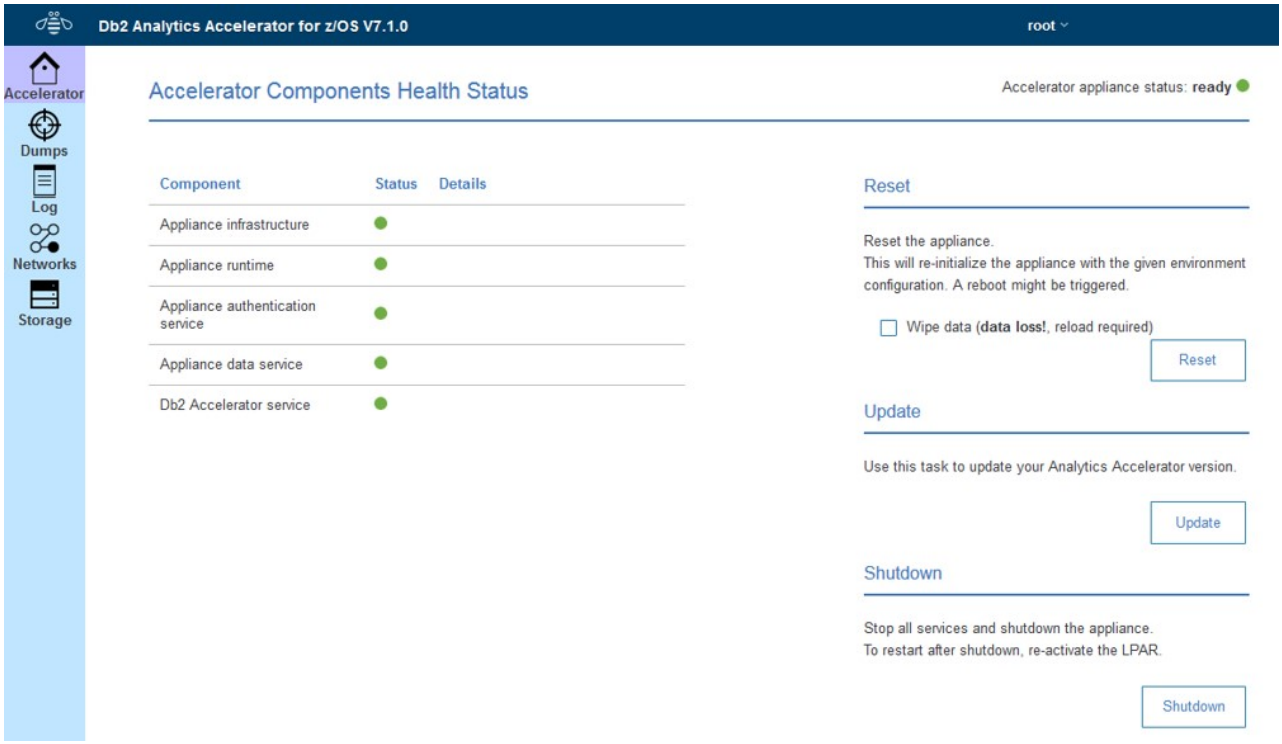


Figure 18. The Accelerator page of the Appliance Installer

3. In the lower right of the Accelerator page, click **Update**. You see the Update page:

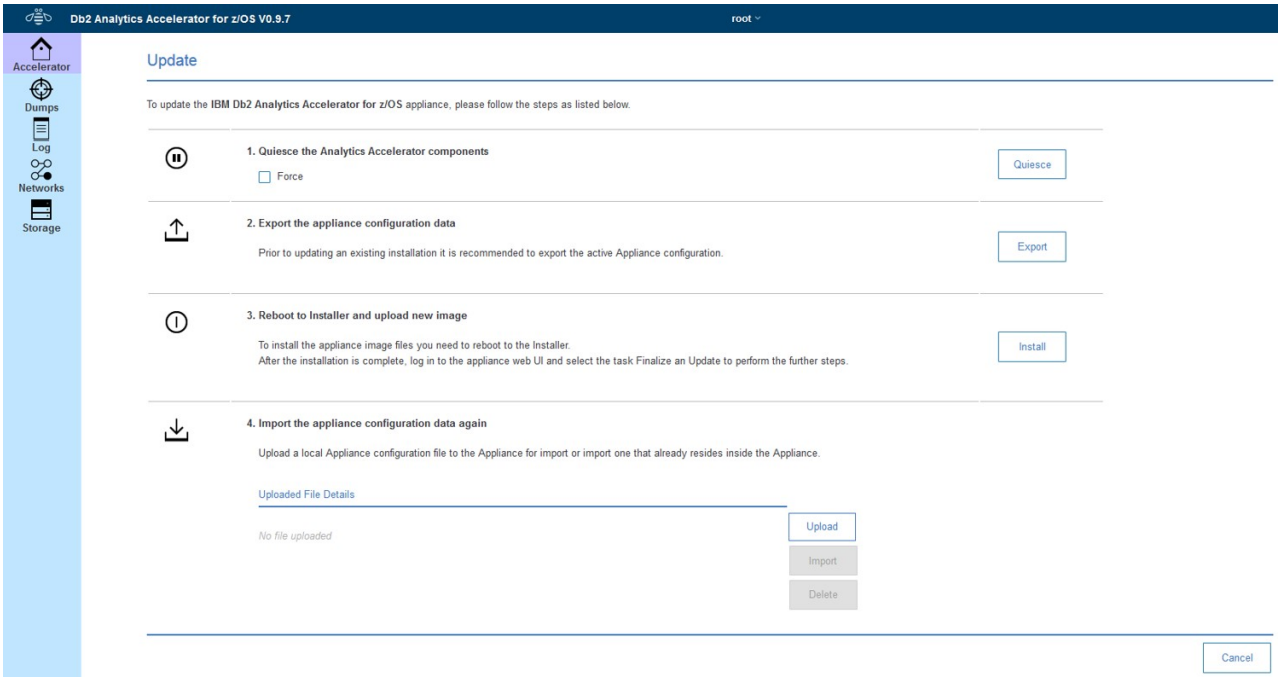


Figure 19. The Update page of the Appliance Installer

4. To make sure that all accelerator operations are paused during the update, click **Quiesce**.
5. By clicking **Export**, save your current configuration to a local drive, so that it can be reloaded to complete the update.
6. In section **3. Reboot to installer and update new image**, click **Install**.
7. Select the image name (in the image in step 6, this is `IBM zAware`) and click **Install**. You see a message saying that the appliance is rebooting.
8. Click **Finalize Update** During this step, the previously exported configuration is imported and reloaded. The appliance reboots again.

