pentaho

## Version 5.3


# Administer DI Server

# Copyright Page



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# Introduction

Administration tasks include setting up data connections, importing and exporting content, creating clusters, and configuring logging and monitoring operations.

## Prerequisites

Before you begin, install and configure PDI.

## Expertise

The topics covered in this section are written for IT administrators who know where data is stored, how to connect to it, details about the computing environment, and how to use the command line to issue commands for Microsoft Windows, Linux, or Microsoft OS.

## Tools

We provide a design tool, Spoon, that you can use to perform some tasks. Other tasks must be performed using the command line interface.

# Specify Data Connections for the DI Server

Pentaho Data Integration (PDI) allows you to make connections in each job and transformation through an input step. Although users can create connections themselves, it is best to set up shared connections for your users so that they can simply select the connection they need from a list. We help you download the correct drivers, choose the connection type, and then create the connection.

- Define Native (JDBC) Database Connections
- Define JNDI Connections for the DI Server
- Define OCI Connections for the DI Server

## JDBC Database Connections

To connect to databases, install the driver for your database, as well as define the access protocol and settings now. You can choose from these access protocols.

- **Native (JDBC):** This is a commonly used access protocol. Please see details in the Database Access Protocol Decision Table to ensure you make an informed choice.
- **JNDI:** This also is a commonly used access type. Please see details in the Database Access Protocol Decistion Table to ensure you make an informed choice.
- **ODBC:** We do not support ODBC, and it is our recommendation that you use the JDBC driver instead the ODBC driver. You should only use ODBC when there is the need to connect to unsupported databases by using the generic database driver or other specific reasons. For more information, see Why Should You Avoid ODBC? on the Pentaho public wiki.
- **OCI:** If you are connecting to an Oracle database, you must first install the appropriate OCI driver and add the OCI connection.

Table 1. Database Access Protocol Decision Table

| If You Are Interested In | Choose Options | |
|---|---|---|
| | Native (JDBC) | JNDI |
| • Understanding options | Native (JDBC) connections are the easiest way to get going quickly. You specify the connection information in Spoon. The connections are controlled by the DI Server.<br>If the connection information changes, you change it in Spoon for each connection you have defined. | JNDI connections are maintained in the application server, offering more advanced configuration options. One typical use case is you may want to hide security credentials from administrators of the Pentaho system. You specify the connection information by editing the `context.xml` file and selecting JNDI as the access type in Spoon.<br>If the connection information changes, you change the `context.xml` file. |

| If You Are Interested In | Choose Options | |
|---|---|---|
| | Native (JDBC) | JNDI |
| • Expertise needed | Knowledge of the JDBC driver and options for your RDBMS | Knowledge of Tomcat or JBoss JNDI connection procedures and options |
| • How much time it takes | Approximately 10 minutes | Approximately 30 minutes |
| • **Recommendation** | **Use for the Pentaho Trial Download, evaluating, and rapid development.** | **Use for production or when the work environment is distributed in a network.** |

# Define Native (JDBC) Database Connections

Once you have chosen to use the Native (JDBC) access protocol, here are configuration and maintenance tasks you can perform.

## Add Drivers

The DI Server and workstations need the appropriate driver to connect to the database that stores your data. Your database administrator, Chief Intelligence Officer, or IT manager should be able to provide the appropriate driver. If not, you can download drivers from your database vendor's website. See the Supported Technologies to ensure that your database and its driver are supported by Pentaho.
Note: If you are using a Microsoft SQL Server (MSSQL), you might need to use an alternative, non-vendor-supported driver called JTDS. Contact Pentaho support to ensure that you are adding the correct driver.

**Installing Drivers**

Once you have the correct driver, copy it to these directories.

**DI Server:** `/pentaho/server/data-integration-server/tomcat/webapps/pentaho-di/WEB-INF/lib/ .`

**Spoon:** `data-integration/lib`

You must restart Spoon for the driver to take effect.

There should be only one driver for your database in this directory. Ensure that there are no other versions of the same vendor's driver in this directory. If there are, back up the old driver files and remove them to avoid version conflicts. This is a concern when you are adding a driver for the same database type as your Pentaho solution repository. If you have any concerns about how to proceed, contact Pentaho support.

When the driver files are in place restart the server.

**Connecting to a Microsoft SQL Server Using Integrated or Windows Authentication**

If you are using a Microsoft SQL Server (MSSQL), you might need to use an alternative, non-vendor-supported driver called JTDS. Contact Pentaho support to ensure that you are adding the correct driver

For Microsoft Windows, most JDBC drivers support Type 2 integrated authentication through the `integratedSecurity` connection string property. To use integrated authentication, copy the `sqljdbc_auth.dll` file to all machines and directories to which you copied the JDBC driver. You can find this file in this location.

```
<installation directory>\sqljdbc_<version>\<language>\auth\
```

| If running: | Use the sqljdbc_auth.dll file here: |
|---|---|
| 32-bit Java Virtual Machine (JVM) even if the operating system is version x64 | x86 folder |
| 64-bit JVM on a x64 processor | x64 folder |
| 64-bit JVM on an Itanium processor | IA64 folder |

# Specify Native (JDBC) Connection Information

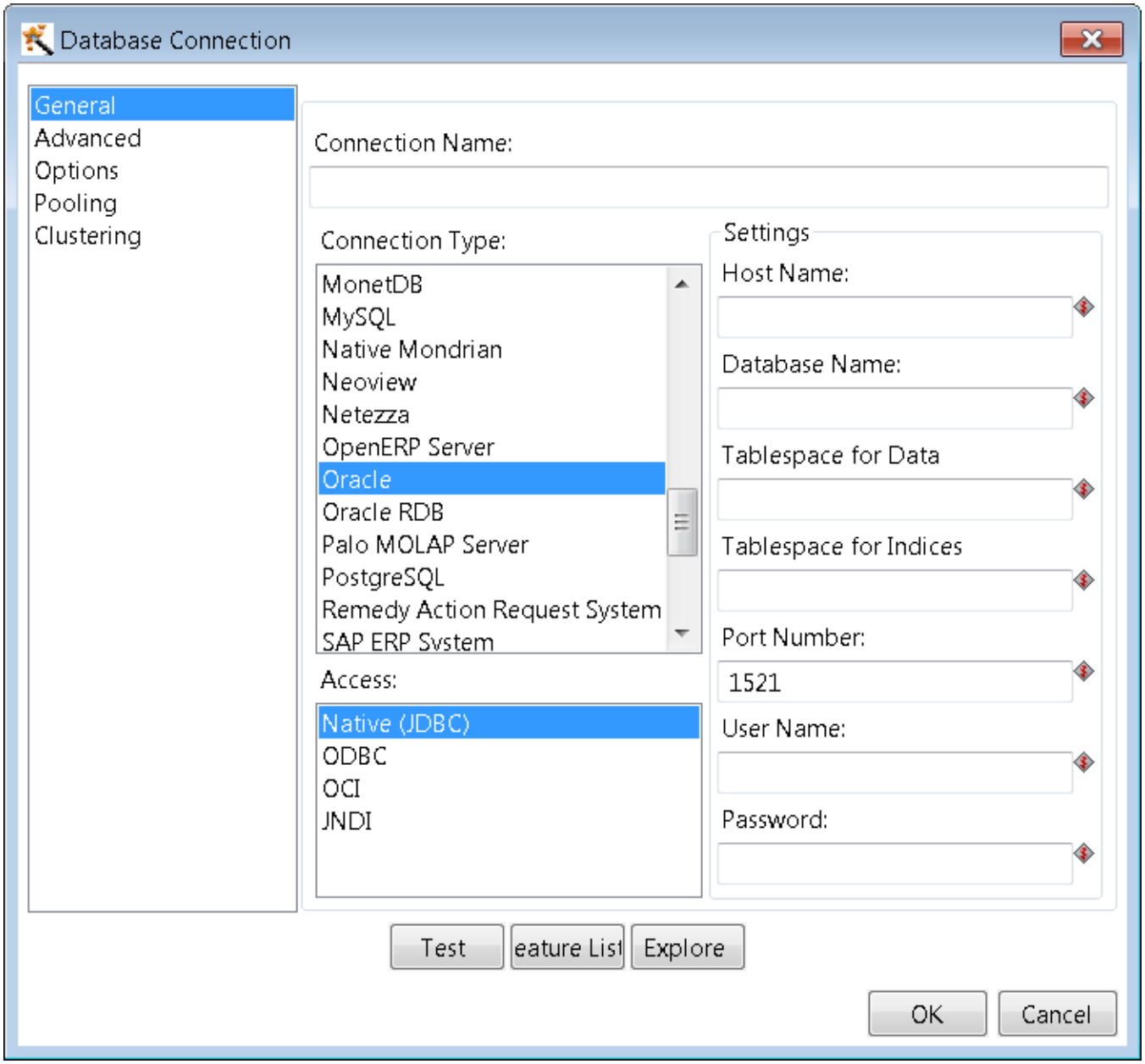
Before you can create the connection, you must have installed the appropriate JDBC driver for your particular data.

Pentaho Data Integration (PDI) allows you to define connections to multiple databases provided by multiple database vendors (MySQL, Oracle, PostgreSQL, and many more). PDI ships with the most suitable JDBC drivers for PostgreSQL, our default database.
Note:

Pentaho recommends that you avoid using ODBC connections. The ODBC to JDBC bridge driver does not always provide an exact match and adds another level of complexity that may affect performance. The only time you may have to use ODBC is if there is no available JDBC driver. For details, this article explains "Why you should avoid ODBC." http://wiki.pentaho.com/pages/viewpage.action?pageId=14850644.

When you define a database connection, the connection information (for example, the user name, password, and port number) is stored in the DI Repository and is available to other users when they connect to the repository. If you are not using the DI Repository, the database connection information is stored in the XML file associated with the transformation or job.

Connections that are available for use with a transformation or job are listed under the **Database connections** node in the **View** pane in Spoon.
You must have information about your database, such as your database type, port number, user name and password, before you define a JDBC connection. You can also set connection properties using variables. Variables provide you with the ability to access data from multiple database types using the same transformations and jobs.
Note: Make sure to use clean ANSI SQL that works on all used database types.




1. From within **Spoon**, navigate to the **View** tab of the **Explorer** pane. Double-click on the **Database connections** folder. The **Database Connection** dialog box appears.

| Section Name | What to Do |
|---|---|
| **Connection Name** | Type name that uniquely identifies your new connection |
| **Connection Type** | Select the type of database to which you are connecting |
| **Access** | Select your method of access. Available access types depend on the connecting database type. |

| Section Name | What to Do |
|---|---|
| **Host Name** | Type the name of the server that hosts the database to which you are connecting. Alternatively, you can specify the host by IP address. |
| **Database Name** | Enter the name of the database to which you are connecting. If you are using a ODBC connection, enter the Data Source Name (DSN) in this field. |
| **Port Number** | Enter the TCP/IP port number if it is different from the default. |
| **User name** | Optionally, type the user name used to connect to the database. |
| **Password** | Optionally, type the password used to connect to the database. |

2. Click **Test**. A confirmation message displays if Spoon is able to establish a connection with the target database.
3. Click **OK** to save your entries and exit the Database Connection dialog box.
4. From within the View tab, right-click on the connection and select **Share** from the list that appears. This shares the connection with your users. They will be able to select the shared connection. From within the View tab, click **Explore** to open the **Database Explorer** for an existing connection. This shows you the schemas and tables inside the connection.

## Add Database-Specific Options

Add database-specific options by adding parameters to the generated URL.

1. From within the **Database Connection** dialog box, select **Options**.
2. Select the first available row in the parameter table.
3. Choose the database type and enter a valid parameter name and its corresponding value.
   Note: For more database-specific configuration help, click **Help**. A new browser opens and displays additional information about configuring the JDBC connection for the currently selected database type.
4. Click **OK** to save your entries.

## Advanced Configuration of Database Connections

The **Advanced** option in the **Database Connection** dialog box allows you to configure properties that are, for most part, associated with how SQL is generated. These options allow you to set a standard across all of your SQL tools, ETL tools and design tools. All database table names and column names are always upper case or lower case no matter what users do in the tools.

| Feature | Description |
|---|---|
| **Supports boolean data types** | Instructs PDI to use native boolean data types if supported by the database. |

| Feature | Description |
|---|---|
| **Quote all in database** | Enables the databases to use a case-sensitive tablename (for example MySQL is case-sensitive on Linux but not case sensitive on Windows). If you quote the identifiers, the databases will use a case sensitive tablename. |
| **Force all to lower case** | Enables all identifiers to lower case. |
| **Force all to upper case** | Enables all identifiers to upper case. |
| **Preferred schema name...** | Enter the preferred schema name (for example, MYSCHEMA). |
| **Enter SQL name...** | Enter the SQL statement used to initialize a connection. |

Pentaho has implemented a database-specific quoting system that allows you to use any name or character acceptable to the supported databases' naming conventions.

Pentaho Data Integration contains a list of reserved words for most of the supported databases. To ensure that quoting behaves correctly, Pentaho has implemented a strict separation between the schema (user/owner) of a table and the table name itself. Doing otherwise makes it impossible to quote tables or fields with one or more periods in them correctly. Placing periods in table and field names is common practice in some ERP systems (for example, fields such as "V.A.T.")

