



Administer DI Server

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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.

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 Decision 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
<ul style="list-style-type: none">• Understanding options	<p>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.</p> <p>If the connection information changes, you change it in Spoon for each connection you have defined.</p>	<p>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 <code>context.xml</code> file and selecting JNDI as the access type in Spoon.</p> <p>If the connection information changes, you change the <code>context.xml</code> file.</p>
<ul style="list-style-type: none">• Expertise needed	Knowledge of the JDBC driver and options for your RDBMS	Knowledge of Tomcat or JBoss JNDI connection procedures and options

If You Are Interested In	Choose Options	
	Native (JDBC)	JNDI
<ul style="list-style-type: none"> • How much time it takes 	Approximately 10 minutes	Approximately 30 minutes
<ul style="list-style-type: none"> • 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:

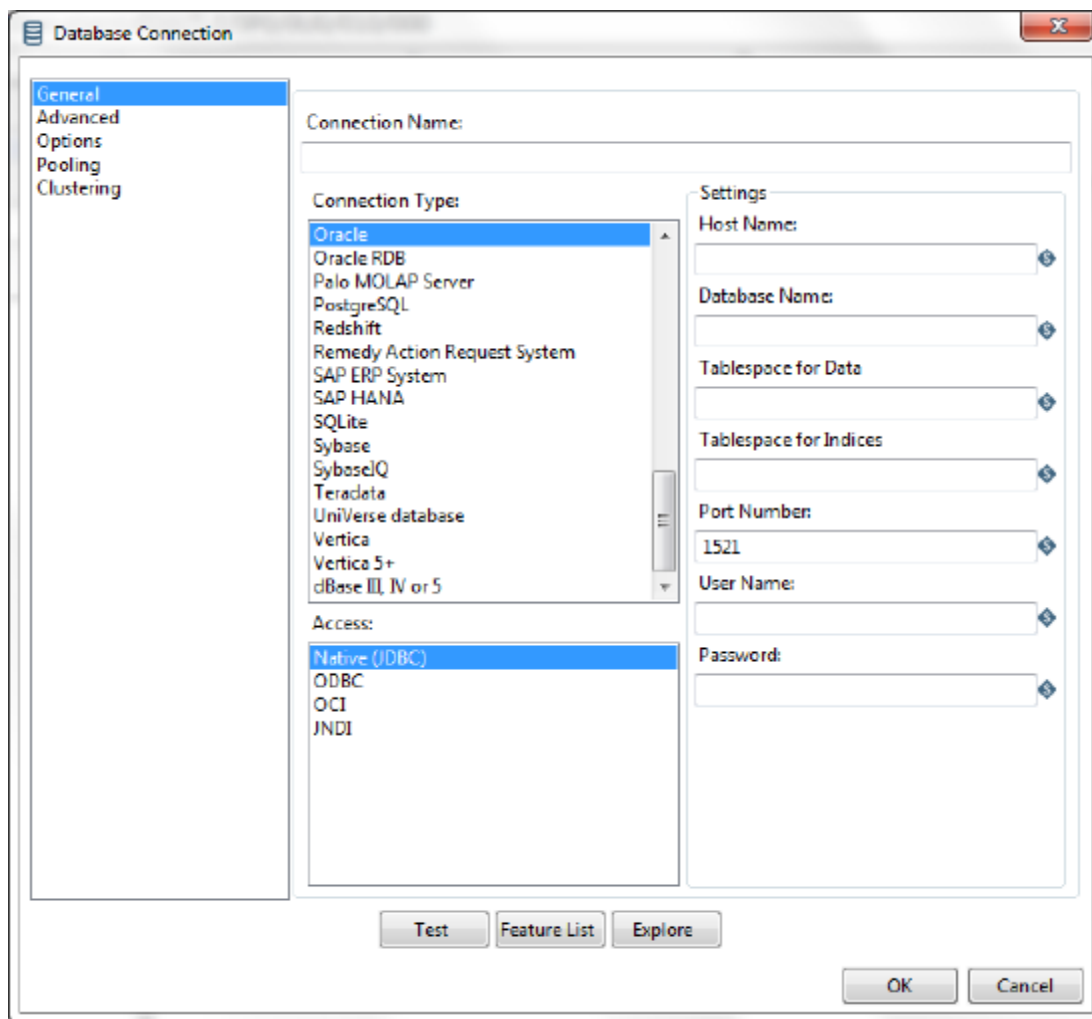
Pentaho recommends that you avoid using ODBC connections. The ODBC to JDBC bridge driver does not always provide an exact match and adds another level of complexity that may affect performance. The only time you may have to use ODBC is if there is no available JDBC driver. For details, this article explains "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.
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.