Results

An information window with the heading Invoking Secure Service Container Installer is briefly displayed. After that, you see the following page:

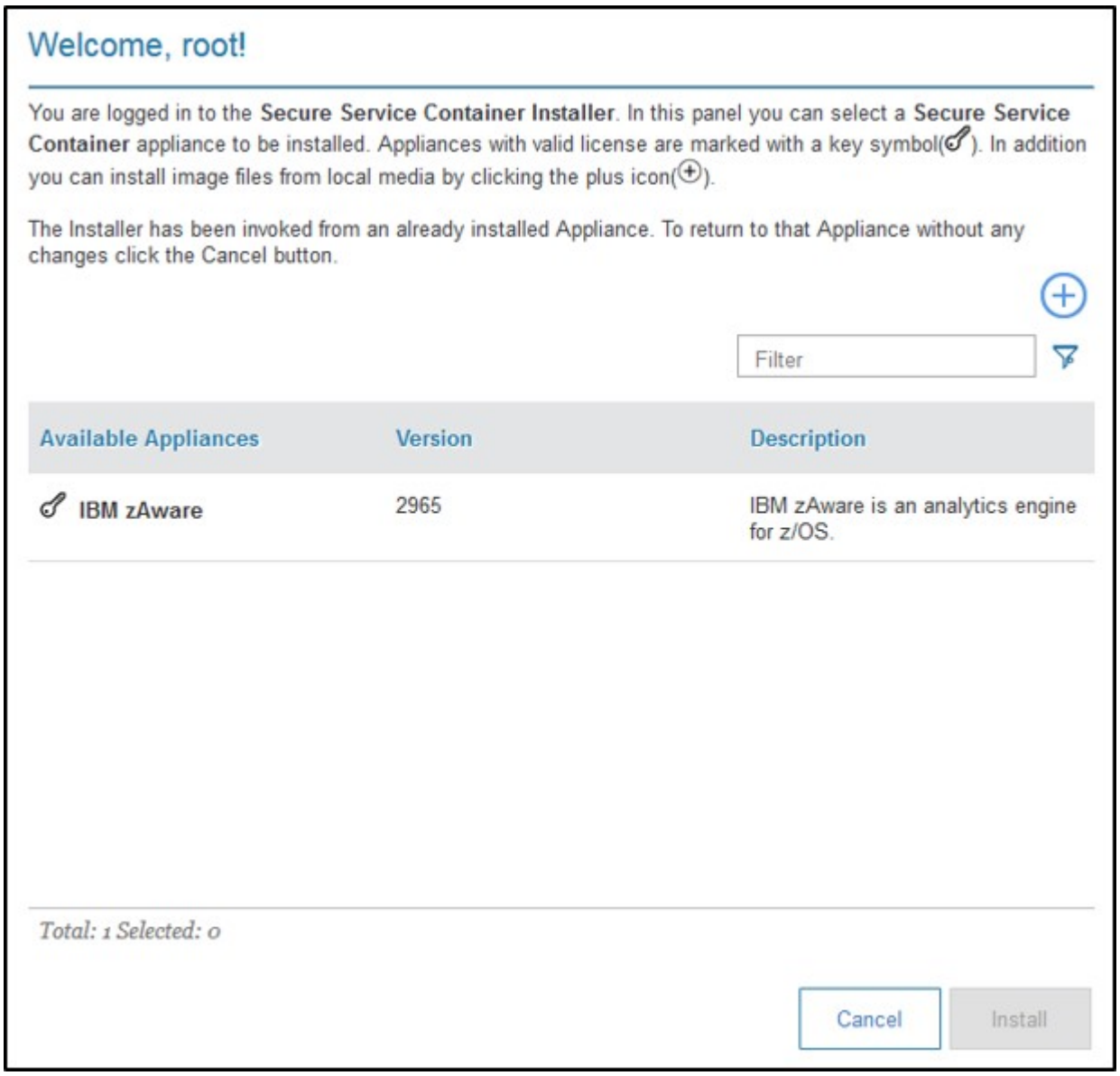


Figure 20. The Welcome page of the Secure Service Container Installer

Updating IBM Db2 Analytics Accelerator Studio

Follow the instructions here to download and install an upgrade of IBM Db2 Analytics Accelerator Studio.

About this task

To download a refresh pack for IBM Db2 Analytics Accelerator Studio, a workstation with an internet connection is required.

If IBM Installation Manager is installed on a workstation without an internet connection, the program cannot automatically locate the repositories for updates of already installed products or additional plugins. Therefore, an administrator has to download the update repository to a central location that users without an internet connection have access to.

Workstation users without an internet connections can then let their local IBM Installation Manager installations point to the repository in the central location or copy the entire installation package from the central location to their workstations and go on from there.

You can use the newer versions of IBM Db2 Analytics Accelerator Studio with older versions of accelerators and stored procedures. However, the user interface might not show new functions until you update the stored procedures to the next higher or newest version.

Procedure

- To download a refresh pack for yourself or for others from a computer with an internet connection:
  1. Click the following link:

     Select fixes: IBM Db2 Analytics Accelerator Studio (All releases, All platforms)
  2. Select the proper refresh pack and click the **Continue** button above the list.
  3. Sign in with your IBM ID or click **Create IBM id** and follow the instructions to create an IBM ID first.
  4. Select your preferred download method:
     - **Download using Download Director** (requires Java enabled browser)
     - **Download using bulk FTP**
     - **Download using your browser (HTTPS)**
  5. Leave the check box **Include prerequisites and co-requisite fixes (you can select the ones you need later)** selected.
  6. In the View and accept terms window, click **I agree** to agree to the terms and conditions.
  7. Click **Download now** and follow the instructions.
  8. Extract the content of the downloaded archive to a directory on your local workstation or to the central location (for access or download by other users).
- To update an IBM Db2 Analytics Accelerator Studio installation:
  1. Start IBM Installation Manager.
  2. Update IBM Db2 Analytics Accelerator Studio by using one of the following procedures:
     - The following approach works if you can still connect to a previously accessed IBM Installation Manager repository, and if that repository has been updated (contains the update):
       a. Click **Update**.
       b. Follow the instructions in the wizard. Deselect components that you do not want to update.
     - If the first method did not work, but you can access the repository file on your company's network or on your local workstation:
       a. From the main menu of IBM Installation Manager, select **File** > **Preferences** > **Repositories**.
       b. Click **Add Repository**.
       c. Click **Browse** and navigate to the directory that contains the extracted update package, either in the central location, or on your local workstation.
       d. Select the `repository.config` file and click **Open**.
       e. Click **OK** twice to return the main window of IBM Installation Manager.
       f. Click **Install**.
       g. Follow the instructions in the installation wizard.

Chapter 13. Removing accelerators from your Db2 for z/OS configuration

You might want to remove all accelerator-related objects and settings from a Db2 for z/OS configuration, for example after finishing a test or a proof-of-concept.

Procedure

1. Set DSNZPARM QUERY_ACCELERATION to NO or remove it.
2. Set DSNZPARM ACCEL to NO or remove it. This parameter change requires a Db2 restart, which can be postponed to the next scheduled maintenance window.
3. For each Db2 subsystem connected to an accelerator, run **-STOP ACCEL**
4. Remove all tables from the connected accelerators. Use the **Remove** button in the relevant Accelerator views of IBM Db2 Analytics Accelerator Studio or the SYSPROC.ACCEL_REMOVE_TABLES stored procedure for this purpose.
5. Remove all accelerators from the connected Db2 subsystems. To this end, use the **Remove** button in the Object List Editor of IBM Db2 Analytics Accelerator Studio or the SYSPROC.ACCEL_REMOVE_ACCELERATOR stored procedure.
6. In Db2 for z/OS, drop the DSNACCEL database, including all tables and table spaces whose names start with SYSACCEL.

Cleaning up the communications database manually

If accelerators have already been disconnected physically, tables and accelerators (steps 4 and 5 in the previous section) cannot be removed by IBM Db2 Analytics Accelerator functions anymore. In that case, clean up the Db2 communications database (CDB) manually by following the steps here.