To avoid quoting-related errors, a rule stops the Pentaho Data Integration from performing quoting activity when there is a start or end quote in the table name or schema. This allows you to specify the quoting mechanism yourself.

## Define Connection Pooling

Instead of having a connection open for each individual step in a transformation, you can set up a connection pool and define options like the initial pool size, maximum pool size, and connection pool parameters. For example, you might start with a pool of ten or fifteen connections, and as you run jobs or transformations, the unused connections drop off. Pooling helps control database access, especially if you have transformations that contain many steps and that require a large number of connections. Pooling can also be implemented when your database licensing restricts the number of active concurrent connections.

This table shows descriptions of the pooling options.

| Feature | Description |
|---|---|
| **Enable connection pooling** | Enables connection pooling |
| **Pool Size** | Sets the *initial* size of the connection pool; sets the *maximum* number of connections in the connection pool |
| **Parameters** | Allows you to define additional custom pool parameters; click **Restore Defaults** when appropriate |

| Feature | Description |
|---|---|
| **Description** | Allows you to add a description for your parameters |

1. Select **Enable Connection Pooling**.
2. Type the initial pool size in the **Initial:** area and the maximum pool size in the **Maximum:** area.
3. Select the parameters you need from within the **Parameters:** area. A Description of the parameter appears in the **Description:** area when you select a check box.
4. Click **OK** to save your selections and close the **Database Connection** dialog box.

## Connect to Clusters

This option allows you to enable clustering for the database connection and create connections to the data partitions. To create a new data partition, enter a **Partition ID** and the **Host Name**, **Port**, **Database**, **User Name**, and **Password** for connecting to the partition.

## Modify Connections

This table contains information about other database-related connection tasks you can perform.

| Task | Description |
|---|---|
| **Edit a Connection** | Right-click on the connection name and select **Edit**. |
| **Duplicate a Connection** | Right-click on the connection name and select **Duplicate**. |
| **Copy to a Clipboard** | Allows you to copy the XML defining the step to the clipboard. You can then paste this step into another transformation. Double-click on the connection name in the tree or right-click on the connection name and select **Copy to Clipboard**. |
| **Delete a Connection** | Double-click on the connection name in the tree or right-click on the connection name and select **Delete**. |
| **SQL Editor** | To execute SQL command against an existing connection, right-click on the connection name and select SQL Editor. |
| **Clear the Database Cache** | To speed up connections Pentaho Data Integration uses a database cache. When the information in the cache no longer represents the layout of the database, right-click on the connection in the tree and select **Clear DB Cache...**. This command is commonly used when databases tables have been changed, created or deleted. |
| **Share a Connection** | Rather than redefining a connection each time you create a job or transformation on your *local device*, right-click and select **Share** to share the connection information among jobs and transformations. |
| **Exploring the Database** | Double-click on the connection name in the tree or right-click on the connection name and select Explore. |

| Task | Description |
| --- | --- |
| **Show dependencies** | Right-click a connection name and select **Show dependencies** to see all of the transformations and jobs that use this database connection. |

# Define JNDI Connections for the DI Server

Pentaho has supplied a way of configuring a JNDI connection for "local" Pentaho Data Integration use so that you do not have an application server continuously running during the development and testing of transformations. To configure, edit the properties file called **jdbc.properties** located at `...\data-integration-server\pentaho-solutions\system\simple-jndi`.

Note: It is important that the information stored in **jdbc.properties** mirrors the content of your application server data sources.

# Define OCI Connections for the DI Server

Once you have chosen to use the OCI access protocol, here are configuration and maintenance tasks you can perform.

## Add Drivers

The DI Server and workstations need the appropriate driver to connect to the database that stores your data. Your database administrator, Chief Intelligence Officer, or IT manager should be able to provide the appropriate driver. If not, you can download drivers from your database vendor's website. See the Supported Technologies to ensure that your database and its driver are supported by Pentaho.
Note: If you are using a Microsoft SQL Server (MSSQL), you might need to use an alternative, non-vendor-supported driver called JTDS. Contact Pentaho support to ensure that you are adding the correct driver.

**Installing Drivers**

Once you have the correct driver, copy it to these directories.

**DI Server:** `/pentaho/server/data-integration-server/tomcat/webapps/pentaho-di/WEB-INF/lib/ .`

**Spoon:** `data-integration/lib`

You must restart Spoon for the driver to take effect.

There should be only one driver for your database in this directory. Ensure that there are no other versions of the same vendor's driver in this directory. If there are, back up the old driver files and remove them to avoid version conflicts. This is a concern when you are adding a driver for the same database type as your Pentaho solution repository. If you have any concerns about how to proceed, contact Pentaho support.

When the driver files are in place restart the server.

**Connecting to a Microsoft SQL Server Using Integrated or Windows Authentication**

If you are using a Microsoft SQL Server (MSSQL), you might need to use an alternative, non-vendor-supported driver called JTDS. Contact Pentaho support to ensure that you are adding the correct driver

For Microsoft Windows, most JDBC drivers support Type 2 integrated authentication through the `integratedSecurity` connection string property. To use integrated authentication, copy the `sqljdbc_auth.dll` file to all machines and directories to which you copied the JDBC driver. You can find this file in this location.

```
<installation directory>\sqljdbc_<version>\<language>\auth\
```

| If running: | Use the sqljdbc_auth.dll file here: |
|---|---|
| 32-bit Java Virtual Machine (JVM) even if the operating system is version x64 | x86 folder |
| 64-bit JVM on a x64 processor | x64 folder |
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# Create OCI Connections

1. Start the web application and DI Servers, log into the Spoon, then click on **Tools** > **Database** > **Explore**. The **Data Sources** dialog box appears.
2. Click the plus icon (**+**) on the right and select **JDBC**. The **Database Connection** dialog box appears with **General** highlighted in the left navigation pane.
3. In the **Connection Name** field, enter a name that uniquely describes this connection. The name can have spaces, but it cannot have special characters, such as #, $, %, and alike.
4. In the **Database Type** list, select **Oracle**.
5. In the **Access** list, select **OCI**.
6. Enter **Settings** as directed by the Oracle OCI documentation.
    a. In the **SID** field, enter the Oracle system ID that uniquely identifies the database on the system.
    b. In the **Tablespace for Data** field, enter the name of the tablespace where the data is stored.
    c. In the **Tablespace for Indicies** field, enter the name of the tablespace where the indicies are stored.
    d. Enter the **User Name** and **Password** required to access the database.
7. Click **Test**. A success message appears if the connection is established.
8. To save the connection, click **OK** twice. This connection name appears in the list of available data sources in the **Data Sources** dialog box. If you want to use Advanced, Options, or Pooling, refer to the Oracle OCI documentation to understand how to specify these settings.

# Add Database-Specific Options

Add database-specific options by adding parameters to the generated URL.

1. From within the **Database Connection** dialog box, select **Options**.
2. Select the first available row in the parameter table.
3. Choose the database type and enter a valid parameter name and its corresponding value.
   Note: For more database-specific configuration help, click **Help**. A new browser opens and displays additional information about configuring the JDBC connection for the currently selected database type.
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| **Description** | Allows you to add a description for your parameters |

1. Select **Enable Connection Pooling**.
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3. Select the parameters you need from within the **Parameters:** area. A Description of the parameter appears in the **Description:** area when you select a check box.
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| Task | Description |
| --- | --- |
| **Share a Connection** | Rather than redefining a connection each time you create a job or transformation on your *local device*, right-click and select **Share** to share the connection information among jobs and transformations. |
| **Exploring the Database** | Double-click on the connection name in the tree or right-click on the connection name and select Explore. |
| **Show dependencies** | Right-click a connection name and select **Show dependencies** to see all of the transformations and jobs that use this database connection. |

# Create a Connection to the DI Repository

Transformations, jobs, and schedules are stored in the DI Repository. Create a connection to the DI Server if you want to access these things, or use the DI Operations Mart audit feature.

1. Make sure that your DI Repository is running.
2. Select **Tools** > **Repository** > **Connect** to open the **Repository Connection** window.
3. If a connection to the DI Repository has not already been created:
    a. Click **Add**(+). The **Select the repository type** window appears.
    b. Select **DI Repository:DI Repository** and click **OK**. The **Repository Configuration** window appears.
    c. Modify the URL associated with your repository if necessary, then click the **Test** button to ensure that the URL is properly configured. If the test fails, make sure that the port number in the URL is correct. (If you installed the DI using the Wizard, the correct port should appear in the `installation-summary.txt` file. The file is in the root directory where you installed DI.)
    d. Click **OK** to exit the **Success** dialog box.
    e. Enter an **ID** number and **Name** for your repository.
    f. Click **OK** to exit the **Repository Configuration** window. Your new connection appears in the list of available repositories.
4. To connect to the repository, enter the user name and password for the repository, then click **OK**.

# Import and Export PDI Content

You can import and export PDI content to and from a repository by using PDI's built-in functions, explained in these subsections.

Note: Among other purposes, these procedures are useful for backing up and restoring content in the solution repository. However, users, roles, permissions, and schedules will not be included in import/export operations. If you want to back up these things, you should follow the procedure in How To Backup the Solution Repository instead.

- Import Content Into a Repository
- Export Content From the Repository

# Import Content Into a Repository

Follow the instructions below to import the repository. You must already be logged into the repository in Spoon before you perform this task.

1. In Spoon, go to **Tools** > **Repository** > **Import Repository**.
2. Locate the export (XML) file that contains the solution repository contents.
3. Click **Open**. The **Directory Selection** dialog box appears.
4. Select the directory in which you want to import the repository.
5. Click **OK**.
6. Enter a comment, if applicable.
7. Wait for the import process to complete.
8. Click **Close**.

The full contents of the repository are now in the directory you specified.

- Use the Import Script From the Command Line

# Use the Import Script From the Command Line

The import script is a command line utility that pulls content into an enterprise or database repository from two kinds of files: Individual KJB or KTR files, or complete repository export XML files.

You must also declare a rules file that defines certain parameters for the data integration content you're importing. We provide a sample file called **import-rules.xml**, included with the standard Data Integration client tool distribution. It contains all of the potential rules with comments that describe what each rule does. You can either modify this file, or copy its contents to another file; regardless, you must declare the rules file as a command line parameter.

## Options

The table below defines command line options for the import script. Options are declared with a dash: **-** followed by the option, then the **=** (equals) sign and the value.

| Parameter | Definition/value |
|---|---|
| rep | The name of the enterprise or database repository to import into. |
| user | The repository username you will use for authentication. |
| pass | The password for the username you specified with **user**. |
| dir | The directory in the repository that you want to copy the content to. |
| limitdir | **Optional.** A list of comma-separated source directories to include (excluding those directories not explicitly declared). |
| file | The path to the repository export file that you will import from. |
| rules | The path to the rules file, as explained above. |
| comment | The comment that will be set for the new revisions of the imported transformations and jobs. |
| replace | Set to **Y** to replace existing transformations and jobs in the repository. Default value is **N**. |
| coe | Continue on error, ignoring all validation errors. |
| version | Shows the version, revision, and build date of the PDI instance that the import script interfaces with. |

```
sh import.sh -rep=PRODUCTION -user=admin -pass=12345 -dir=/ -file=import-rules.
xml -rules=import-rules.xml -coe=false -replace=true -comment="New version upload
from UAT"
```

# Export Content From the Repository

Follow the instructions below to export the repository. You must already be logged into the repository through Spoon to complete this task.

1. In Spoon, go to **Tools** > **Repository** > **Export Repository**.
2. In the **Save As** dialog box, browse to the location where you want to save the export file.
3. Type a name for your export file in the **File Name** text box..
   Note: The export file will be saved in XML format regardless of the file extension used.
4. Click **Save**.

The export file is created in the location you specified. This XML file is a concatenation of all of the data integration content you selected. It is possible to break it up into individual KTR and KJB files by hand or through a transformation.

# Set DI Version Control and Comment Tracking Options

By default, PDI tracks versions and comments for jobs, transformations, and connection information when you save them. You can turn version control and comment tracking on or off by modifying the `repository.spring.properties` text file.

## Turn Version Control Off

To turn version control off, complete these steps. If you turn version control off, comment tracking is also turned off.

1. Exit from Spoon.
2. Stop the DI Server.
3. Open the `data-integration-server/pentaho-solution/systems/repository.spring.properties` file in a text editor.
4. Set `versioningEnabled` to `false`.

```
versioningEnabled=false
```

0. 1. Save and close the file.
1. 2. Start the DI Server.
2. 3. Start Spoon.
3. 4. To verify that version control is off, connect to the DI Repository. In the **Repository Explorer** window in the **Browse** tab, click on a file. Note that although you can see the **Access Control** the label, the **Version History** tab is hidden.

## Turn Comment Tracking Off

To turn comment tracking off, complete these steps.

0. 1. Exit from Spoon.
1. 2. Stop the DI Server.
2. 3. Open the `data-integration-server/pentaho-solution/systems/repository.spring.properties` file in a text editor.
3. 4. Set `versioningEnabled` to `true` and `versionCommentsEnabled` to `false`.

```
versioningEnabled=true
versionCommentsEnabled=false
```

3. 1. Save and close the file.
4. 2. Start the DI Server.
5. 3. Start Spoon.
6. 4. To verify that comment tracking is off, connect to the DI Repository. In the **Repository Explorer** window in the **Browse** tab, click on a file. Note that the **Version History** tab appears, but that the **Comment** field is hidden. Also note that when you save a transformation, job, or connection information, you are no longer prompted to enter a comment.