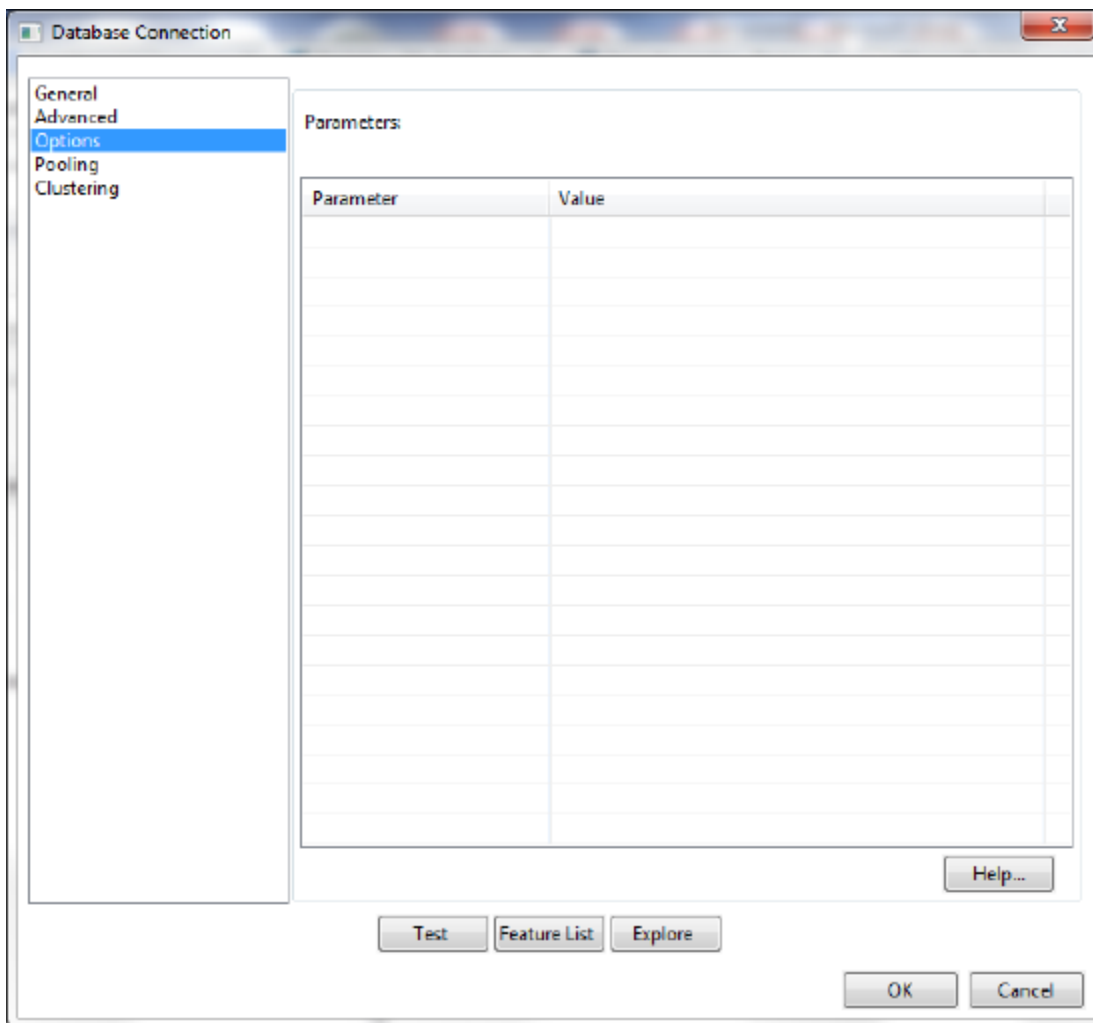
Section Name	What to Do
Password	Optionally, type the password used to connect to the database.