Procedure

1. Run the following SQL query to get a list of the defined accelerators:

   ```
   SELECT ACCELERATORNAME FROM SYSACCEL.SYSACCELERATORS
   ```

2. Delete entries in the CDB by running the following SQL statements for each defined accelerator . Replace <accelerator name> with the names returned by the SQL query in step 1.

   ```
   DELETE FROM SYSIBM.LOCATIONS WHERE LINKNAME = '<accelerator name>';
   DELETE FROM SYSIBM.IPNAMES  WHERE LINKNAME = '<accelerator name>';
   DELETE FROM SYSIBM.USERNAMES  WHERE LINKNAME = '<accelerator name>';
   ```

3. Drop the DSNACCEL database, including all tables and table spaces whose names start with SYSACCEL.

   Attention: Because this step deletes the Db2 pseudo-catalog tables, the information about other accelerators attached to the same Db2 subsystem gets lost as well. It is not just the information about the *<accelerator name>* accelerator.

Removing the remaining database objects

Remove the remaining accelerator-related database objects by running the following SQL statements:

About this task

Attention: Do not run the following commands if you just want to remove a single accelerator and keep others. These commands will remove them all.

Procedure

1. `DROP TABLE DSNAQT.ACCEL_*;`
2. `DROP VIEW DSNAQT.ACCEL_NAMES;`
3. `DROP SEQUENCE DSNAQT.UNLOADIDS;`
4. `DROP PROCEDURE SYSPROC.ACCEL_*;`
5. `DROP FUNCTION  DSNAQT.ACCEL_*;`
6. `FREE PACKAGE SYSACCEL.*;`

What to do next

If you use both product features (coexistence): Your contract with IBM might oblige you to physically erase all disks before an IBM Integrated Analytics System is moved outside of your data center. A procedure exists that guarantees and certifies the erasure of disks. If required, contact IBM support to request the execution of this procedure. If you want to reuse a machine after the execution, you must install and configure it from scratch.

Chapter 14. Troubleshooting

In the following sections, you find descriptions of known IBM Db2 Analytics Accelerator for z/OS problems. The author and the development team have tried to provide a solution wherever possible. However, a solution might be unavailable because the cause of a problem cannot be clearly identified. This is mostly the case if multiple causes can lead to the same symptom. It can also be that a solution has not yet been found. In such cases, contact IBM support.

Important: During a customer session with IBM support, system parameters might be changed. For the parameter changes to take effect, a restart of an accelerator is often required. In such situations, the accelerator will be unavailable for operational tasks until it has come back online.

Firewall blocks operations because crucial ports are closed

If product functions are not executed, check your firewall settings. IBM Db2 Analytics Accelerator requires certain ports to be open. See the table in this topic.

Symptoms

- You cannot accelerate queries.
- You cannot run functions from the IBM Db2 Analytics Accelerator Console.
- You cannot open a secure-shell (ssh) connection to an accelerator.
- Services are unavailable or switches (routers) cannot be reached because ICPM (Internet Control Message Protocol) traffic is blocked.

Causes

Required networking ports are closed.

Resolving the problem

Table 1. Required networking ports for IBM Db2 Analytics Accelerator

Function or protocol	Required port	Direction
Query execution (DRDA protocol)	1400	Both ways
Communication between accelerator and stored procedures	1401	Both ways
IBM Db2 Analytics Accelerator Console	1600	Both ways
Secure DRDA (stunnel)	11400	Both ways
Secure communication between accelerator and stored procedures (stunnel)	11401	Both ways
Secure shell connection (ssh)	2222	Both ways
ICMP traffic	N/A	Both ways

Message DSNUTILU NOT INVOKED APF AUTHORIZED

You run the DSNUTILU stored procedure and receive a reply message that says `DSNUTILU NOT INVOKED APF AUTHORIZED`.

Symptoms

You cannot run the DSNUTILU stored procedure successfully.

Causes

The stored procedure is not APF-authorized.

Resolving the problem

Make sure that all libraries used by the WLM application environment for Db2 stored procedures are APF-authorized in the STEPLIB statement of the startup JCL procedure.

No CEEDUMPs

You cannot find a CEEDUMP although a signal was caught while you were running an IBM Db2 Analytics Accelerator for z/OS stored procedure.

Symptoms

A signal was caught while running an IBM Db2 Analytics Accelerator for z/OS stored procedure, but a CEEDUMP has apparently not been produced.

Causes

Missing configuration settings.

Resolving the problem

To analyze problems that cause the stored procedure to end abnormally or stop with a signal, a CEEDUMP is required. The JCL startup procedure for the Workload Manager (WLM) application environment of the IBM Db2 Analytics Accelerator for z/OS stored procedure allows you to specify a location for a CEEDUMP.

Important: Make sure that the JCL startup procedure for the Workload Manager (WLM) application environment of the IBM Db2 Analytics Accelerator for z/OS stored procedure contains a `DD` statement for `CEEDUMP`.

PRIQ value too high when creating table spaces

During table-space creation, you receive a message saying that the PRIQ value was exceeded.

Symptoms

The problem occurs if you want to create a table, but a table space must be created before this. The following error message might be displayed:

```
IDC3221I CONSTANT '16777216' NOT WITHIN VALUE RANGE
```

Causes

Program Temporary Fix (PTF) UK43901 is missing.

Resolving the problem

Install the PTF or use smaller sizes.

The Db2 command -DIS ACCEL does not work

You cannot run the Db2 for z/OS command -DIS ACCEL.

Symptoms

The -DIS ACCEL command does not return the expected accelerator information.

Resolving the problem

1. Verify that the Db2 ZPARMs are configured as described in the section "Installing libraries with IBM Db2 Analytics Accelerator support" on page 21*Installing Db2 libraries with IBM Db2 Analytics Accelerator for z/OS support* of the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.
2. Verify that the IBM Db2 Analytics Accelerator for z/OS libraries are part of the STEPLIB statement.

Connection authorization failure (error -4214)

You receive a message about a connection authorization failure with error code -4214.

Symptoms

The full message is similar to this one:

```
[jcc][t4][2010][11246][4.7.89]
Connection authorization failure occurred.
Reason: Local security service non-retryable error.
ERRORCODE=-4214, SQLSTATE=28000
```

Causes

No access to the Db2 subsystem, although z/OS can be accessed.

Diagnosing the problem

The error is probably due to a missing RACF authorization.

Resolving the problem

Check the RACF security settings.

Errors during ZPARM compilation

You receive error messages during ZPARM compilation.

Symptoms

You receive the following error messages:

```
X00370097
VOLTDEVT=SYSDA,                  X00370098
XLKUPDLT=NO,                     X00370099
ZOSMETRICS=NO
 ** ASMA017W Undefined keyword parameter; default to positional,
 including keyword - DSN6S/OPTIOWGT
 ** ASMA017W Undefined keyword parameter; default to positional,
 including keyword - DSN6S/OPTJBPR
 ** ASMA017W Undefined keyword parameter; default to positional,
 including keyword - DSN6S/ZOSMETRICS
 ** ASMA435I Record 3165 in Db291.ISAO.LAB.SDSNMACS(DSN6SPRM)
 on volume: TSMS08
 57+*         Avoid overflow      DK153
 000000       00000 00814    60+DSN6SPRM
 CSECT        CSECT name     02-DSNDS
```

Causes

These errors are caused by the following parameters, which are unknown because they have been introduced by Program Temporary Fixes (PTFs) that are newer than those included in the base level of the libraries with IBM Db2 Analytics Accelerator for z/OS support:

- OPTIOWGT
- OPTJBPR
- ZOSMETRICS

Resolving the problem

Update the libraries with IBM Db2 Analytics Accelerator for z/OS support.