## Turn Version Control On

To turn version control on, do these things.

1. Exit from Spoon.
2. Stop the DI Server.
3. Open the `data-integration-server/pentaho-solution/systems/repository.spring.properties` file in a text editor.
4. Set `versioningEnabled` to `true`.

```
versioningEnabled=true
```

1. If you want to also turn Comment Tracking, make sure to set `versionCommentsEnabled` to `true`.
2. Save and close the file.
3. Start the DI Server.
4. Start Spoon.
5. To verify that Version Control is on, connect to the DI Repository. In the **Repository Explorer** window in the **Browse** tab, click on a file. Note that the **Version History** tab appears. When you save a transformation, job, or connection information, version control is applied.

## Turn Comment Tracking On

To turn comment tracking on, complete these steps.

1. Exit from Spoon.
2. Stop the DI Server.
3. Open the `data-integration-server/pentaho-solution/systems/repository.spring.properties` file in a text editor.
4. Set `versioningEnabled` to `true` and `versionCommentsEnabled` to `true`.

```
versioningEnabled=true
versionCommentsEnabled=true
```

1. Save and close the file.

2. Start the DI Server.
3. Start Spoon.
4. To verify that Comment Tracking is on, connect to the DI Repository. In the **Repository Explorer** window in the **Browse** tab, click on a file. Note that the **Version History** tab appears with the **Comments** field. When you save a transformation, job, or connection information, you are prompted to enter a comment.

# Purge Content and Connection Information from the DI Repository

The Purge Utility allows you to permanently shared objects (servers, clusters, and databases) stored in the DI Repository as well as content *(*transformations and jobs). You can also delete revision information for content and shared objects.

CAUTION:

Purging is permanent. Purged items cannot be restored.

To use the Purge Utility, complete these steps.

1. Make sure the DI Repository is running.
2. Open a shell tool, command prompt window, or terminal window, and navigate to the `pentaho/design-tools/data-integration directory`.
3. At the prompt enter the purge utility command. The format for the command, a table that describes each parameter, and parameter examples follow.

NOTE:

The command must contain the `url`, `user`, and `password` parameters, as well as one of these parameters: `versionCount`, `purgeBeforeDate`, `purgeFiles`, `purgeRevisions`.

**Windows:**

```
purge-utility.bat [-url] [-user] [-password] [-purgeTarget] [-versionCount]
[-purgeBeforeDate] [-purgeFiles] [-purgeRevisions] [-logFileName] [-logLevel]
```

**Linux:**

```
purge-utility.sh [-url] [-user] [-password] [-purgeTarget] [-versionCount]
[-purgeBeforeDate] [-purgeFiles] [-purgeRevisions] [-logFileName] [-logLevel]
```

| Option | Required? | Description |
|---|---|---|
| `-url` | Y | URL address for the DI Repository. This is a required parameter. By default, this the DI Server is installed at this URL: http://localhost:9080. |
| `-user` | Y | Username for an account that can access the DI Server as an administrator. This is a required parameter. |
| `-password` | Y | Password for the account used to access the DI Server. This is a required parameter. |

| | | |
|---|---|---|
| -purgeTarget | N | Indicates whether to purge content, shared objects, or both. You can set purgeTarget to CONTENT, SHARED, BOTH, C, S, and B. (C = Content, S = Shared, and B = Both). If you do not indicate a purgeTarget, the utility will purge content by default. |
| -versionCount | You must include **only one** of these: versionCount, purgeBeforeDate, purgeFiles, or purgeRevisions | Deletes entire version history except the for last versionCount versions. Set this value to an integer. |
| -purgeBeforeDate | | Deletes all versions before purgeBeforeDate. The format for the date must be mm/dd/yyyy. |
| -purgeFiles | | When set to TRUE, content, shared object, or both types of files are permanently and physically removed. The type of file (or files) removed depends on what is set in the purgeTarget parameter. If the purgeTarget parameter is not set, content files are purged by default. |
| -purgeRevisions | | When set to TRUE, all revisions are purged, but the current file remains unchanged. |
| -logFileName | N | Allows you to specify the file name for the log file. If this parameter is not present, the log is written to a file that has this name format: purge-utility-log-YYYYMMdd-HHmmss.txt. YYYYMMdd-HHmmss indicates the date and time that the log file was created (e.g. purge-utility-log-20140313-154741.txt). |
| -logLevel | N | Indicates the types and levels of detail the logs should contain. Values are: ALL, DEBUG, ERROR, FATAL, TRACE, INFO, OFF, and WARN. By default the log is set to INFO. Check the Log4J documentation for more details on the logging framework definitions: https://logging.apache.org/log4j/1.2/apidocs/org/apache/log4j/Level.html. |

- In this example, only the last five revisions of transformations and jobs are NOT deleted. All previous revisions are deleted.

```
purge-utility.bat -url=http://localhost:9080 -user=jdoe -password=mypassword -
versionCount=5
```

- In the example that follows all revisions before 01/11/2009 are deleted. Logging is set to the WARN level.

```
purge-utility.bat -url=http://localhost:9080 -user=jdoe -password=mypassword
-purgeBeforeDate=01/11/2009 -logLevel=WARN
```

- In this example, all shared objects before 01/11/2007 are deleted. Logging is turned OFF.

```
purge-utility.bat -url=http://localhost:9080 -user=jdoe -password=mypassword
-purgeBeforeDate=01/11/2007 -purgeTarget=S -logLevel=OFF
```

1. When finished, examine the logs to see if there were any issues or problems with the purge.
2. To see the results of the purge process, disconnect, then reconnect to the DI Repository. In the **Repository Explorer**, in the **Browse** tab, verify that the items you specified in your purge utility command were purged.

# Use Carte Clusters

Carte is a simple web server that allows you to execute transformations and jobs remotely.  It receives XML (using a small servlet) that contains the transformation to execute and the execution configuration.  It allows you to remotely monitor, start and stop the transformations and jobs that run on the Carte server.

You can set up an individual instance of Carte to operate as a standalone execution engine for a job or transformation.  In Spoon you can define one or more Carte servers and send jobs and transformations to them.  If you want to improve PDI performance for resource-intensive transformations and jobs, use a Carte cluster.

NOTE:

You can cluster the DI Server to provide failover support.  If you decide to use the DI Server, you must enable the proxy trusting filter as explained in Execute Scheduled Jobs on a Remote Carte Server, then set up your dynamic Carte slaves and define the DI Server as the master.

# Execute Scheduled Jobs on a Remote Carte Server

Follow the instructions below if you need to schedule a job to run on a remote Carte server. Without making these configuration changes, you will be unable to remotely execute scheduled jobs.
Note: This process is also required for using the DI Server as a load balancer in a dynamic Carte cluster.

1. Stop the DI Server and remote Carte server.
2. Copy the **repositories.xml** file from the `.kettle` directory on your workstation to the same location on your Carte slave. Without this file, the Carte slave will be unable to connect to the DI Repository to retrieve PDI content.
3. Open the `/pentaho/server/data-integration-server/tomcat/webapps/pentaho-di/WEB-INF/web.xml` file with a text editor.
4. Find the **Proxy Trusting Filter** filter section, and add your Carte server's IP address to the **param-value** element.

```
<filter>
    <filter-name>Proxy Trusting Filter</filter-name>
    <filter-class>org.pentaho.platform.web.http.filters.
ProxyTrustingFilter</filter-class>
    <init-param>
      <param-name>TrustedIpAddrs</param-name>
      <param-value>127.0.0.1,192.168.0.1</param-value>
      <description>Comma separated list of IP addresses of a trusted hosts.
</description>
    </init-param>
    <init-param>
      <param-name>NewSessionPerRequest</param-name>
      <param-value>true</param-value>
      <description>true to never re-use an existing IPentahoSession in the
HTTP session; needs to be true to work around code put in for BISERVER-
2639</description>
    </init-param>
</filter>
```

5. Uncomment the proxy trusting filter-mappings between the <!-- begin trust --> and <!-- end trust --> markers.

```
  <!-- begin trust -->
  <filter-mapping>
    <filter-name>Proxy Trusting Filter</filter-name>
```

```
    <url-pattern>/webservices/authorizationPolicy</url-pattern>
  </filter-mapping>

  <filter-mapping>
    <filter-name>Proxy Trusting Filter</filter-name>
    <url-pattern>/webservices/roleBindingDao</url-pattern>
  </filter-mapping>

  <filter-mapping>
    <filter-name>Proxy Trusting Filter</filter-name>
    <url-pattern>/webservices/userRoleListService</url-pattern>
  </filter-mapping>

  <filter-mapping>
    <filter-name>Proxy Trusting Filter</filter-name>
    <url-pattern>/webservices/unifiedRepository</url-pattern>
  </filter-mapping>

  <filter-mapping>
    <filter-name>Proxy Trusting Filter</filter-name>
    <url-pattern>/webservices/userRoleService</url-pattern>
  </filter-mapping>

  <filter-mapping>
    <filter-name>Proxy Trusting Filter</filter-name>
    <url-pattern>/webservices/Scheduler</url-pattern>
  </filter-mapping>

  <filter-mapping>
    <filter-name>Proxy Trusting Filter</filter-name>
    <url-pattern>/webservices/repositorySync</url-pattern>
  </filter-mapping>
  <!-- end trust -->
```

6. Save and close the file, then edit the **carte.sh** or **Carte.bat** startup script on the machine that runs your Carte server.
7. Add **-Dpentaho.repository.client.attemptTrust=true** to the **java** line at the bottom of the file.

```
java $OPT -Dpentaho.repository.client.attemptTrust=true org.pentaho.di.www.
Carte "${1+$@}"
```

8. Save and close the file.

9. Start your Carte and DI Server

You can now schedule a job to run on a remote Carte instance.

# Execute Transformations and Jobs on a Carte Cluster

There are two types of Carte clusters.  Static Carte cluster has a fixed schema that specifies one master node and two or more slave nodes. In a static cluster, you specify the nodes in a cluster at design-time, *before* you run the transformation or job.

A Dynamic Carte cluster has a schema that specifies one master node and a varying number of slave nodes. Unlike a static cluster, slave nodes are not known until runtime.  Instead, you register the slave nodes, then at runtime, PDI monitors the slave nodes every 30 seconds to see if it is available to perform transformation and job processing tasks.

Static clusters are a good choice for smaller environments where you don't have a lot of machines (virtual or real) to use for PDI transformations.  Dynamic clusters work well if nodes are added or removed often, such as in a cloud computing environment. Dynamic clustering is also more appropriate in environments where transformation performance is extremely important, or if there can potentially be multiple concurrent transformation executions.

# Configure Static and Dynamic Carte Clusters

If you want to speed the processing of your transformations, consider setting up a Carte cluster. A Carte cluster consists of two or more Carte slave servers and a Carte master server. When you run a transformation, the different parts of it are distributed across Carte slave server nodes for processing, while the Carte master server node tracks the progress.

## Configure a Static Carte Cluster

Follow the directions below to set up static Carte slave servers.

1. Copy over any required JDBC drivers and PDI plugins from your development instances of PDI to the Carte instances.
2. Run the Carte script with an IP address, hostname, or domain name of this server, and the port number you want it to be available on.

   ```
   ./carte.sh 127.0.0.1 8081
   ```

3. If you will be executing content stored in a DI Repository, copy the **repositories.xml** file from the `.kettle` directory on your workstation to the same location on your Carte slave. Without this file, the Carte slave will be unable to connect to the DI Repository to retrieve content.
4. Ensure that the Carte service is running as intended, accessible from your primary PDI development machines, and that it can run your jobs and transformations.
5. To start this slave server every time the operating system boots, create a startup or init script to run Carte at boot time with the same options you tested with.

NOTE:

## Configure a Dynamic Carte Cluster

This procedure is only necessary for dynamic cluster scenarios in which one Carte server will control multiple slave Carte instances.

NOTE:

The following instructions explain how to create `carte-master-config.xml` and `carte-slave-config.xml` files. You can rename these files if you want, but you must specify the content in the files as per the instructions.

### Configure Carte Master Server

Follow the process below to configure the Carte Master Server.

1. Copy over any required JDBC drivers from your development instances of PDI to the Carte instances.
2. Create a **carte-master-config.xml** configuration file using the following example as a template:

```
<slave_config>
<!-- on a master server, the slaveserver node contains information about this
Carte instance -->
    <slaveserver>
        <name>Master</name>
        <hostname>localhost</hostname>
        <port>9001</port>
        <username>cluster</username>
        <password>cluster</password>
        <master>Y</master>
    </slaveserver>
</slave_config>
```

NOTE:

The **<name>** of the Master server **must be unique** among all Carte instances in the cluster.

3. Run the Carte script with the carte-slave-config.xml parameter. Note that if you placed the `carte-master-config.xml` file in a different directory than the Carte script, you will need to add the path to the file to the command.

```
./carte.sh carte-master-config.xml
```

4. Ensure that the Carte service is running as intended.
5. To start this master server every time the operating system boots, create a startup or init script to run Carte at boot time.

You now have a Carte master server to use in a dynamic cluster. Next, configure the Carte slave servers.

### Configure Carte Slave Servers

Follow the directions below to set up static Carte slave servers.