- Click **Test**. A confirmation message displays if Spoon is able to establish a connection with the target database.
- Click **OK** to save your entries and exit the Database Connection dialog box.
- 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 window**, select **Options**.

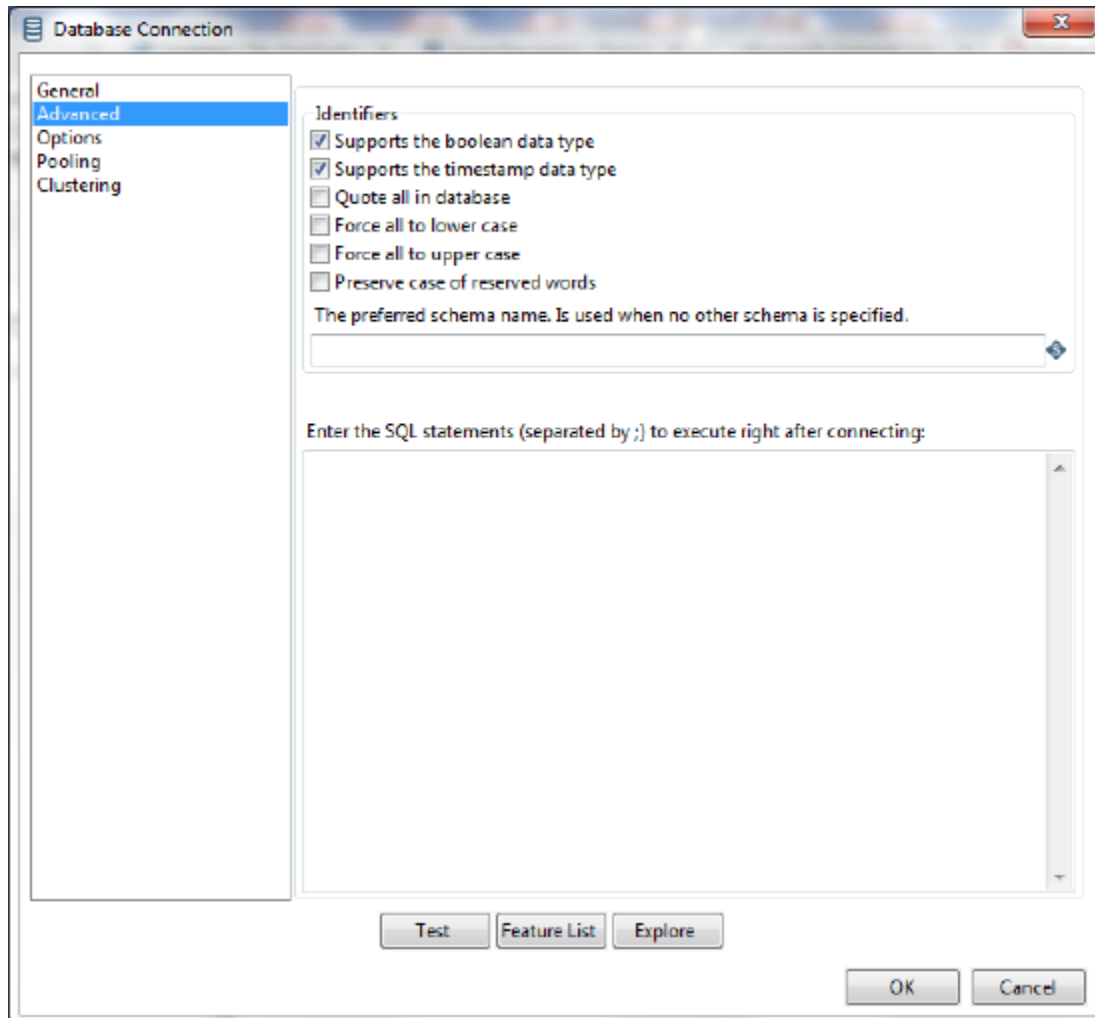


1. Select the first available row in the parameter table.

2. 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.
3. 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 the boolean data type	Instructs PDI to use native boolean data types if supported by the database.

Feature	Description
Supports the boolean timestamp type	Instructs PDI to use timestamp data type if supported by the database.
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.