DRDA connection does not work

You can ping the accelerators, but you cannot establish a distributed relational database access (DRDA) connection between your database management system and the accelerator.

Symptoms

Db2 commands or IBM Db2 Analytics Accelerator for z/OS stored procedures cannot establish a TCP/IP connection with the accelerator. Running the SYSPROC.ACCEL_TEST_CONNECTION stored procedure reveals this issue.

Resolving the problem

Make sure that the distributed data facility (DDF) of Db2 for z/OS uses the same TCP/IP stack as the ping program.

Package not found when running a stored procedure from IBM Db2 Analytics Accelerator Studio

You receive a message saying that a package was not found when you try to run an IBM Db2 Analytics Accelerator for z/OS stored procedure from IBM Db2 Analytics Accelerator Studio.

Symptoms

You receive a message similar to this one:

```
SQL0805N  Package "<location>.NULLID.SYSSTAT.5359534C564C3031"
was not found. SQLSTATE=51002
```

Causes

The package has not been bound due to an IBM Db2 Analytics Accelerator Studio installation error.

Resolving the problem

Bind the package manually. The following methods can be used:

- From the Db2 command-line client:
  1. `cd <Db2-client-install-folder>\bnd`

     where `<Db2-client-install-folder>` is the fully qualified path to the installation folder of the Db2 command-line client.
  2. `db2 connect to <database-name>`

     where `<database-name>` is the database to which the stored procedure belongs.
  3. `db2 bind @db2cli.lst grant public`
- Using the Db2Binder utility from a Windows command-prompt:

1. Adjust the following command as needed. Then press the Enter key.

   ```
   cd /d <idaa-studio-install-directory>
   \plugins\com.ibm.datatools.db2_2.1.403.v20120228_2105\driver
   ```

   where <idaa-studio-install-directory> is the drive and installation directory of IBM Db2 Analytics Accelerator Studio on your local workstation, for example C:\Program Files\IBM\ IBM Db2 Analytics Accelerator Studio 2.1. The full name of the com.ibm.datatools.db2_ directory changes with each new driver. So make sure that you choose the correct directory.
2. Enter:

   ```
   ..\..\..\jre\bin\java -cp db2jcc4.jar;
   db2jcc4_license_cisuz.jar;
   db2jcc4_license_cu.jar com.ibm.db2.jcc.Db2Binder
   -url jdbc:db2://<server>:<port>/<location>
   -user <user-id> -password <password>
   ```

   where

   <server>
   Is the host name of the Db2 data server

   <port>
   Is the port on which the Db2 data server listens to JDBC requests

   <location>
   Is the unique name of the database server. An application uses the location name to access a Db2 database server. A database alias can be used to override the location name when accessing a remote server.

   <user-id>
   Is a user ID with the privilege of running the Db2 Binder utility

   <password>
   Is the password belonging to <user-id>

SQL code -430 from IBM Db2 Analytics Accelerator for z/OS stored procedures

A stored procedure of IBM Db2 Analytics Accelerator for z/OS ends abnormally, and you receive an error message with SQL code -430.

Symptoms

IBM Db2 Analytics Accelerator for z/OS stored procedures end abnormally. In IBM Db2 Analytics Accelerator Studio, the Administration Explorer returns a message window like this one:

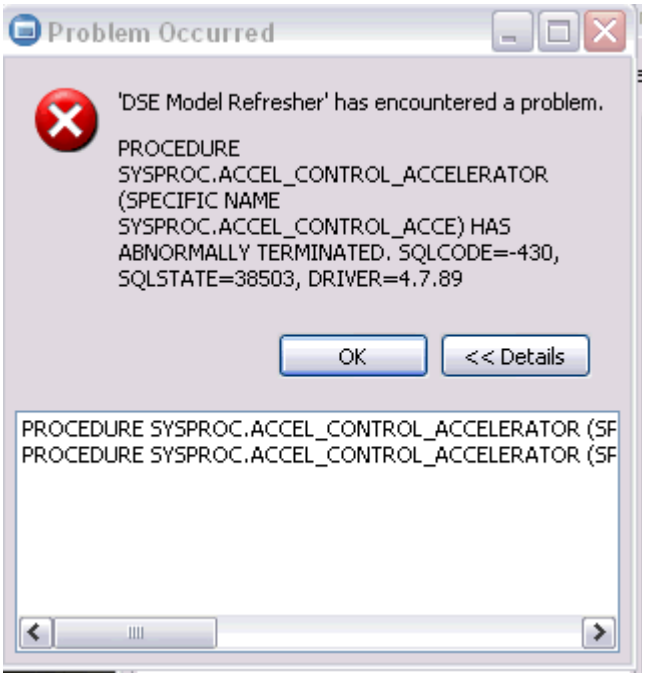


Figure 21. SQL code -430 message window

Causes

This might be a configuration problem.

Diagnosing the problem

1. Verify that the IBM Db2 Analytics Accelerator for z/OS stored procedures run in a separate Workload Manager (WLM) environment. Each application environment must be set up according to the instructions in *Setting up a WLM application environment for IBM Db2 Analytics Accelerator for z/OS stored procedures*. In particular, the ADMIN_INFO_SYSPARM and DSNUTILU stored procedures must run in different WLM environments and NUMTCB must be set to the correct value.
2. If the problem persists, collect the following diagnostic information for IBM support:
   - CEEDUMP in the WLM job
   - Stored procedure trace files in the z/FS directory `/tmp`. The names of these files follow this pattern:

     ```
     aqt-trace-<YYYYMMDD-HHMM>-<procedure name>-*
     ```

     Example:

     ```
     aqt-trace-20171113-1028-ACCEL_TEST_CONNECTION-ghbHxQ
     ```

   Transfer the trace files in binary mode.

SQL code -471 referring to a function in the DSNAQT schema

You receive a message with `SQLCODE= -471` and reason code `00E79002` when trying to run the internal function DSNAQT.ACCEL_READFILE3.

Symptoms

You see an error message that is similar to the following:

```
DSNT408I SQLCODE = -471, ERROR: INVOCATION OF FUNCTION OR PROCEDURE
DSNAQT.ACCEL_LIST_SOFTWARE FAILED DUE TO REASON 00E79002
DSNT418I SQLSTATE = 55023 SQLSTATE RETURN CODE
DSNT415I SQLERRP = DSNX9GPL SQL PROCEDURE DETECTING ERROR
DSNT416I SQLERRD = -40 0 0 -1 0 0 SQL DIAGNOSTIC INFORMATION
DSNT416I SQLERRD = X'FFFFFFD8' X'00000000' X'00000000' X'FFFFFFFF'
X'00000000' X'00000000' SQL DIAGNOSTIC INFORMATION
```

Causes

In addition to externally published stored procedures in the SYSPROC schema, IBM Db2 Analytics Accelerator for z/OS employs user-defined functions internally. These functions are included in the DSNAQT schema and serve the following purposes:

- Reading temporary trace files from IBM Db2 Analytics Accelerator for z/OS stored procedures (function DSNAQT.ACCEL_READFILE3)
- Checking available stored-procedure interface versions (function DSNAQT.ACCEL_GETVERSION)

If such a function was stopped for some reason (for example by a database administrator), the end-user who has triggered the execution of the internal function sees a Db2 error `-471 00E79002`.