1. Follow the process to configure the Carte Master Server.
2. Make sure the Master server is running.
3. Copy over any required JDBC drivers from your development instances of PDI to the Carte instances.
4. In the `/pentaho/design-tools/` directory,create a **carte-slave-config.xml** configuration file using the following example as a template:

```
<slave_config>
<!-- the masters node defines one or more load balancing Carte instances that
will manage this slave -->
    <masters>
<slaveserver>
<name>Master</name>
<hostname>localhost</hostname>
<port>9000</port>
```

```
<!-- uncomment the next line if you want the DI Server to act as the load
balancer -->
<!--    <webAppName>pentaho-di</webAppName> -->
<username>cluster</username>
<password>cluster</password>
<master>Y</master>
</slaveserver>
</masters>
<report_to_masters>Y</report_to_masters>
<!-- the slaveserver node contains information about this Carte slave instance -->
    <slaveserver>
        <name>SlaveOne</name>
        <hostname>localhost</hostname>
        <port>9001</port>
        <username>cluster</username>
        <password>cluster</password>
        <master>N</master>
    </slaveserver>
</slave_config>
```

NOTE:

The slaveserver **<name>** must be unique among all Carte instances in the cluster.

5. If you want a slave server to use the same kettle properties as the master server, add the `<get_properties_from_master>` and `<override_existing_properties>` tags between the `<slaveserver>` and `</slaveserver>` tags for the slave server. Put the name of the master server between the `<get_properties_from_master>` and `</get_properties_from_master>` tags. Here is an example.

```
<!-- the slaveserver node contains information about this Carte slave instance -->
    <slaveserver>
        <name>SlaveOne</name>
        <hostname>localhost</hostname>
        <port>9001</port>
        <username>cluster</username>
        <password>cluster</password>
        <master>N</master>
        <get_properties_from_master>Master</get_properties_from_master>
        <override_existing_properties>Y</override_existing_properties>
    </slaveserver>
```

6. Save and close the file.

7. Run the Carte script with the `carte-slave-config.xml` parameter. Note that if you placed the `carte-slave-config.xml` file in a different directory than the Carte script, you will need to add the path to the file to the command.

```
./carte.sh carte-slave-config.xml
```

8. If you will be executing content stored in a DI Repository, copy the **repositories.xml** file from the `.kettle` directory on your workstation to the same location on your Carte slave. Without this file, the Carte slave will be unable to connect to the DI Repository to retrieve PDI content.
9. Stop, then start the master and slave servers.
10. Stop, then start the DI Server.
11. Ensure that the Carte service is running as intended. If you want to start this slave server every time the operating system boots, create a startup or init script to run Carte at boot time.

## Changing Jetty Server Parameters

Carte runs on a Jetty server. You do not need to do anything to configure the Jetty server for Carte to work. But if you want to make changes to the default connection parameters, complete the steps in one of the subsections that follow.

| Jetty Server Parameters | Definition |
|---|---|
| `acceptors` | The number of thread dedicated to accepting incoming connections. The number of acceptors should be below or equal to the number of CPUs. |
| `acceptQueueSize` | Number of connection requests that can be queued up before the operating system starts to send rejections. |
| lowResourcesMaxIdleTime | This allows the server to rapidly close idle connections in order to gracefully handle high load situations. |

NOTE:

If you want to learn more about these options, check out the Jetty documentation here: http://wiki.eclipse.org/Jetty/Howto/Configure_Connectors#Configuration_Options. For more information about a high load setup read this article: https://wiki.eclipse.org/Jetty/Howto/High_Load.

### Setting the Jetty Server Parameters in the carte-slave-config.xml file

To change the Jetty Server parameters in the `carte-slave-config.xml` file, complete these steps.

1. In the `/pentaho/design-tools/` directory, open the **carte-slave-config.xml** and add these lines between the <slave_config> </slave_config> tags.

```
<slave_config>
...
    <!-- Carte uses an embedded jetty server. Include this next section only if you want
to change the default jetty configuration options.-->
    <jetty_options>
```

```
        <acceptors>2</acceptors>
        <acceptQueueSize>2</acceptQueueSize>
        <lowResourcesMaxIdleTime>2</lowResourcesMaxIdleTime>
    </jetty_options>
</slave_config>
```

2. Adjust the values for the parameters as necessary, then save and close the file.

### Setting the Jetty Server Parameters in the kettle.properties file

To change the Jetty Server parameters in the `kettle.properties` file, configure the following parameters to the numeric value you want. See Set Kettle Variables if you need more information on how to do this.

| Kettle Variable in `kettle.properties` | Jetty Server Parameter |
|---|---|
| `KETTLE_CARTE_JETTY_ACCEPTORS` | `acceptors` |
| `KETTLE_CARTE_JETTY_ACCEPT_QUEUE_SIZE` | `acceptQueueSize` |
| `KETTLE_CARTE_JETTY_RES_MAX_IDLE_TIME` | lowResourcesMaxIdleTime |

# Initialize Slave Servers in Spoon

Follow the instructions below to configure PDI to work with Carte slave servers.

1. Open a transformation.
2. In the **Explorer View** in Spoon, select the **Slave** tab.
3. Select the **New** button. The **Slave Server dialog** window appears.
4. In the **Slave Server dialog** window, enter the appropriate connection information for the Data Integration (or Carte) slave server.

| Option | Description |
|---|---|
| **Server name** | The name of the slave server. |
| **Hostname or IP address** | The address of the device to be used as a slave. |
| **Port (empty is port 80)** | Defines the port you are for communicating with the remote server. If you leave the port blank, 80 is used. |
| **Web App Name (required for DI Server)** | Leave this blank if you are setting up a Carte server. This field is used for connecting to the DI server. |
| **User name** | Enter the user name for accessing the remote server. |
| **Password** | Enter the password for accessing the remote server. |
| **Is the master** | Enables this server as the master server in any clustered executions of the transformation. |

Note: When executing a transformation or job in a clustered environment, you should have one server set up as the master and all remaining servers in the cluster as slaves.

Below are the proxy tab options:

| Option | Description |
|---|---|
| Proxy server hostname | Sets the host name for the Proxy server you are using. |
| The proxy server port | Sets the port number used for communicating with the proxy. |
| Ignore proxy for hosts: regexp \| separated | Specify the server(s) for which the proxy should not be active. This option supports specifying multiple servers using regular expressions. You can also add multiple servers and expressions separated by the ' \| ' character. |

5. Click **OK** to exit the dialog box. Notice that a plus sign (+) appears next to **Slave Server** in the Explorer View.

# Create a Cluster Schema in Spoon

Clustering allows transformations and transformation steps to be executed in parallel on more than one Carte server. The clustering schema defines which slave servers you want to assign to the cluster and a variety of clustered execution options.

Begin by selecting the **Kettle cluster schemas** node in the Spoon **Explorer View**. Right-click and select **New** to open the **Clustering Schema** dialog box.

| Option | Description |
|---|---|
| **Schema name** | The name of the clustering schema |
| **Port** | Specify the port from which to start numbering ports for the slave servers. Each additional clustered step executing on a slave server will consume an additional port.<br>Note: To avoid networking problems, make sure no other networking protocols are in the same range . |
| **Sockets buffer size** | The internal buffer size to use |
| **Sockets flush interval rows** | The number of rows after which the internal buffer is sent completely over the network and emptied. |
| **Sockets data compressed?** | When enabled, all data is compressed using the Gzip compression algorithm to minimize network traffic |
| **Dynamic cluster** | If checked, a master Carte server will perform failover operations, and you must define the master as a slave server in the field below. If unchecked, Spoon will act as the master server, and you must define the available Carte slaves in the field below. |
| **Slave Servers** | A list of the servers to be used in the cluster. You must have one master server and any number of slave servers. To add servers to the cluster, click **Select slave servers** to select from the list of available slave servers. |

# Execute Transformations in a Cluster

**To run a transformation on a cluster**, access the **Execute a transformation** screen and select **Execute clustered**.

**To run a clustered transformation via a job**, access the **Transformation** job entry details screen and select the **Advanced** tab, then select **Run this transformation in a clustered mode?**.

**To assign a cluster to an individual transformation step**, right-click on the step and select **Clusterings** from the context menu. This will bring up the cluster schema list. Select a schema, then click **OK**.

When running transformations in a clustered environment, you have the following options:

- **Post transformation** — Splits the transformation and post it to the different master and slave servers
- **Prepare execution** — Runs the initialization phase of the transformation on the master and slave servers
- **Prepare execution** — Runs the initialization phase of the transformation on the master and slave servers
- **Start execution** — Starts the actual execution of the master and slave transformations.
- **Show transformations** — Displays the generated (converted) transformations that will be executed on the cluster

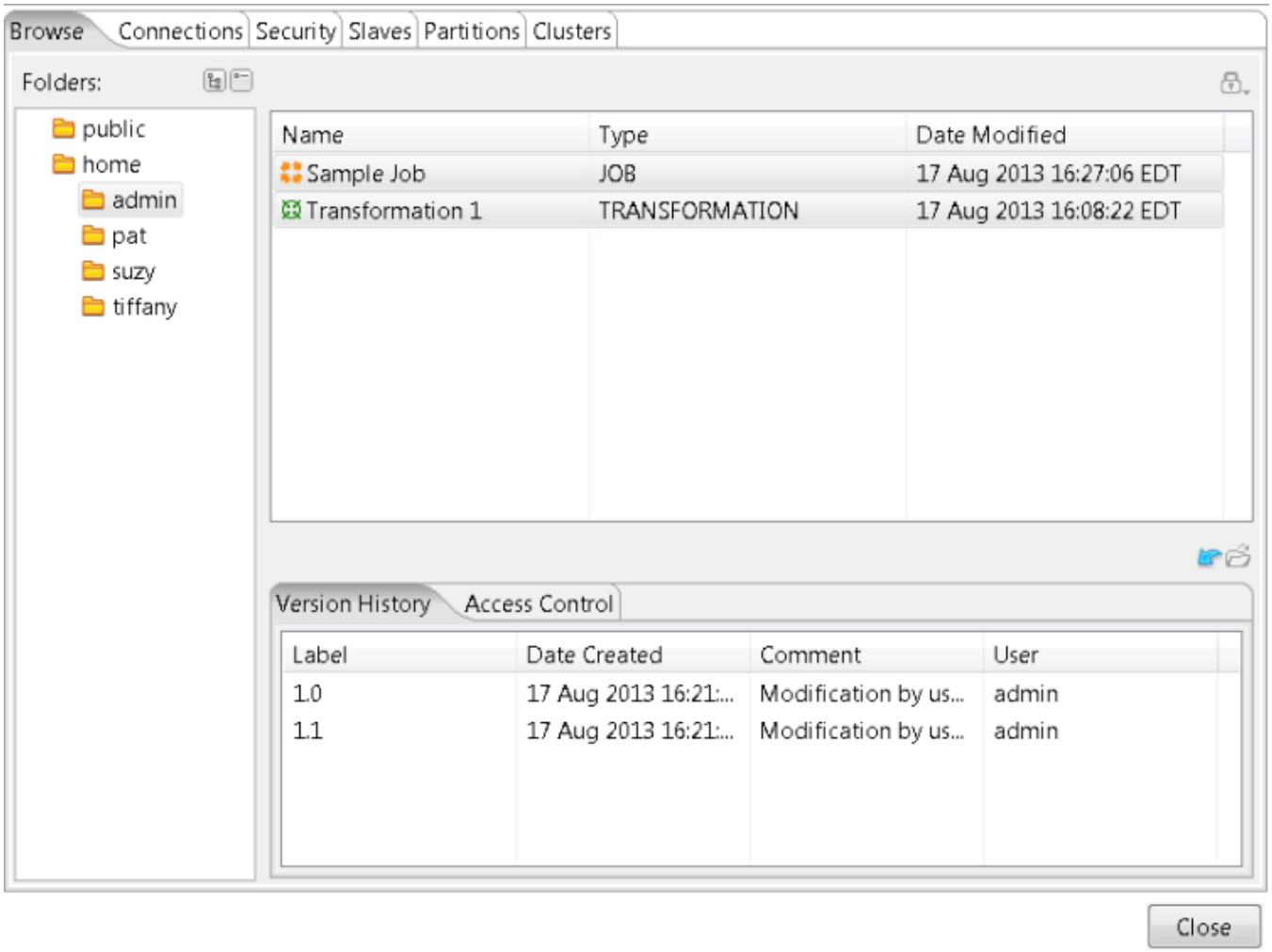
# Install License Keys Using the Command Line Interface

1. Download the .lic file you want to install.
2. Copy your .lic files to the DI Server.
3. Navigate to the `licenses` directory. pdi/pdi-ee/data-integration/licenses
4. Run the license installation script.
    a. **For Linux:** Run `install_license.sh` with the install switch and the location and name of your .lic file as a parameter. You can specify multiple .lic files separated by spaces. Be sure to use backslashes to escape any spaces in the path or file name. `install_license.sh install /home/dvader/downloads/Pentaho\ DI\ Enterprise\ Edition.lic`
    b. **For Windows:** Run `install_license.bat` with the install switch and the location and name of your license file as a parameter. `install_license.bat install "C:\Users\dvader\Downloads\Pentaho DI Enterprise Edition.lic"`

# Assign Permissions to Use or Manage Database Connections

You may have several connections to your data that you do not want to share with all of your users. When connected to the DI Server, Spoon gives you the ability to make your data visible to only the users and roles that you specify. You can assign permission to allow users and roles to read, write, or delete the connection. You can also delegate the ability to assign these permissions to another user or role.