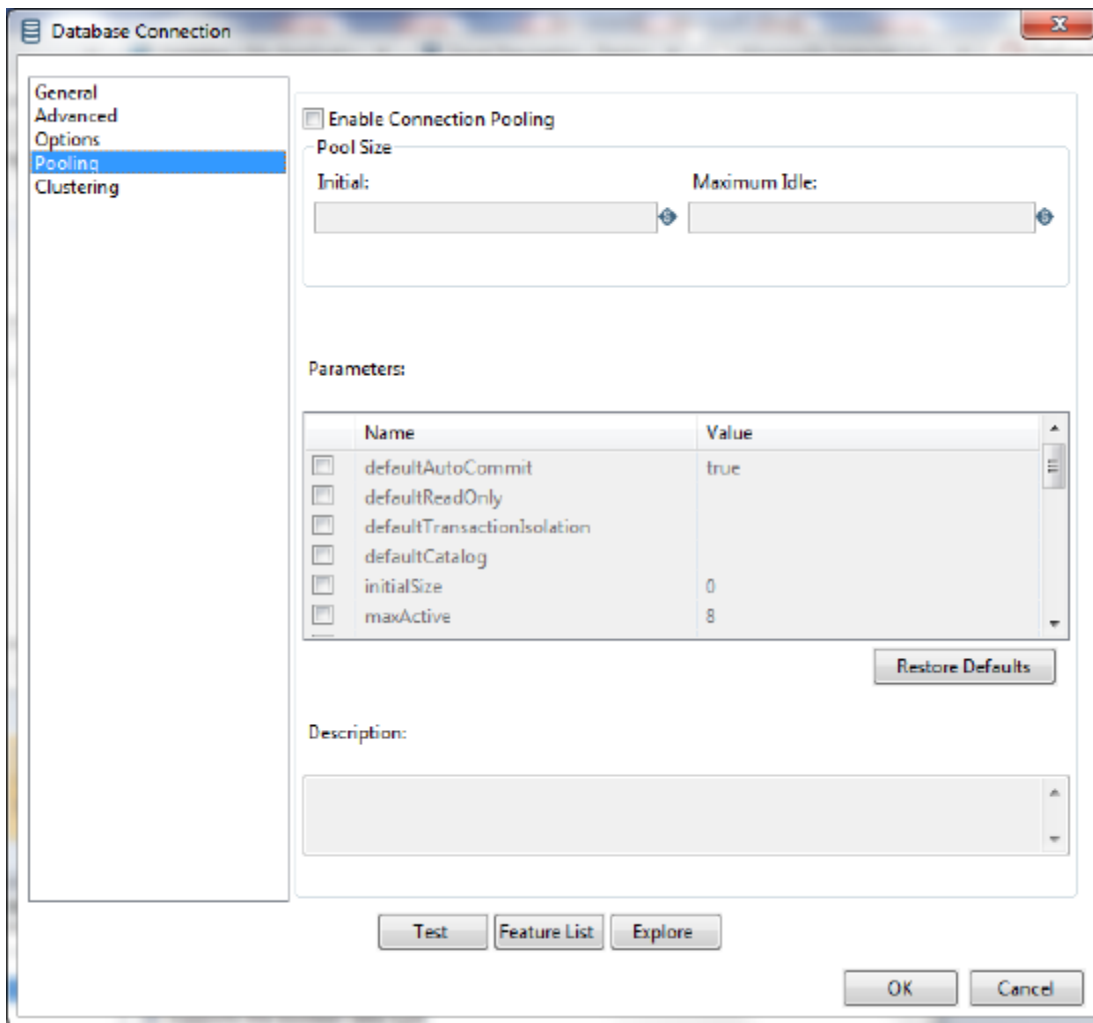
Pentaho has implemented a database-specific quoting system that allows you to use any name or character acceptable to the supported databases' naming conventions.

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.