Resolving the problem

1. From your Db2 subsystem, check the function status by using the following command:

   ```
   -DIS FUNCTION SPECIFIC (DSNAQT.*)
   ```

2. If the function is not in the state `STARTED`, start it with the following command:

   ```
   -STA FUNCTION SPECIFIC (DSNQAT.*)
   ```

The trace information that was supposed to be delivered to the caller of the stored procedure in a Db2 result set has been kept in its temporary location (`/tmp` by default). Thus you can still transfer this information after restarting the stopped function.

SYSPROC.ACCEL_LOAD_TABLES returns SQL error -471 and reason code E790002 for DSNUTILU

You try to load accelerator tables, but the SYSPROC.ACCEL_LOAD_TABLES stored procedure returns SQL error -471 and reason code E790002. This error is related to the Db2 stored procedure SYSPROC.DSNUTILU.

Symptoms

The load performance is poor and load processes do not run to completion.

Causes

Wrong setup of the Workload Manager (WLM) application environment for DSNUTILU

Resolving the problem

1. See “Adjusting WLM performance goals for SYSPROC.ACCEL_LOAD_TABLES” on page 35.
2. If you still see -471 errors, consider changing the value of the STORTIME ZPARM to NOLIMIT (the default is 180 seconds).

Load of partitioned tables freezes during unload phase

You can load unpartitioned tables without problems, but the process stalls when you try to load tables with more than one partition.

Symptoms

The Db2 command -DISPLAY UTIL(*) shows two or more UNLOAD utility processes that appear to be active, but only with a few unloaded rows. The number of displayed unloaded rows does not change when you run the -DISPLAY UTIL(*) command repeatedly.

Causes

The Db2 stored procedure SYSIBM.DSNUTILU has been started more than once in the same address space.

Resolving the problem

1. Make sure that `NUMTCB` is set to `1`.

   You can change the value in the JCL for the setup of the Workload Manager (WLM) application environment (part of SYSIBM.DSNUTILU) so that it is set when you run the SYSIBM.DSNUTILU stored procedure, or set it as a start parameter in the definition of the WLM application environment.

   Important: A NUMTCB start parameter in the definition of the application environment overrides an equivalent setting in the JCL.
2. Make sure that the address space for DSNUTILU is managed by the WLM and not limited to a single instance per system or per sysplex.

Chapter 15. Opening a service request

You might run into a situation in which you have to contact IBM support because you cannot solve an issue by yourself. A reason might be that specific updates or patches are required to successfully complete maintenance or repair jobs on the accelerator. Such jobs are usually carried out by an IBM service engineer. Follow the steps here to open a service request (formerly called problem management record or PMR) and provide IBM support with the necessary information.

1. In IBM Db2 Analytics Accelerator Studio, enable tracing for the accelerator that you want to update. A trace level of DEFAULT is sufficient.

   For more information, see *Tracing* in the *IBM Db2 Analytics Accelerator Studio: User's Guide*.
2. Save the trace information to a file.
3. Open a service request at https://www.ibm.com/support/servicerequest/Home.action. Consider that IBM support needs some time to analyze your system, coordinate maintenance actions, and update components as required.
4. Attach the trace file to the service request.

Transferring maintenance updates

A task that is closely related to service requests is the transfer of maintenance updates. When you have submitted the service request, IBM support will tell you the proper download location and the names of the packages that you have to download. After finishing the download, transfer the update packages as a preparation for the IBM service personnel, who will help you install the updates on your IBM Integrated Analytics System.

Before you begin

Update packages must exist in the download directory for packages of this type in the z/OS UNIX file system (zFS). The target system must be able to access this directory.

Important: The AQT_HOST_PACKAGE_DIRECTORY environment variable points to this download directory. It specifies an absolute path (starting from the root directory). The AQT_HOST_PACKAGE_DIRECTORY environment is set in the `<HLQSP>.SAQTSAMP(AQTENV)` data set, where `<HLQSP>` is the chosen high-level qualifier for stored-procedure libraries. The value of this environment variable determines where IBM Db2 Analytics Accelerator Studio looks for updates. If it is not set correctly, the packages cannot be located and thus cannot be transferred to the IBM Integrated Analytics System. To avoid a setup with obsolete or wrong entries, use the sample AQTENV data set that comes with IBM Db2 Analytics Accelerator for z/OS Version 7.1.0.

About this task

In general, maintenance update packages are not installed automatically. They are just transferred to a directory on the IBM Integrated Analytics System, from where you must install them manually with the help of IBM support.

Transferring an update invokes the **SYSPROC.ACCEL_UPDATE_SOFTWARE2** stored procedure on your data server. For information about the privileges that are required to run this procedure and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related reference** at the end of this section.

To start an update transfer process, follow the steps in this section.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. In the Administration Explorer, select the **Accelerators** folder.
3. In the Object List Editor on the right, double-click the accelerator.
4. If necessary, expand the **About** section.
5. In the **About** section, click the **Transfer updates** link.
6. In the Transfer Updates window, you can see all software packages that are available in the zFS of your z/OS data server. Select the appropriate check boxes in the first column of the table to mark the packages that you want to transfer.

   Attention:

   - Make sure that you select the proper packages, that is, packages belonging to the release level that you want to upgrade to. The list in the Transfer Updates window might be confusing, especially if it also contains older packages. To find the correct package numbers, see the closing information or the release notes for the latest program temporary fix (PTF). You find the closing information or the release notes for a PTF on the support home page, in the category *Plan and install documentation* (see link under **Related information** at the end of this topic). If a PTF was shipped with a major product release, then, in general, you must transfer the packages included in the PTF rather than the packages in the base version.
   - If the list contains too many packages so that selecting the proper ones becomes awkward, select unwanted package names and click **Remove**. This will just remove the packages from the list or view, but won't delete the package files from the z/FS or your client workstation.
7. Choose the appropriate method to transfer the selected packages:

   Transfer file from client
   To transfer one or more downloaded packages from the connected client workstation.

   Transfer file from IBM Z
   To transfer one or more packages from the z/FS of your z/OS data server.

Installing maintenance updates

While updates for IBM Db2 Analytics Accelerator for z/OS and the databaseare installed automatically at the end of the transfer process or by using the **Apply** function, other updates have to be installed manually with the help of IBM support.

Before you begin

Make sure that the following conditions apply:

- You have opened a service request as described in Chapter 15, "Opening a service request," on page 87.
- The IBM Integrated Analytics System must be fully operational. Hardware problems must not exist. Replace defective hard disks before installing the update.
- Remote access from z/OS OMVS to the accelerator via secure shell (ssh) must be enabled.
- IBM support will ask you to open or allow a screen-sharing session on your workstation. Make sure that this complies with the security guidelines of your organization or ask the responsible staff for a special permit.

About this task

An update installation requires you to stop the database container for approximately 30 minutes. The accelerator cannot be used during this time.