Connection definitions are stored in the DI Repository. The Spoon Repository Explorer enables you to browse the available connections and select the one for which you want to assign permissions.




1. From within **Spoon**, click on **Tools** > **Repository** > **Explore**. The **Repository Explorer** on [Your_DI_Repository_Name] dialog box appears.
2. Select the Connections tab.
3. Select the connection for which you want to assign permissions.

4. From the User/Role area, select the user or role for which you want to assign permissions.
5. Check the permissions you want to assign to the selected user or role.

| Selection | Selection Result |
|---|---|
| Read | For this user or role, the connection appears in the connection list and can be selected for use. If users or roles have permission to read a transformation or job but not to a referenced database connection, they cannot open the transformation or job and an error message appears. |
| Write | This user or role can edit the connection definition. |
| Delete | This user or role can permanently remove the connection definition from the list.. |
| Manage Access Control | This user or role can assign read, write, and delete permissions to other users or roles. |

6. Click **Apply**.
7. Click **Close** to exit the dialog box.

# List of Server Ports Used by PDI

The port numbers below must be available internally on the machine that runs the DI Server. The only exception is SampleData, which is only for evaluation and demonstration purposes and is not necessary for production systems. If you are unable to open these ports, or if you have port collisions with existing services, refer to Change Service Port Numbers for instructions on how to change them.

| Service | Port Number |
|---|---|
| Data Integration Server | 9080 |
| H2 (SampleData) | 9092 |
| Embedded BA Server (Jetty) | 10000 |

- **Change Service Port Numbers**

# Change Service Port Numbers

## DI Server (Tomcat)

Edit the `/pentaho/server/data-integration-server/tomcat/conf/server.xml` file and change the port numbers in the section shown below.

```
<!-- A "Connector" represents an endpoint by which requests are received
         and responses are returned. Documentation at :
         Java HTTP Connector: /docs/config/http.html (blocking & non-blocking)
         Java AJP  Connector: /docs/config/ajp.html
         APR (HTTP/AJP) Connector: /docs/apr.html
         Define a non-SSL HTTP/1.1 Connector on port 9080
    -->
    <Connector URIEncoding="UTF-8" port="9080" protocol="HTTP/1.1"
               connectionTimeout="20000"
               redirectPort="9443" />
    <!-- A "Connector" using the shared thread pool-->
    <!--
    <Connector URIEncoding="UTF-8" executor="tomcatThreadPool"
               port="9080" protocol="HTTP/1.1"
               connectionTimeout="20000"
               redirectPort="9443" />
```

Note: You may also have to change the SSL and SHUTDOWN ports in this file, depending on your configuration.

Next, follow the directions in Change the DI Server URL to accommodate for the new port number.

## Embedded BA Server (Jetty)

This server port is hard-coded in Pentaho Data Integration and cannot be changed. If port 10000 is unavailable, the system will increment by 1 until an available port is found.

# Change the DI Server URL

You can change the DI Server hostname from localhost to a specific IP address, hostname, or domain name by following these instructions. This procedure is also a requirement if you are changing the DI Server port number.

1. Stop the DI Server through your preferred means.
2. Open the `/pentaho/server/data-integration-server/tomcat/webapps/pentaho-di/WEB-INF/web.xml` file with a text editor.
3. Modify the value of the **fully-qualified-server-url** element appropriately.

```
<context-param>
    <param-name>fully-qualified-server-url</param-name>
    <param-value>http://localhost:9080/pentaho-di/</param-value>
</context-param>
```

4. Save and close the file.
5. Start the DI Server.

The DI Server is now configured to reference itself at the specified URL.

# Logging and Monitoring Operations

This section contains information on DI Server and client tool logging and status monitoring.

- Enable Logging
- Monitor Job and Transformation Results
- Use Checkpoints to Restart Jobs
- DI Operations Mart
- Apply Best Practices for Kettle Logging

# Enable Logging

The logging functionality in Data Integration enables you to more easily troubleshoot complex errors and failures, and measure performance. To turn on logging in Data Integration, follow the below procedure.

1. Create a database or table space called **pdi_logging**.
2. Start Spoon, and open a transformation or job for which you want to enable logging.
3. Go to the **Edit** menu and select **Settings...** The **Settings** dialog appears.
4. Select the **Logging** tab.
5. In the list on the left, select the function you want to log.
6. Click the **New** button next to the **Log Connection** field. The **Database Connection** dialogue appears.
7. Enter your database connection details, then click **Test** to ensure that they are correct. Click **OK** when you are done.
8. Look through the list of fields to log, and ensure that the correct fields are selected.
   Warning: Monitoring the **LOG_FIELD** field can negatively impact BA Server or DI Server performance. However, if you don't select all fields, including LOG_FIELD, when configuring transformation logging, you will not see information about this transformation in the Operations Mart logging.

Logging is enabled for the job or transformation.
When you run a job or transformation that has logging enabled, you have the option of choosing the log verbosity level in the execution dialogue:

- **Nothing** Do not record any output
- **Error** Only show errors
- **Minimal** Only use minimal logging
- **Basic** This is the default level
- **Detailed** Give detailed logging output
- **Debug** For debugging purposes, very detailed output
- **Row level** Logging at a row level. This will generate a lot of log data

If the **Enable time** option is enabled, all lines in the logging will be preceded by the time of day.

## Log Rotation

This procedure assumes that you do not have or do not want to use an operating system-level log rotation service. If you are using such a service on your Pentaho server, connect to the BA Server and Data Integration Server and use that instead of implementing this solution.

The Business Analysis and Data Integration servers use the Apache log4j Java logging framework to store server feedback. The default settings in the log4j.xml configuration file may be too verbose and grow too large for some production environments. Follow these instructions to modify the settings so that Pentaho server log files are rotated and compressed.

1. Stop all relevant Pentaho servers.

2. Download a .zip archive of the Apache Extras Companion for log4j package: Apache Logging Services.
3. Unpack the **apache-log4j-extras** JAR file from the zip archive, and copy it to the following locations:
   - **Business Analytics Server:** `/tomcat/webapps/pentaho/WEB-INF/lib/`
   - **Data Integration Server:** `/tomcat/webapps/pentaho-di/WEB-INF/lib/`
4. Edit the **log4j.xml** settings file for each server that you are configuring. The files are in the following locations:
   - **BA Server:** `/tomcat/webapps/pentaho/WEB-INF/classes/`
   - **DI Server:** `/tomcat/webapps/pentaho-di/WEB-INF/classes/`
5. Remove all **PENTAHOCONSOLE** appenders from the configuration.
6. Modify the **PENTAHOFILE** appenders to match the log rotation conditions that you prefer. You may need to consult the log4j documentation to learn more about configuration options. Two examples that many Pentaho customers find useful are listed:

   **Daily (date-based) log rotation with compression:**

```
<appender name="PENTAHOFILE" class="org.apache.log4j.rolling.
RollingFileAppender">
    <!-- The active file to log to; this example is for BA/DI Server.-->
    <param name="File" value="../logs/pentaho.log" />
    <param name="Append" value="false" />
    <rollingPolicy class="org.apache.log4j.rolling.TimeBasedRollingPolicy">
        <!-- See javadoc for TimeBasedRollingPolicy -->
        <param name="FileNamePattern" value="../logs/pentaho.%d.log.gz" />
    </rollingPolicy>
    <layout class="org.apache.log4j.PatternLayout">
        <param name="ConversionPattern" value="%d %-5p [%c] %m%n"/>
    </layout>
</appender>
```

   **Size-based log rotation with compression:**

```
<appender name="PENTAHOFILE" class="org.apache.log4j.rolling.
RollingFileAppender">
    <!-- The active file to log to; this example is for BA/DI Server.-->
    <param name="File" value="../logs/pentaho.log" />
    <param name="Append" value="false" />
    <rollingPolicy class="org.apache.log4j.rolling.
FixedWindowRollingPolicy">
        <param name="FileNamePattern" value="../logs/pentaho.%i.log.gz" />
        <param name="maxIndex" value="10" />
        <param name="minIndex" value="1" />
    </rollingPolicy>
    <triggeringPolicy class="org.apache.log4j.rolling.
```

```
SizeBasedTriggeringPolicy">
        <!-- size in bytes -->
        <param name="MaxFileSize" value="10000000" />
    </triggeringPolicy>
    <layout class="org.apache.log4j.PatternLayout">
        <param name="ConversionPattern" value="%d %-5p [%c] %m%n" />
    </layout>
</appender>
```

7. Save and close the file, then start all affected servers to test the configuration.

You have an independent log rotation system in place for all modified Pentaho servers.

# Monitor Job and Transformation Results

You can view remotely executed and scheduled job and transformation details, including the date and time that they were run, and their status and results, through the **Kettle Status** page. To view it, navigate to the `/pentaho-di/kettle/status` page on your Data Integration Server (change the host name and port to match your configuration):

```
http://internal-di-server:9080/pentaho-di/kettle/status
```

You must be logged in to ensure you are redirected to the login page.

You can get to a similar page in Spoon by using the **Monitor** function of a slave server.

Notice the **Configuration details** table at the bottom of the screen. This shows the three configurable settings for schedule and remote execution logging. See slave-server-config.xml for more information on what these settings do and how you can modify them.
Note: This page clears when the server is restarted, or at the interval specified by the **object_timeout_minutes** setting.

- **slave-server-config.xml**

# slave-server-config.xml

Any action done through the Carte server embedded in the Data Integration Server is controlled through the `/pentaho/server/data-integration-server/pentaho-solutions/system/kettle/slave-server-config.xml` file. These three configurable options are explained here.

Note: To make modifications to slave-server-config.xml, you must stop the Data Integration Server.

| Property | Values | Description |
|---|---|---|
| max_log_lines | Any value of 0 (zero) or greater. 0 indicates that there is no limit. | Truncates the execution log when it goes beyond this many lines. |
| max_log_timeout_minutes | Any value of 0 (zero) or greater. 0 indicates that there is no timeout. | Removes lines from each log entry if it is older than this many minutes. |
| object_timeout_minutes | Any value of 0 (zero) or greater. 0 indicates that there is no timeout. | Removes entries from the list if they are older than this many minutes. |

# slave-server-config.xml

```
<slave_config>
  <max_log_lines>0</max_log_lines>
  <max_log_timeout_minutes>0</max_log_timeout_minutes>
  <object_timeout_minutes>0</object_timeout_minutes>
</slave_config>
```

# Use Checkpoints to Restart Jobs

Checkpoints let you restart jobs that fail without you having to rerun the entire job from the beginning. You add checkpoints at hops that connect one job entry to another. Then, when you run the job and a checkpoint is encountered, the software saves the state of the job entry, including the parameters, internal result rows, and result files. If an error occurs that causes the job to fail, like the database is not functioning properly so you can't connect to it, the job ends. But, when the error is resolved and you restart the job, instead of the job starting at the beginning, it starts at the last checkpoint before the error occurred. Because the state of the job entry performed up to the checkpoint was saved, the job resumes as if the failure had not occurred. In addition to setting up checkpoints, you need to set up a checkpoint log. The checkpoint log tracks each time a job runs and where failures occur. This can be helpful for troubleshooting.

In addition to the general instructions presented in this section, checkpoints are addressed in detail in the wiki.



## Add a Checkpoint

To add a checkpoint, complete these steps.

1. In Spoon, open a job.
2. Right-click a step or transformation in the job, then select **Mark as Checkpoint** from the menu that appears.
3. The checkpoint is added to the job.

## Delete a Checkpoint

To delete a checkpoint, complete these steps.

1. In Spoon, open a job.
2. Right-click a step or transformation in the job, then select **Clear Checkpoint Marker** from the menu that appears.
3. The checkpoint is cleared from the job.

## Set Up a Checkpoint Log

To set up a checkpoint log, complete these steps. Checkpoints logs are covered in detail in the wiki.

1. In Spoon, open a job.
2. Right-click in an empty space in the job's tab that appears in the Spoon window. In the **Job Properties** window, click the **Log** tab.
3. Select **Checkpoints log table**.
4. Add the log connection and the name of the log table, as well as other information as needed.
5. Choose the log table fields you want enabled.

6. When complete, click **OK**.

# DI Operations Mart

The DI Operations Mart uses Spoon transformations and jobs to collect and query Data Integration log data. You can then use BA server tools to visualize log data in reports, charts, or dashboards.

- Set Up DI Operations Mart
- Maintain and Update DI Operations Mart
- Reference Tables for DI Operations Mart

# Set Up DI Operations Mart

The DI Operations Mart is a centralized data mart that stores job or transformation log data for easy reporting and analysis. The data mart is a collection of tables organized as a data warehouse using a star schema. Together, dimension tables and a fact table represent the logging data. These tables need to be created in the DI Operations Mart database. Pentaho provides SQL scripts to create these tables for MySQL, Oracle, and PostgresSQL databases. A Data Integration job populates the time and date dimensions.

## Unzip DI Operations Mart Files

The files needed to install the DI Operations Mart are already on your computer. Here is how to find and unzip those files, then set up the database.

1. Unzip the `pentaho-operations-mart-<version number>.zip` file, which is located in the `data-integration-server/pentaho-solutions` directory. `<version number>` indicates the version number Pentaho assigns to the build of the DI Operations Mart. We recommend that you unzip the file in a temporary directory outside of the pentaho directory structure.
2. When unzipped, the directory structure looks like this.

- `pdi-operations-mart/`
- `DDL/`
- `etl/`
- `models/`
- `pentaho_operations_mart/`
- `samples/`
- `exportManifest.xml`

## Create Logging Tables and Datamart

Logging tables must be created in the database.

1. From any program that can run scripts against the logging data database, execute `pentaho_logging_<database>.sql`. (`<database>` is MySQL, Oracle, or PostgreSQL). `pentaho_logging_<database>.sql` is in the `pdi-operations-mart/DDL/<database>` directory. The script generates several logging schemas.
2. If you installed PDI using the custom or manual method, the `pdi-operations-mart` database must be created. Execute the DDL script called `pentaho_mart_<database>.sql`, where <database> is is the database vendor, such as MySQL, Oracle, or PostgreSQL. The DDL script can be found in the `pdi-operations-mart/DDL/<database>` directory.
3. When complete, the following tables are created.

| Dimension Tables | Fact, Pro-Audit, and Staging Tables |
|---|---|
| • dim_batch<br>• dim_component<br>• dim_content_item<br>• dim_date<br>• dim_execution<br>• dim_executor<br>• dim_instance<br>• dim_log_table<br>• dim_session<br>• dim_state<br>• dim_step<br>• dim_time | • fact_component<br>• fact_execution<br>• fact_instance<br>• fact_jobentry_execution<br>• fact_perf_execution<br>• fact_session<br>• fact_step_execution<br>• pro_audit_staging<br>• pro_audit_tracker<br>• stg_content_item |

1. Execute the following SQL script in the tool of your choice. The script enables DI Operations Mart to run on PostgreSQL.

```
ALTER TABLE pentaho_dilogs.jobentry_logs DROP COLUMN result;
ALTER TABLE pentaho_dilogs.jobentry_logs ADD COLUMN "result" boolean;
ALTER TABLE pentaho_operations_mart.fact_jobentry_execution DROP COLUMN result;
ALTER TABLE pentaho_operations_mart.fact_jobentry_execution ADD COLUMN "result"
CHAR(5);
```

## Set Global Kettle Logging Variables

Set up Kettle logging variables so that by default, transformation, job, step, and performance logging data is captured in tables you specify.

1. In Spoon, select **Edit > Edit the kettle.properties** file.
2. In the **Kettle properties** window, set the following variable names and values. The variable names and values in this section are the default. If you have set up your operations mart differently, change the variable names and values so they match your environment.

| Variable Name | Value |
|---|---|
| KETTLE_JOB_LOG_DB | live_logging_info |
| KETTLE_JOB_LOG_TABLE | job_logs |
| KETTLE_TRANS_LOG_DB | live_logging_info |
| KETTLE_TRANS_LOG_TABLE | trans_logs |

| Variable Name | Value |
|---|---|
| KETTLE_STEP_LOG_DB | live_logging_info |
| KETTLE_STEP_LOG_TABLE | step_logs |
| KETTLE_JOBENTRY_LOG_DB | live_logging_info |
| KETTLE_JOBENTRY_LOG_TABLE | jobentry_logs |
| KETTLE_TRANS_PERFORMANCE_LOG_DB | live_logging_info |
| KETTLE_TRANS_PERFORMANCE_LOG_TABLE | transperf_logs |
| KETTLE_CHANNEL_LOG_DB | live_logging_info |
| KETTLE_CHANNEL_LOG_TABLE | channel_logs |
| KETTLE_METRICS_LOG_DB | live_logging_info |
| KETTLE_METRICS_LOG_TABLE | metrics_logs |

0. 1. If you choose to use a non-default schema, set these variables as well. Their values should match the name of your schema.
   - KETTLE_JOB_LOG_SCHEMA
   - KETTLE_TRANS_LOG_SCHEMA
   - KETTLE_STEP_LOG_SCHEMA
   - KETTLE_JOBENTRY_LOG_SCHEMA
   - KETTLE_TRANS_PERFORMANCE_LOG_SCHEMA
   - KETTLE_CHANNEL_LOG_SCHEMA
   - KETTLE_METRICS_LOG_SCHEMA
7. 1. Click **OK**.
8. 2. Restart Spoon and the DI Server.

# Import DI Operations Mart

Follow these instructions to import DI Operations Mart tables, schema, and database connection into your database.

1. Start Spoon, then connect to the DI Repository.
2. Select **Tools > Repository > Import Repository**.
3. Select `etl/pdi-operations-mart.xml` then click **Open**. The `etl` directory is where you unzipped the `pentaho-operations-mart-<version number>.zip` file.
4. When prompted about setting rules for the import, click **No**.
5. The **Directory Selection** window appears. To create a new directory where the PDI Operations Mart will be stored:

e. A. Right-click the **public** folder and select **New sub-directory**.

f. B. In the **Enter the Directory Name** window, type **pdi_operations_mart** then click **OK**.

g. C. **pdi_operations_mart** appears. Make sure it is highlighted, then click **OK**.

h. D. Click **OK** in the **Enter comment** window.

6. The **Repository Import** window appears with a status of the import. When the *Import finished* message appears, click the **Close** button.

## Set Up Database Connections

The connection information must match the credentials needed for your database.

1. In Spoon, close open jobs and transformations.
2. Select **Tools** > **Repository** > **Explore** from the drop-down menu.
3. In the **Repository Explorer** window, select the **Connections** tab.
4. Create a database connection and name it **`ive_logging_info`**. In the **Database Connection** window enter information for the connection that gets the online logging data. The default connection information appears in the following table, but yours might be different, depending on the ports and password assigned during PDI installation.

| Item | Default Value |
|---|---|
| Connection Name | `live_logging_info` |
| Hostname | `localhost` |
| Database Name | `di_hibernate` |
| Port Number | `5432` |
| User Name | `hibuser` |
| Advanced/Preferred Schema | `pentaho_dilogs` |
| Password | `See your system administrator for the default value.` |

1. Click **OK** to save the information.
2. If you need to have multiple connections to get the online logging information, create new connections and enter the information for each connection.
3. Select the `pentaho_operations_mart` from the **Connections** tab and edit the entry by clicking the pencil icon in the upper-right corner. The **Database Connection** window opens.
4. Enter the information for the connection. When finished, click **OK**.

| Item | Default Value |
|---|---|
| Connection Name | `pentaho_operations_mart` |

| Item | Default Value |
|---|---|
| Hostname | `localhost` |
| Database Name | `di_hibernate` |
| Port Number | `5432` |
| User Name | `hibuser` |
| Advanced/Preferred Schema | `pentaho_operations_mart` |
| Password | `See your system administrator for the default value.` |

# Update Links

Update the `Fill in DIM_Date and DIM_Time` job so it points to the version in the repository, then run the `Fill in DIM_Date and DIM_Time` job to finish setting up the DI Operations Mart.

1. In Spoon, select **Tools** > **Repository** > **Explore**.
2. In the **Browse** tab, click the **pdi_operations_mart**.
3. Double-click `Fill in DIM_Date and DIM_Time` to open it in Spoon.
4. Click **Close** to close the Repository Explorer.
5. Double-click `Generate DIM_DATE`.

   d. A. In the **Transformation specification** tab, click **Specify by name and directory**.

   e. B. There are two fields that become active. The first is where you specify the directory. The second is where you specify the name of the transformation. Position the cursor in the first field, then press **[CTRL]+[SPACE]** and select **${Internal.Job.Repository.Directory}** from the options that appear.

   f. C. In the second field enter `Generate_DIM_DATE.ktr`.

   g. D. Click **OK**.

6. Double-click `Generate DIM_TIME` and repeat step 5a - 5d. For step 5c, enter `Generate_DIM_TIME.ktr` instead of `Generate_DIM_DATE.ktr`.
7. Save the job, then run it.
8. When complete, close the job.

# Test DI Operations Mart

To run a test, build and run a simple transformation or job, then run the DI Operations Mart.

1. In Spoon, create and save a transformation and a job. For more information on how to create a transformation or job, see the Get Started with DI tutorial.
2. Select **Tools** > **Repository** > **Explore**, then select **pdi_operations_mart**.
3. Select the `Update Dimensions then Logging Datamart.kjb` job, then run it.

# Schedule DI Operations Mart Job

As a best practice, you should schedule the updating of Pentaho Operations Mart data so that you have up-to-date information for Operations Mart reports. It is recommended that you schedule log updates at least daily to ensure you have the freshest data.

1. In Spoon, select **Tools** > **Repository** > **Explore**, then select **pdi_operations_mart**.
2. Select the `Update_Logging_Datamart.kjb` job and open it.
3. Set a schedule for this job by following the instructions in Scheduling Transformations and Jobs from Spoon.
4. When finished, close and save the schedule and the job.

# Give Users Access to the DI Operations Mart

You must have previously mapped user roles, as described in Mondrian Role Mapping in the BA Server.

By default, only users who have the **Admin** role can access the Pentaho Operations Mart. The **Admin** role has access to all capabilities within all Pentaho products, including the Pentaho Operations Mart. If you want to allow users to view and run the Pentaho Operations Mart only, you can assign them the **Pentaho Operations** role. For example, a user who has been assigned the **Pentaho Operations** user role is able to open and view a report within the DI Operations mart, but does not have the ability to delete it.

To give users access to view the DI Operations Mart, assign the Pentaho Operations role to those users.

1. From within the **Pentaho User Console**, select the **Administration** tab.
2. From the left panel, select **Security** > **Users/Roles**.
3. Select the **Roles** tab.
4. Add the new role called **Pentaho Operations** by following the instructions in Adding Roles.
5. Assign the appropriate users to the new role, as described in Adding Users to Roles.
6. Advise these users to log in to the Pentaho User Console, create a Pentaho Analyzer or Pentaho Interactive Report, and ensure that they can view the Pentaho Operations Mart in the **Select a Data Source** dialog.

# Maintain and Update DI Operations Mart

## Override Kettle Logging Variable Settings

If you want to override the Kettle logging variable settings for where logging data is stored in a specific transformation or job, complete these steps. Even if you override those settings, logging information will be used to create Operations Mart reports.

1. From within Spoon, open a job or transformation.
2. Select the **View** tab, then right-click the job or transformation and select **Transformation Settings** or **Job Settings**.
3. Select the **Logging** tab and choose the appropriate selection from the left pane.

- For jobs, select **Job**.
- For transformations, select **Transformation**.

1. In the **Log Connection** field, enter or select the appropriate database connection. If you are using the default settings, choose `live_logging_info`. Otherwise, enter or choose the database connection that reflects your environment's configuration.
2. In the **Log table name** field

- For jobs, enter `LOG_JOB`.
- For transformations, enter `LOG_TRANS`.

1. In order to collect row input or output information for jobs or transformations, for instance for throughput calculations, specify an Input and output step for each transformation that collects external input or output data.

- For `LINES_INPUT`, specify the step collecting external input data.
- For `LINES_OUTPUT`, specify the step collecting output data.

1. Ensure all entries under **Fields To Log** are selected. If the `LOG_JOB` or `LOG_TRANS` table has not been created in the database, click the **SQL** button and then click the **Execute** button in the subsequent dialog box.
2. Click **OK**.
3. In the **Monitoring** tab in the **Transformation Properties** or **Job Properties** window, check the box labeled **Enable step performance monitoring?**
4. Click **OK** to exit the dialog box, then save the job or transformation.

The DI Operations Mart is configured to collect ETL logging data.

# Update Operations Mart

You can monitor the latest performance of your ETL operations by updating the logging data within the DI Operations Mart. As a prerequisite, the Operations Mart must have previously been created and configured with the logging data you want to collect.

Your data logs need to be updated if you modified these types of data.

- Logging table
- Database connection
- Transformation step
- Job entry

You must update and then populate the executor and log dimensions table if you want to log the most current data.

If you modified the logging table, database connection, operations mart transformation steps or job entries, you need to manually update the DI operations mart executor, log dimension tables, and then refresh the data.

1. From within Spoon, select **Tools** > **Repository** > **Explore**.
2. Select **pdi_operations_mart**.
3. Choose the appropriate job or transformation from the table.

| If you want to | Choose |
|---|---|
| Update the executor and log dimension tables. | `Update Executor and Log Table Dimensions.ktr` |
| Populate the Pentaho Operations Mart with the logging information *without* updating executor and log dimension tables. | `Update_Logging_Datamart.kjb` |
| Update the executor and log dimension tables with the latest logging data. Then, update the Pentaho Operations Mart with that new data. | `Update_Dimensions_then_Logging_Datamart.kjb` |

1. Schedule the `Update_Logging_Datamart.kjb` job to run periodically. For more information on how to schedule the job, see *Scheduling Transformations and Jobs From Spoon*.

The job or transformation runs. The Operations Mart updates and/or populates with the latest logging data.

# Clean Up Operations Mart Tables

Cleaning up the PDI Operation Mart consists of running a job or transformation that deletes data older than the specified maximum age. The transformation and job for cleaning up the PDI Operations Mart can be found in the "etl" folder.

1. In Spoon, open `Clean_up_PDI_Operations_Mart.kjb, then set` these parameters.

- **max.age** (required)—the maximum age in days of the data. Job and transformation data older than the maximum age will be deleted from the datamart.
- **schema.prefix** (optional)—for PostgreSQL databases, enter the schema name followed by a period (.), this will be applied to the SQL statements. For other databases, leave the value blank.