Procedure

1. Contact IBM support. IBM support will ask you for remote screen-sharing access to the client machine.
2. With IBM assistance, open a login shell to the accelerator. There are several ways to do that:
   - If an ssh server and an ssh client are installed in the z/FS of your IBM Z, and if server and client have been activated, you can connect with a network client application, such as PuTTY, from your client workstation to the accelerator by opening the following connections:
     a. From your workstation to the IBM Z server by ssh. Use your user ID and password to log in. See an example of an ssh login from a PuTTY window:

        ```
        login as: willy
        willy@boedca1's password:
        ```

        Important: If your z/OS version is V2R2 or higher, make sure that the address space for the Cryptographic Service Facility (CSF) has been started. Otherwise, the ssh connection to z/OS will fail.

     b. From the IBM Z to the accelerator by ssh. See the following example:

        ```
        ssh -p 2222 root@10.104.9.3
        ```

        where:

        2222
        is the listening port on the accelerator

        10.104.9.3
        is the IP address of the accelerator

   - If an ssh server is installed and active on your IBM Z, and if port-forwarding is enabled for that server, you can connect to the accelerator by an ssh tunnel, which looks like a single connection from your client workstation to the accelerator. To enable port-forwarding, set `AllowTcpForwarding yes` in the `/etc/ssh/sshd_config` file of your zFS and restart the ssh server for the change to take effect.

     Example: The commands for a tunnel connection would look similar to these:

a. `ssh -L 10022:10.0.0.1:2222 user@systemz`

   where:

   -L 10022
   is the local port on the client workstation

   10.0.0.1
   is the IP address of the accelerator

   2222
   is the remote port or listening port on the accelerator

   user@systemz
   `user` is ID with which you log on to the UNIX System Services ssh server and `systemz` is the host name of that server.

b. `ssh -p 10022 root@localhost`

   where:

   -p 10022
   is the local port on the client workstation

   root@localhost
   `root` is the user ID on the accelerator and `localhost` is the host name of the client workstation

Tip: IBM provides a tool package called IBM Ported Tools for z/OS, which is free of charge. One of the programs in this package is called OpenSSH, which contains an ssh client component that you can use to connect from the zFS to the accelerator. Note that you only need the client component of OpenSSH for maintenance updates (called **ssh**). For more information, see:

http://www.ibm.com/systems/z/os/zos/features/unix/ported

The resulting login screen looks similar to this:

```
Using keyboard-interactive authentication.
Secure token for service password
(this token must be sent to IBM together with the serial# the first time you request
a service password):

MHu2cK9FLC2pIkyAEbOoyDxK1yU7UQO1VPyXVviVxwGRtAC3gBiXiio5YLXzQTCQRfL/TRyuG8zFBC2CkSe3
GXPrFjM9KgB41gEFYOoxSEhjXY0S89fKGa7E/M+/VCdnsfHX2k2GpBq0XpyVPps6o0Q==

Enter Service Password (Date: '20170506' Serial#: '7130001' Rev: '4'):
```

3. As you enter the command to log on to the machine, the secure token, which contains the encrypted machine password, is displayed on the screen. In the previous example, this is the cryptic string that starts with `MHu2cK`. For the first service session, submit this token and the machine serial number to IBM support. IBM support will then generate a service password. You have to submit the secure token only for the first service session. The token is stored in an IBM service database for subsequent requests. This database cannot be accessed from the internet. If a further service session is required, you just have to give IBM support the serial number of the machine.
4. IBM support will enter the service password for you. The password will be valid exclusively for your accelerator machine and for the current date only.
5. Navigate to the directory on the accelerator in which the transferred update files are stored.
6. To proceed, follow the instructions of IBM support.

7. Having installed the updates, delete the files that are not needed anymore.
8. Terminate the ssh session by entering `exit` at the command prompt.

Appendix A. Members of SAQTSAMP

The SAQTSAMP data set contains various samples for installing, configuring or running the product's stored procedures. The following table lists all these members and provides brief descriptions of their functions.

Table 2. Members of the SAQTSAMP data set

Member name	Function
AQTENV	Default environment variable settings for the stored procedures.
AQTDEF6	Default trace specification and other settings for the **message** input parameter. The default input is used when stored procedures are called with a NULL value or empty string in the **message** input parameter. The sample uses a verbosity level of INFO for all stored procedure calls and specifies that the traces are to be kept in a specific directory if the procedure ends with an error. To use this member, you must add an appropriate DD statement (`DD AQTDEF6`) to the JCL that starts the Workload Manager (WLM) environment for IBM Db2 Analytics Accelerator stored procedures.
AQTSCALL	Sample application program in the C programming language with embedded SQL CALL statements for calling IBM Db2 Analytics Accelerator stored procedures.
AQTSCI01	Db2 command line processor script that calls the following stored procedures in the order indicated: 1. SYSPROC.ACCEL_REMOVE_TABLES (returns only the version of the stored procedure) 2. SYSPROC.ADMIN_INFO_SYSPARM 3. SYSPROC.ADMIN_COMMAND_Db2(-DIS ACCEL) 4. SYSPROC.ADMIN_COMMAND_Db2(-DIS GROUP) 5. SYSPROC.DSNUTILU(UNLOAD)

Table 2. Members of the SAQTSAMP data set (continued)

Member name	Function
AQTSCI02	Db2 command line processor script that calls the following stored procedures and Db2 commands in the order indicated: 1. SYSPROC.ACCEL_ADD_ACCELERATOR for the initial setup Running this stored procedure requires a valid pairing code. You must therefore edit AQTSCI02 so that a valid pairing code is provided when SYSPROC.ACCEL_ADD_ACCELERATOR is invoked. **Important:** In the sample script, the call of this stored procedure has been commented out. To activate the call, you must uncomment the corresponding line. 2. SYSPROC.ACCEL_TEST_CONNECTION 3. SYSPROC.ACCEL_ADD_TABLES 4. SYSPROC.ACCEL_GET_TABLES_INFO 5. SYSPROC.ACCEL_LOAD_TABLES To enforce a reload of the accelerator-shadow tables and enable these for query acceleration: 1. SYSPROC.ACCEL_LOAD_TABLES 2. SYSPROC.ACCEL_SET_TABLES_ACCELERATION(ON) To execute the query: 1. START -ACCEL 2. Query execution 3. SYSPROC.ACCEL_GET_QUERIES 4. STOP -ACCEL To check various other functions: 1. SYSPROC.ACCEL_REMOVE_TALBES 2. SYSPROC.ACCEL_CONTROL_ACCELERATOR (including the various subfunctions) 3. SYSPROC.ACCEL_REMOVE_ACCELERATOR **Important:** In the sample script, the call of this stored procedure has been commented out. To activate the call, you must uncomment the corresponding line. **Note:** This script requires customization.
AQTSJI00	JCL that collects information about required IBM Db2 Analytics Accelerator databases and tables.
AQTSJI01	JCL that calls the Db2 command line processor for verifying IBM Db2 Analytics Accelerator stored procedures without an accelerator.
AQTSJI02	JCL that calls all verification steps one-by-one. For a successful completion, a running and connected accelerator is required.
AQTSJI03	JCL that compiles, links, and invokes the AQTSCALL sample program, which calls IBM Db2 Analytics Accelerator stored procedures. For a successful completion of the job, a running accelerator is required.