1. Data that was not within the specified date range is now deleted.
2. To schedule regular clean up of the PDI Operations Mart, see Create DI Solutions.

# Reference Tables for DI Operations Mart

DI Operations Mart consists of several tables, which are referenced in this section.

## Logging Tables Status for the Data Integration Operations Mart

### Transformation Log Tables

The transformation tables have a **status** column, these are descriptions of the values that can be found in that column.

| Status Display | Description |
|---|---|
| `start` | Indicates the transformation was started and remains in this status until the transformation ends when no logging interval is set. |
| `end` | Transformation ended successfully. |
| `stop` | Indicates the user stopped the transformation. |
| `error` | Indicates an error occurred when attempting to run the transformation. |
| `running` | A transformation is only in this status directly after starting and does not appear without a logging interval. |
| `paused` | Indicates the transformation was paused by the user and does not appear without a logging interval. |

### Jobs Log Tables

The job log tables have a **status** column, these are descriptions of the values that can be found in that column.

| Status Display | Description |
|---|---|
| `start` | Indicates the job was started and keeps in this status until the job ends, and when no logging interval is set. |

| Status Display | Description |
|---|---|
| end | Job ended successfully. |
| stop | Indicates the user stopped the job. |
| error | Indicates an error occurred when attempting to run the job. |
| running | A job is only in this status directly after starting and does not appear without a logging interval. |
| paused | Indicates the job was paused by the user, and does not appear without a logging interval. |

# Logging Dimensions and Metrics for the Data Integration Operation Mart

These tables are references that identify the various dimensions and metrics that can be used to create new ETL log charts and reports.

## Fact Table

(fact_execution)

| Field Name | Description |
|---|---|
| execution_date_tk | A technical key (TK) linking the fact to the date when the transformation/job was executed. |
| execution_time_tk | A technical key (TK) linking the fact to the time-of-day when the transformation/job was executed. |
| batch_tk | A technical key (TK) linking the fact to batch information for the transformation/job. |
| execution_tk | A technical key (TK) linking the fact to execution information about the transformation/job. |
| executor_tk | A technical key (TK) linking the fact to information about the executor (transformation or job). |
| parent_executor_tk | A technical key (TK) linking the fact to information about the parent transformation/job). |
| root_executor_tk | A technical key (TK) linking the fact to information about the root transformation/job. |
| execution_timestamp | The date and time when the transformation/job was executed. |

| Field Name | Description |
|---|---|
| duration | The length of time (in seconds) between when the transformation was logged (LOGDATE) and the maximum dependency date (DEPDATE) |
| rows_input | The number of lines read from disk or the network by the specified step. Can be input from files, databases, etc. |
| rows_output | The number of rows output during the execution of the transformation/job. |
| rows_read | The number of rows read in from the input stream of the the specified step. |
| rows_written | The number of rows written during the execution of the transformation/job. |
| rows_rejected | The number of rows rejected during the execution of the transformation/job. |
| errors | The number of errors that occurred during the execution of the transformation/job. |
| failed | Indicates if the job or transformation has failed. 0 means the job or transformation completed successfully. 1 indicates the job or transformation failed. |

## Batch Dimension

(dim_batch)

| Field Name | Description |
|---|---|
| batch_tk | A technical key (TK) for linking facts to batch information. |
| batch_id | The ID number for the batch. |
| logchannel_id | A string representing the identifier for the logging channel used by the batch. |
| parent_logchannel_id | A string representing the identifier for the parent logging channel used by the batch. |

## Date Dimension

(dim_date)

| Field Name | Description |
|---|---|
| date_tk | A technical key (TK) for linking facts to date information. |
| date_field | A Date object representing a particular day (year, month, day). |
| ymd | A string representing the date value in year-month-day format. |
| ym | A string representing the date value in year-month format. |
| year | An integer representing the year value. |
| quarter | An integer representing the number of the quarter (1-4) to which this date belongs. |
| quarter_code | A 2-character string representing the quarter (Q1-Q4) to which this date belongs. |
| month | An integer representing the number of the month (1-12) to which this date belongs. |
| month_desc | A string representing the month (“January”..”December”) to which this date belongs. |
| month_code | A string representing the shortened month code (“JAN”..”DEC”) to which this date belongs. |
| day | An integer representing the day of the month (1-31) to which this date belongs. |
| day_of_year | An integer representing the day of the year (1-366) to which this date belongs. |
| day_of_week | An integer representing the day of the week (1-7) to which this date belongs. |
| day_of_week_desc | A string representing the day of the week (“Sunday”..”Saturday”) to which this date belongs. |
| day_of_week_code | A string representing the shortened day-of-week code (“SUN”..”SAT”) to which this date belongs. |
| week | An integer representing the week of the year (1-53) to which this date belongs. |

## Execution Dimension

(dim_execution)

| Field Name | Description |
|---|---|
| execution_tk | A technical key (TK) for linking facts to execution information. |
| execution_id | A unique string identifier for the execution. |
| server_name | The name of the server associated with the execution. |
| server_host | The name of the server associated with the execution. |
| executing_user | The name of the user who initiated the execution. |
| execution_status | The status of the execution (start, stop, end, error). |
| client | The name of the client that triggered the execution. |

**Executor Dimension** This table contains information about an executor that is a job or transformation (dim_executor).

| Field Name | Description |
|---|---|
| executor_tk | A technical key (TK) for linking facts to executor information |
| version | An integer corresponding to the version of the executor |
| date_from | A date representing the minimum date for which the executor is valid |
| date_to | A date representing the maximum date for which the executor is valid |
| executor_id | A string identifier for the executor |
| executor_source | The source location (either file- or repository-relative) for the executor |
| * executor_environment | File server, repository name, related to the executor_source. **Reserved for future use.* |
| executor_type | The executor type (“job” or “transformation”) |
| executor_name | The name of the executor (transformation name, e.g.) |
| executor_desc | A string description of the executor (job description, e.g.) |

| Field Name | Description |
|---|---|
| executor_revision | A string representing the revision of the executor (“1.3”, e.g.) |
| executor_version_label | A string representing a description of the revision (i.e. change comments) |
| exec_enabled_table_logging | Whether table logging is enabled for this executor. Values are “Y” if enabled, “N” otherwise. |
| exec_enabled_detailed_logging | Whether detailed (step or job entry) logging is enabled for this executor. Values are “Y” if enabled, “N” otherwise. |
| exec_enabled_perf_logging | Whether performance logging is enabled for this executor. Values are “Y” if enabled, “N” otherwise. |
| exec_enabled_history_logging | Whether historical logging is enabled for this executor. Values are “Y” if enabled, “N” otherwise. |
| last_updated_date | The date the executor was last updated |
| last_updated_user | The name of the user who last updated the executor |

## Log Table Dimension

This is a “junk dimension” containing log table information (dim_log_table).

| Field Name | Description |
|---|---|
| log_table_tk | A technical key (TK) for linking. |
| object_type | The type of PDI object being logged (“job”, “transformation”, “step”, e.g.) |
| table_connection_name | The name of the database connection corresponding to the location of the transformation/ job logging table |
| table_name | The name of the table containing the transformation/job logging information |
| schema_name | The name of the database schema corresponding to the location of the transformation/job logging table |
| step_entry_table_conn_name | The name of the database connection corresponding to the location of the step/entry logging table |

| Field Name | Description |
|---|---|
| step_entry_table_name | The name of the table containing the step/entry logging information |
| step_entry_schema_name | The name of the database schema corresponding to the location of the step/entry logging table |
| perf_table_conn_name | The name of the database connection corresponding to the location of the performance logging table |
| perf_table_name | The name of the table containing the performance logging information |
| perf_schema_name | The name of the database schema corresponding to the location of the performance logging table |

### Time-Of-Day-Dimension

This dimension contains entries for every second of a day from midnight to midnight (dim_time).

| Field Name | Description |
|---|---|
| time_tk | A technical key (TK) for linking facts to time-of-day information |
| hms | A string representing the time of day as hours-minutes-seconds ("00:01:35", e.g.) |
| hm | A string representing the time of day as hours-minutes ("23:59", e.g.) |
| ampm | A string representing whether the time-of-day is AM or PM. Values are “am” or “pm”. |
| hour | The integer number corresponding to the hour of the day (0-23) |
| hour12 | The integer number corresponding to the hour of the day with respect to AM/PM (0-11) |
| minute | The integer number corresponding to the minute of the hour (0-59) |
| second | The integer number corresponding to the second of the minute (0-59) |

## Step Fact Table

This fact table contains facts about individual step executions (fact_step_execution).

| Field Name | Description |
|---|---|
| execution_date_tk | A technical key (TK) linking the fact to the date when the step was executed. |
| execution_time_tk | A technical key (TK) linking the fact to the time-of-day when the step was executed. |
| batch_tk | A technical key (TK) linking the fact to batch information for the step. |
| executor_tk | A technical key (TK) linking the fact to information about the executor (transformation). |
| parent_executor_tk | A technical key (TK) linking the fact to information about the parent transformation. |
| root_executor_tk | A technical key (TK) linking the fact to information about the root transformation/job. |
| execution_timestamp | The date and time when the step was executed. |
| step_tk | A technical key (TK) linking the fact to information about the step. |
| step_copy | The step copy number. This is zero if there is only one copy of the step, or (0 to N-1) if N copies of the step are executed. |
| rows_input | The number of lines read from disk or the network by the step. Can be input from files, databases, etc. |
| rows_output | The number of lines written to disk or the network by the step. Can be output to files, databases, etc. |
| rows_read | The number of rows read in from the input stream of the step. |
| rows_written | The number of rows written to the output stream of the step. |
| rows_rejected | The number of rows rejected during the execution of the step. |
| errors | The number of errors that occurred during the execution of the step. |

## Step Dimension

This dimension contains information about individual steps and job entries (dim_step) .

| Field Name | Description |
|---|---|
| step_tk | A technical key (TK) for linking facts to step/entry information |
| step_id | The string name of the step/entry |
| * original_step_name | The name of the step/entry template used to create this step/entry ("Table Input", e.g.). **Reserved for future use.* |

## Job Entry Fact Table

This fact table contains facts about individual job entry executions (fact_jobentry_execution).

| Field Name | Description |
|---|---|
| execution_date_tk | A technical key (TK) linking the fact to the date when the job entry was executed. |
| execution_time_tk | A technical key (TK) linking the fact to the time-of-day when the job entry was executed. |
| batch_tk | A technical key (TK) linking the fact to batch information for the job entry. |
| executor_tk | A technical key (TK) linking the fact to information about the executor (transformation or job). |
| parent_executor_tk | A technical key (TK) linking the fact to information about the parent transformation/job. |
| root_executor_tk | A technical key (TK) linking the fact to information about the root transformation/job. |
| step_tk | A technical key (TK) linking the fact to information about the job entry. |
| execution_timestamp | The date and time when the job entry was executed. |
| rows_input | The number of lines read from disk or the network by the job entry. Can be input from files, databases, etc. |
| rows_output | The number of lines written to disk or the network by the job entry. Can be output to files, databases, etc. |

| Field Name | Description |
|---|---|
| rows_read | The number of rows read in from the input stream of the job entry. |
| rows_written | The number of rows written to the output stream of the job entry. |
| rows_rejected | The number of rows rejected during the execution of the job entry. |
| errors | The number of errors that occurred during the execution of the job entry. |
| result | Whether the job entry finished successfully or not. Values are “Y” (successful) or “N” (otherwise). |
| nr_result_rows | The number of result rows after execution. |
| nr_result_files | The number of result files after execution. |

### Execution Performance Fact Table

This fact table contains facts about the performance of steps in transformation executions (fact_perf_execution).

| Field Name | Description |
|---|---|
| execution_date_tk | A technical key (TK) linking the fact to the date when the transformation was executed. |
| execution_time_tk | A technical key (TK) linking the fact to the time-of-day when the transformation was executed. |
| batch_tk | A technical key (TK) linking the fact to batch information for the transformation. |
| executor_tk | A technical key (TK) linking the fact to information about the executor (transformation). |
| parent_executor_tk | A technical key (TK) linking the fact to information about the parent transformation/job. |
| root_executor_tk | A technical key (TK) linking the fact to information about the root transformation/job. |
| step_tk | A technical key (TK) linking the fact to information about the transformation/job. |

| Field Name | Description |
| --- | --- |
| seq_nr | The sequence number. This is an identifier differentiating performance snapshots for a single execution. |
| step_copy | The step copy number. This is zero if there is only one copy of the step, or (0 to N-1) if N copies of the step are executed. |
| execution_timestamp | The date and time when the transformation was executed. |
| rows_input | The number of rows read from input (file, database, network, ...) during the interval |
| rows_output | The number of rows written to output (file, database, network, ...) during the interval |
| rows_read | The number of rows read from previous steps during the interval. |
| rows_written | The number of rows written to following steps during the interval. |
| rows_rejected | The number of rows rejected by the steps error handling during the interval. |
| errors | The number of errors that occurred during the execution of the transformation/job. |
| input_buffer_rows | The size of the step's input buffer in rows at the time of the snapshot. |
| output_buffer_rows | The size of the output buffer in rows at the time of the snapshot. |

# Apply Best Practices for Kettle Logging

Kettle logging provides extensive flexibility that allows you to determine log locations, granularity, as well as what information is captured. Here are a best practices for setting up logging in your environment. For more information on logging, see the Logging and Monitoring Operations article.