Table 2. Members of the SAQTSAMP data set (continued)

Member name	Function
AQTSSCHK	UNIX System Services shell script that checks the output of Db2 command line processor scripts containing IBM Db2 Analytics Accelerator stored procedure calls. If BPXBATCH is used to call this script, as in the AQTSJI02 member, the return code of this job step is determined by the **MESSAGE** output parameters of the stored procedures. Divide this return code by 256 to determine the severity of an error: **0** All stored procedures that were called returned information messages **4** Warning (return code 1024) **8** Error (return code 2048) **12** Severe (return code 3072)
AQTSSCPY	UNIX System Services shell script that copies SAQTSAMP members to the `/tmp/ivp` directory in the z/OS UNIX file system. **Note:** Db2 command line processor scripts cannot be run from a data set.
AQTSXADD	XML definition of a simple table specification (`<tableSpecifications>` element). This XML code can be used as input for the SYSPROC.ACCEL_ADD_TABLES stored procedure.
AQTSXALT	XML definition of a table specification as input for the SYSPROC.ACCEL_ALTER_TABLES stored procedure.
AQTSXCN0	XML code for the deletion of collected trace data. The XML code is used as the value of the **COMMAND** parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXCN1	XML code for the retrieval of accelerator status information. The XML code is used as the value of the **COMMAND** parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXCN2	XML code for the configuration of accelerator tracing. The XML code is used as the value of the **COMMAND** parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXCN3	XML code for the collection of trace data. The XML code is used as the value of the **COMMAND** parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXCN4	XML code that lists the active tasks on the accelerator. The XML code is used as the value of the **COMMAND** parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXIM0	XML code that returns just the version of an IBM Db2 Analytics Accelerator stored procedure without executing its actual function. The XML code is used as the value of the **MESSAGE** input parameter.
AQTSXQHI	XML definition that serves as an input value for the QUERY_SELECTION parameter of the SYSPROC.ACCEL_GET_QUERIES stored procedure.
AQTSXSD1	All XML schema definitions (xsd files) for the input and output parameters of the IBM Db2 Analytics Accelerator stored procedures.
AQTSXTCO	XML definition that serves as an input value for the DIAGNOSTIC_INPUT parameter of the SYSPROC.ACCEL_TEST_CONNECTION stored procedure.
AQTSXTS0	XML definition of a table set as input for various stored procedures.
AQTSXTSL	XML definition that serves as an input value for the TABLE_LOAD_SPECIFICATION parameter of the SYSPROC.ACCEL_LOAD_TABLES stored procedure.

Table 2. Members of the SAQTSAMP data set (continued)

Member name	Function
AQTSXTSU	XML definition for an update of selected table partitions. The definition serves as an input value for the TABLE_LOAD_SPECIFICATION parameter of the SYSPROC.ACCEL_LOAD_TABLES stored procedure.
AQTTIJSP	JCL for the installation of the IBM Db2 Analytics Accelerator stored procedures.

Appendix B. Environment variables

The job control language (JCL) for the configuration of the Workload Manager (WLM) environment for IBM Db2 Analytics Accelerator stored procedures contains a data definition (`DD`) `"AQTENV"`. This data definition includes a data set in which environment variables are defined. These variables control the behavior of some stored procedures.

Important:

- When editing the AQTENV data set with an ISPF editor, make sure not to use the NUM ON option. Otherwise the line numbers of the columns from 72 to 80 become part of the variable values. Also, do not insert blanks before or after the equals sign and make sure that you do not have trailing blanks at the end of the line.

  The AQTENV data set is made available to the stored procedures by the RUN OPTION `'ENVAR("_CEE_ENVFILE_S=DD:AQTENV")'`, which is set in the CREATE PROCEDURE statement for each procedure. If a line in the AQTENV data set matches the pattern *`NAME=VALUE`*, the environment variable *`NAME`* is set to *`VALUE`*. For more information, follow the **Related information** link at the end.
- Make sure that the permissions for the AQTENV data set include read access for all users who execute stored procedures. Otherwise, the environment variable settings do not take effect and corresponding error messages are written to the system log.
- After modifying settings in the AQTENV data set, refresh the WLM environment so that the changes can take effect.
- When upgrading to a new release, always use the AQTENV sample that is provided with the new version as a template for your own AQTENV data set. This ensures that you do not set obsolete environment variables and specify all mandatory new variables that were introduced with the new release.

You can set or override environment variables temporarily on a per-call basis. Settings will be valid only for the duration of a stored-procedure call. For more information, follow the link to the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference* at the end of this topic.

AQT_HOST_PACKAGE_DIRECTORY
: Update packages can be downloaded to and transferred from a directory in the UNIX file system (z/FS) of your z/OS data server or from a workstation. If a z/FS directory is used, you must set AQT_HOST_PACKAGE_DIRECTORY to an absolute path to point to the directory containing the update packages because IBM Db2 Analytics Accelerator Studio and the SYSPROC.ACCEL_UPDATE2 stored procedure look for update packages in this directory. Most update packages must be downloaded from IBM Shopz or from IBM Fix Central. In the following steps, they are transferred to the accelerator, from where they are deployed and activated. There might be packages that you cannot install by yourself, but require the help of IBM support. For these types of updates, you must open a service request first. For more information, follow the link to *Opening service requests* at the end of this topic.

AQT_DO_SYSLOGGING
: Causes messages about the start and the completion of load operations to be written to the SYSLOG of the z/OS LPAR in which the

SYSPROC.ACCEL_LOAD_TABLES stored procedure runs. Messages contain the name of the accelerator, the task number of the load jobs, and information about the reduction or increase of parallel processing threads (up to the limit set by AQT_MAX_UNLOAD_IN_PARALLEL). The variable is set by default (`AQT_DO_SYSLOGGING=SET`). To suppress these messages, comment out this line.

AQT_KEEPIDLE_INTERVAL
Specifies an interval that determines for how long a TCP/IP connection can be idle before keep-alive-packages are sent to the connected accelerator. The stored procedures build TCP/IP connections to the accelerator. To avoid connection failures caused by implicit connection closures, routers, or VPN (virtual private network) tunnels, TCP sends keep-alive-packages or probes after a period of time during which the network was idle. This is necessary to keep the connections up during long running load operations.

This setting affects all stored procedures and overwrites the KEEPALIVEOPTIONS settings for the TCP/IP stack that is specified in the Worload Manager (WLM) environment of the IBM Db2 Analytics Accelerator stored procedures. By default, the interval is set to 60 seconds. If the setting should turn out to be the source of problems, change the value or disable the mechanism entirely by commenting out the corresponding line in the AQTENV data set.

Note that socket connections between the stored procedures and the accelerator are also configured to send keep-alive-packages, and that the NO_DELAY and NON_BLOCKING options are set for the sending of these packages.

AQT_MAX_RETRIES_DSNUTILU
Determines how many times the SYSPROC.ACCEL_LOAD_TABLES stored procedure tries to call DSNUTILU if the attempt failed in the first place with SQL code `-471` and reason code `00E79002` (timeout error). The default value is 2.

AQT_MAX_UNLOAD_IN_PARALLEL
The maximum number of parallel DSNUTILU invocations used by the SYSPROC.ACCEL_LOAD_TABLES stored procedure when loading data from a partitioned Db2 table. Increasing the value leads to a better performance, provided that enough processors are available to handle additional parallel processes. Note also that increasing the value of AQT_MAX_UNLOAD_IN_PARALLEL to more than 8 might not increase the throughput any further. The default value is 4.