- **Store logs in a centralized database.** By default, log files are stored locally. Spoon, Carte, and DI Server logs are stored separately. To make log information easier to find, place logs in a central database. As an added bonus, centralized logging makes it easier to use PDI's performance monitoring more effectively.
- **Use JNDI to Store Database Connection Information**. Although you can create JDBC connections, using JNDI makes it easier for you to switch from development to production environments. Connection details are contained in one external file. For more information on, see Define JNDI Connections for the DI Server.
- **Obtain Full Insert Accesses for Tables**. Logging can fail if you do not have the appropriate accesses. Having the appropriate accesses minimizes this risk. To learn more about table access, consult the documentation for your database.
- **Install JDBC Drivers Locally and on Each Server**. This helps you avoid *Driver not found* errors. A list of supported drivers appears here.
- **Use Implied Schemas When Possible.** Implied schemas result in fewer places to troubleshoot should logging fail. Of course, you can still specify a schema if needed.
- **Make templates for transformation and job files**. Include logging configurations in the template so that they can be reused with ease.
- **Use Kettle Global Logging Variables When Possible**. To avoid the work of adding logging variables to each transformation or job, consider using global logging variables instead. You can override logging variables by adding information to individual transformations or jobs as needed.

If you choose to use the `kettle.properties` file observe the following best practices.

- **Backup your kettle.properties files.** If you are making many changes to the Kettle.properties file, consider backing up the file first. This will make it easier to restore should issues occur.
- **Maintain a Master Copy of the kettle.properties file.** It is usually easiest to use the kettle.properties file for Spoon, then to overwrite the Carte and DI Server copies if changes are made. Make sure that values that might change, such as directory paths, are maintained however.
- **Test Thoroughly**. Test your settings by saving your `kettle.properties` file locally, then restarting spoon. Make sure the `kettle.properties` file loads properly. Execute a transformation or job that uses the settings. Try executing the transformation locally and remotely on the DI Server to ensure that log variables reference the same places.

# Contents of the .kettle Directory

| File | Purpose |
|---|---|
| kettle.properties | Main PDI properties file; contains global variables for low-level PDI settings |
| shared.xml | Shared objects file |
| db.cache | The database cache for metadata |
| repositories.xml | Connection details for PDI database or solution repositories |
| .spoonrc | User interface settings, including the last opened transformation/job |
| .languageChoice | Default language for the PDI client tool |

- Change the PDI Home Directory Location (.kettle folder)

# Change the PDI Home Directory Location (.kettle folder)

The default location for the Pentaho Data Integration home directory is the **.kettle** directory in your system user's home directory.

- **Windows:** `C:\Documents and Settings\example_user\.kettle`
- **Linux:** `~/.kettle`)

There will be a different .kettle directory, and therefore a different set of configuration files, for each system user that runs PDI.

## Standalone PDI client tool deployments

You can specify a single, universal .kettle directory for all users by declaring a KETTLE_HOME environment variable in your operating system. When declaring the variable, leave out the **.kettle** portion of it; this is automatically added by PDI.

```
export KETTLE_HOME=/home/pentaho/examplepath/pdi
```

## BA Server deployments that run PDI content

If you followed a manual deployment or archive package installation path, you can set a system environment variable as explained above, but it must be declared before the BA Server service starts. You can alternatively change the **CATALINA_OPTS** system variable to include the -D flag for KETTLE_HOME, or you can edit the script that runs the BA Server and set the flag inline, as in this example from the **start-pentaho.sh** script:

```
export CATALINA_OPTS="--Xms2048m -Xmx2048m -XX:MaxPermSize=256m -Dsun.rmi.dgc.
client.gcInterval=3600000 -Dsun.rmi.dgc.server.gcInterval=3600000" -DKETTLE_
HOME=/home/pentaho/examplepath/pdi
```

## Windows service modification

If you used the graphical utility to install the DI Server, then you must modify the Java options flag that runs the BA Server Tomcat service. Here is an example command that will change the value of KETTLE_HOME to `C:\<examplepath>\pdi\.kettle`:

```
tomcat6.exe //US//pentahobiserver ++JvmOptions -DKETTLE_HOME=C:\examplepath\pdi
```

Modify the **DI Server** in the same way, changing the service name:

```
tomcat6.exe //US//pentahoDataIntegrationServer ++JvmOptions -DKETTLE_
HOME=C:\<examplepath>\pdi
```

# Purge Transformations, Jobs, and Shared Objects from the DI Repository

The Purge Utility allows you to permanently delete shared objects (servers, clusters, and databases) stored in the DI Repository as well as content *(*transformations and jobs). You can also delete revision information for content and shared objects.

CAUTION:

Purging is permanent. Purged items cannot be restored.

To use the Purge Utility, complete these steps.

1. Make sure the DI Repository is running.
2. Open a shell tool, command prompt window, or terminal window, and navigate to the `pentaho/design-tools/data-integration directory`.
3. At the prompt enter the purge utility command. The format for the command, a table that describes each parameter, and parameter examples follow.

NOTE:

The command must contain the `url`, `user`, and `password` parameters, as well as one of these parameters: `versionCount`, `purgeBeforeDate`, `purgeFiles`, `purgeRevisions`.

**Windows:**

```
purge-utility.bat [-url] [-user] [-password] [-purgeSharedObjects][-versionCount]
[-purgeBeforeDate] [-purgeFiles] [-purgeRevisions] [-logFileName] [-logLevel]
```

**Linux:**

```
purge-utility.sh [-url] [-user] [-password] [-purgeSharedObjects] [-versionCount]
[-purgeBeforeDate] [-purgeFiles] [-purgeRevisions] [-logFileName] [-logLevel]
```

| Option | Required? | Description |
|---|---|---|
| `-url` | Y | URL address for the DI Repository. This is a required parameter. By default, this the DI Server is installed at this URL: http://localhost:9080. |
| `-user` | Y | Username for an account that can access the DI Server as an administrator. This is a required parameter. |
| `-password` | Y | Password for the account used to access the DI Server. This is a required parameter. |

| | | |
|---|---|---|
| -purgeSharedObjects | N | When set to TRUE, the parameter purges shared objects from the repository. This parameter must be used with the purgefile parameter. If you try to purge shared objects without including the purgefile parameter in the command line, an error occurs. If you set the purgeSharedObjects parameter to FALSE, it does not purge shared objects. If you include the purgeSharedObjects parameter in the command, but you don't set it to TRUE or FALSE, the Purge Utility will assume that it is set to TRUE. |
| -versionCount | You must include **only one** of these: versionCount, purgeBeforeDate, purgeFiles, or purgeRevisions | Deletes entire version history except the for last versionCount versions. Set this value to an integer. |
| -purgeBeforeDate | | Deletes all versions before purgeBeforeDate. The format for the date must be mm/dd/yyyy. |
| -purgeFiles | | When set to TRUE, transformations and jobs are permanently and physically removed. Note that shared objects (such as database connections) are NOT removed. If you want to also remove shared objects, include the purgeSharedObject parameter as well. If you set the purgeFiles parameter to FALSE, it does not purge files. If you include the purgeFiles parameter in the command, but you don't set it to TRUE or FALSE, the Purge Utility will assume that it is set to TRUE. |
| -purgeRevisions | | When set to TRUE, all revisions are purged, but the current file remains unchanged. If you set the purgeRevisions parameter to FALSE, it does not purge revisions. If you include the purgeRevisions parameter in the command, but you don't set it to TRUE or FALSE, the Purge Utility will assume that it is set to TRUE. |
| -logFileName | N | Allows you to specify the file name for the log file. If this parameter is not present, the log is written to a file that has this name format: purge-utility-log-YYYYMMdd-HHmmss.txt. YYYYMMdd-HHmmss indicates the date and time that the log file was created (e.g. purge-utility-log-20140313-154741.txt). |
| -logLevel | N | Indicates the types and levels of detail the logs should contain. Values are: ALL, DEBUG, ERROR, FATAL, TRACE, INFO, OFF, and WARN. By default the log is set to INFO. Check the Log4J documentation for more details on the logging framework definitions: https://logging.apache.org/log4j/1.2/apidocs/org/apache/log4j/Level.html. |

- In this example, only the last five revisions of transformations and jobs are NOT deleted. All previous revisions are deleted.

```
purge-utility.bat -url=http://localhost:9080 -user=jdoe -password=mypassword -
versionCount=5
```

- In the example that follows all revisions before 01/11/2009 are deleted. Logging is set to the WARN level.

```
purge-utility.bat -url=http://localhost:9080 -user=jdoe -password=mypassword -
purgeBeforeDate=01/11/2009 -logLevel=WARN
```

- In this example, all transformations, jobs, and shared objects are deleted. Note that you do not need to set the `purgeFiles` and `purgeSharedObjects` parameters to `TRUE` for this command to work. Logging is turned OFF.

```
purge-utility.bat -url=http://localhost:9080 -user=jdoe -password=mypassword -
purgeFiles -purgeSharedObjects -logLevel=OFF
```

1. When finished, examine the logs to see if there were any issues or problems with the purge.
2. To see the results of the purge process, disconnect, then reconnect to the DI Repository. In the **Repository Explorer**, in the **Browse** tab, verify that the items you specified in your purge utility command were purged.

# Set DI Version Control and Comment Tracking Options

By default, PDI tracks versions and comments for jobs, transformations, and connection information when you save them. You can turn version control and comment tracking on or off by modifying the `repository.spring.properties` text file.

## Turn Version Control Off

To turn version control off, complete these steps. If you turn version control off, comment tracking is also turned off.

1. Exit from Spoon.
2. Stop the DI Server.
3. Open the `data-integration-server/pentaho-solution/systems/repository.spring.properties` file in a text editor.
4. Set `versioningEnabled` to `false`.

```
versioningEnabled=false
```

0. 1. Save and close the file.
1. 2. Start the DI Server.
2. 3. Start Spoon.
3. 4. To verify that version control is off, connect to the DI Repository. In the **Repository Explorer** window in the **Browse** tab, click on a file. Note that although you can see the **Access Control** the label, the **Version History** tab is hidden.

## Turn Comment Tracking Off

To turn comment tracking off, complete these steps.

0. 1. Exit from Spoon.
1. 2. Stop the DI Server.
2. 3. Open the `data-integration-server/pentaho-solution/systems/repository.spring.properties` file in a text editor.
3. 4. Set `versioningEnabled` to `true` and `versionCommentsEnabled` to `false`.

```
versioningEnabled=true
versionCommentsEnabled=false
```

3. 1. Save and close the file.
4. 2. Start the DI Server.
5. 3. Start Spoon.
6. 4. To verify that comment tracking is off, connect to the DI Repository. In the **Repository Explorer** window in the **Browse** tab, click on a file. Note that the **Version History** tab appears, but that the **Comment** field is hidden. Also note that when you save a transformation, job, or connection information, you are no longer prompted to enter a comment.

## Turn Version Control On

To turn version control on, do these things.

1. Exit from Spoon.
2. Stop the DI Server.
3. Open the `data-integration-server/pentaho-solution/systems/repository.spring.properties` file in a text editor.
4. Set `versioningEnabled` to `true`.

```
versioningEnabled=true
```

1. If you want to also turn Comment Tracking, make sure to set `versionCommentsEnabled` to `true`.
2. Save and close the file.
3. Start the DI Server.
4. Start Spoon.
5. To verify that Version Control is on, connect to the DI Repository. In the **Repository Explorer** window in the **Browse** tab, click on a file. Note that the **Version History** tab appears. When you save a transformation, job, or connection information, version control is applied.

## Turn Comment Tracking On

To turn comment tracking on, complete these steps.

1. Exit from Spoon.
2. Stop the DI Server.
3. Open the `data-integration-server/pentaho-solution/systems/repository.spring.properties` file in a text editor.
4. Set `versioningEnabled` to `true` and `versionCommentsEnabled` to `true`.

```
versioningEnabled=true
versionCommentsEnabled=true
```

1. Save and close the file.

2. Start the DI Server.
3. Start Spoon.
4. To verify that Comment Tracking is on, connect to the DI Repository. In the **Repository Explorer** window in the **Browse** tab, click on a file. Note that the **Version History** tab appears with the **Comments** field. When you save a transformation, job, or connection information, you are prompted to enter a comment.

# Troubleshooting

This section contains known problems and solutions relating to the procedures earlier.

- Jobs Scheduled on DI Server Cannot Execute Transformation on Remote Carte Server
- Sqoop Import into Hive Fails

# Jobs Scheduled on DI Server Cannot Execute Transformation on Remote Carte Server

You may see an error like this one when trying to schedule a job to run on a remote Carte server:

```
ERROR 11-05 09:33:06,031 - !UserRoleListDelegate.ERROR_0001_UNABLE_TO_INITIALIZE_
USER_ROLE_LIST_WEBSVC!
                com.sun.xml.ws.client.ClientTransportException: The server sent
HTTP status code 401: Unauthorized
```

To fix this, follow the instructions in Executing Scheduled Jobs on a Remote Carte Server.

# Sqoop Import into Hive Fails

If executing a Sqoop import into Hive fails to execute on a remote installation, the local Hive installation configuration does not match the Hadoop cluster connection information used to perform the Sqoop job.

Verify the Hadoop connection information used by the local Hive installation is configured the same as the Sqoop job entry.