AQT_QUOTEFIX1026
Converts Turkish characters that would otherwise cause errors during table load operations. This variable is set by default (`AQT_QUOTEFIX1026=SET`).

AQT_RTS_EXTERNALIZATION_AUTH_FAILURE
Determines the behavior if the Db2 command `-ACCESS DATABASE (ACCESS DB)` is called by a stored procedure, but cannot be invoked because the user who runs the stored procedure lacks the proper authorization. Possible values:

`ERROR (default)`
Processing stops and an error message is displayed.

`WARNING`
Processing continues, but a warning is displayed at the end of the process. There will be just one generic warning.

IGNORE
Processing continues without a warning or error message.

AQT_SECONDS_BEFORE_RETRY_DSNUTILU
Specifies the interval in seconds between DSNUTILU calls (retries). By default, this interval is set to 60 seconds.

AQT_SKIP_UNLOAD_EMPTY_PARTS
Suppresses invocations of the Db2 UNLOAD utility (DSNUTILU) when SYSPROC.ACCEL_LOAD_TABLES was called to load an accelerator-shadow table or partition, but the Db2 source table or partition is empty. This improves the performance of the load process. The detection of empty tables relies on Db2 real-time statistics.

Important: If the `<externalTool>` element is used as part of the *table_load_specification* parameter for SYSPROC.ACCEL_LOAD_TABLES, the Db2 UNLOAD utility is always called, irrespective of the setting of this variable.

AQT_SKIP_VALIDATE_XML
Skips the validation of XML code when it is returned in result sets or output parameter strings. The omission of this step leads to a better performance, especially when large result sets are returned. To disable this setting (turn XML validation on), comment out the line in the AQTENV data set.

AQT_SORTDEVT
Specifies the device type to use when sorting temporary data sets dynamically. This setting is used by the sort program when anIBM Db2 Analytics Accelerator stored procedure sends a request to a Db2 Utility that includes a sort job like this.

AQT_UTILITY_TMP
Specifies a template for the generation of unique temporary data-set names to be used by Db2 utilities. For example, several IBM Db2 Analytics Accelerator stored procedures invoke Db2 utilities, which in turn create temporary data sets with the user ID of the stored-procedure caller as the high-level qualifier. If you do not want this to happen, you can set AQT_UTILITY_TMP to generate a different name. The syntax is:

```
AQT_UTILITY_TMP = &USERID..AQT.&UNIQ.
```

where

&USERID.
ID of the user who runs the stored procedure

&UNIQ.
Causes the creation of a unique identifier

The specification needs to resolve to valid and unique data-set names. To ensure uniqueness, always make the &UNIQ. variable part of the template value. The string `AQT` is a constant.

TZ Sets the correct timezone for stored procedures running in the WLM address space that has been configured for IBM Db2 Analytics Accelerator. The setting affects the formatting of timestamps in trace files.

Related information:

TCP_KeepAlive socket option

- IBM DB2 Analytics Accelerator for z/OS: Stored Procedures Reference
- z/OS V1R12.0 XL C/C++ Programming Guide (SC09-4765-11)
- IBM DB2 Analytics Accelerator for z/OS: User's Guide

Appendix C. Disabling accelerators in a Db2 subsystem

It is recommended that you disable an accelerator before you activate an IBM Db2 Analytics Accelerator for z/OS software update or take actions to solve a problem.

Procedure

Use one of the following methods (Db2 command or IBM Db2 Analytics Accelerator Studio):

- In Db2 for z/OS, enter `-stop ACCEL <name>` where `<name>` is the name of the accelerator
- In IBM Db2 Analytics Accelerator Studio:
  1. Go to the Administration Explorer.
  2. Select the **Accelerators** folder.
  3. In the Object List Editor on the right, select the accelerator.
  4. Complete one of the following steps:

     – Click  on the accelerator to disable the selected accelerator without canceling running queries. The accelerator status first changes to *Stopping*, then to *Stopped*. During the *Stopping* phase, running queries are completed.

     – Click the button on the right of the  button and select **Force** from the menu to disable the selected accelerator and cancel all running queries. The status of the accelerator changes to *Stopped* immediately.

     Note: Disabling does not make an accelerator unusable or remove it from the configuration. It just deactivates it. To re-enable an accelerator, click the  button on the toolbar.

Appendix D. Enabling accelerators in a Db2 subsystem

If you have disabled an accelerator before activating an accelerator update or solving a problem, (re-)enable the accelerator so that it becomes operational again.

Procedure

Use one of the following methods (Db2 command or IBM Db2 Analytics Accelerator Studio):

- In Db2 for z/OS, enter `-start ACCEL <name>` where `<name>` is the name of the accelerator.
- In IBM Db2 Analytics Accelerator Studio:
  1. Go to the Administration Explorer.
  2. Select the **Accelerators** folder.
  3. In the Object List Editor on the right, select the accelerator.
  4. Click **Start** on top of the Object List Editor. The status of the accelerator changes from *Stopped* to *Online*.

Glossary

This glossary includes terms and definitions related to the installation of IBM Db2 Analytics Accelerator for z/OS.

The following cross-references are used in this glossary:

- *See* refers you from a term to a preferred synonym, or from an acronym or abbreviation to the defined full form.
- *See also* refers you to a related or contrasting term.

To view glossaries for other IBM products, go to www.ibm.com/software/globalization/terminology (opens in new window).

A

access plan graph
A visual representation of a query that shows the database objects that are accessed by the query and the order in which this is done.

APF See authorized program facility (APF).

authorized program facility (APF)
In a z/OS environment, a facility that permits the identification of programs that are authorized to use restricted functions.

D

DDF See distributed data facility (DDF).

distributed data facility (DDF)
A set of Db2 for z/OS components by which Db2 for z/OS communicates with another relational database management system.

L

lock A means of preventing uncommitted changes made by one application process from being perceived by another application process and for preventing one application process from updating data that is being accessed by another process. A lock ensures the integrity of data by preventing concurrent users from accessing inconsistent data.

P

port-forwarding
A networking mechanism that allows Secure Shell access to a host in a private network from the outside.

S

Secure Shell (SSH)
A UNIX-based command interface and protocol for securely getting access to a remote computer.

S-FTP See SSH File Transfer Protocol.

SSH File Transfer Protocol
A network protocol that provides the ability to transfer files securely over any reliable data stream.

SSH tunnel
A secure and encrypted path through a network.

SSH See Secure Shell (SSH).

systems programmer
A programmer who plans, maintains, and controls the use of an operating system with the aim of improving the overall productivity of an installation.

T

table space
A logical unit of storage in a database. In Db2 for z/OS, a table space is a page set and can contain one or more tables.

throughput
A measure of the amount of information transmitted over a network in a given period of time. Throughput is generally measured in bits per second (bps), kilobits per second (Kbps), or megabits per second (Mbps).

V

virtual IP address
An IP address that is shared among multiple domain names or multiple servers. Virtual IP addressing enables one IP address to be used either when insufficient IP addresses are available or as a means to balance traffic to multiple servers.

W

WLM application environment
A z/OS Workload Manager attribute that is associated with one or more procedures. The WLM application environment determines the address space in which a given procedure runs.

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