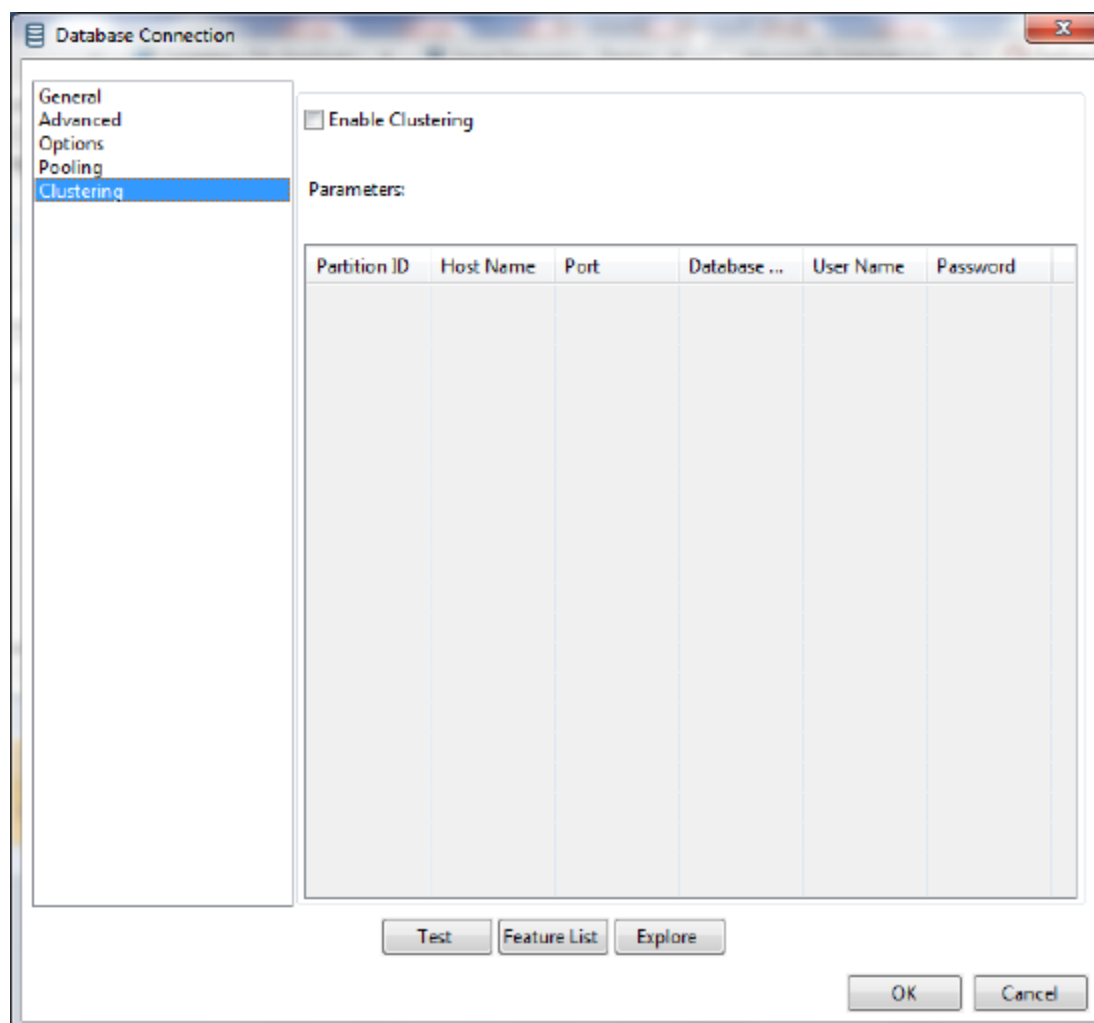
Feature	Description
Enable connection pooling	Enables connection pooling
Pool Size	Sets the <i>initial</i> size of the connection pool; sets the <i>maximum</i> number of connections in the connection pool
Parameters	Allows you to define additional custom pool parameters; click Restore Defaults when appropriate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

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

Task	Description
	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 <i>local device</i> , 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.

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
64-bit JVM on an Itanium processor	IA64 folder

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 Indices** field, enter the name of the tablespace where the indices 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.
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.
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 <i>initial</i> size of the connection pool; sets the <i>maximum</i> number of connections in the connection pool
Parameters	Allows you to define additional custom pool parameters; click Restore Defaults when appropriate
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.

Task	Description
Share a Connection	Rather than redefining a connection each time you create a job or transformation on your <i>local device</i> , 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

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

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.

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.

Changing Ports and URLs

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

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

Explains how to 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

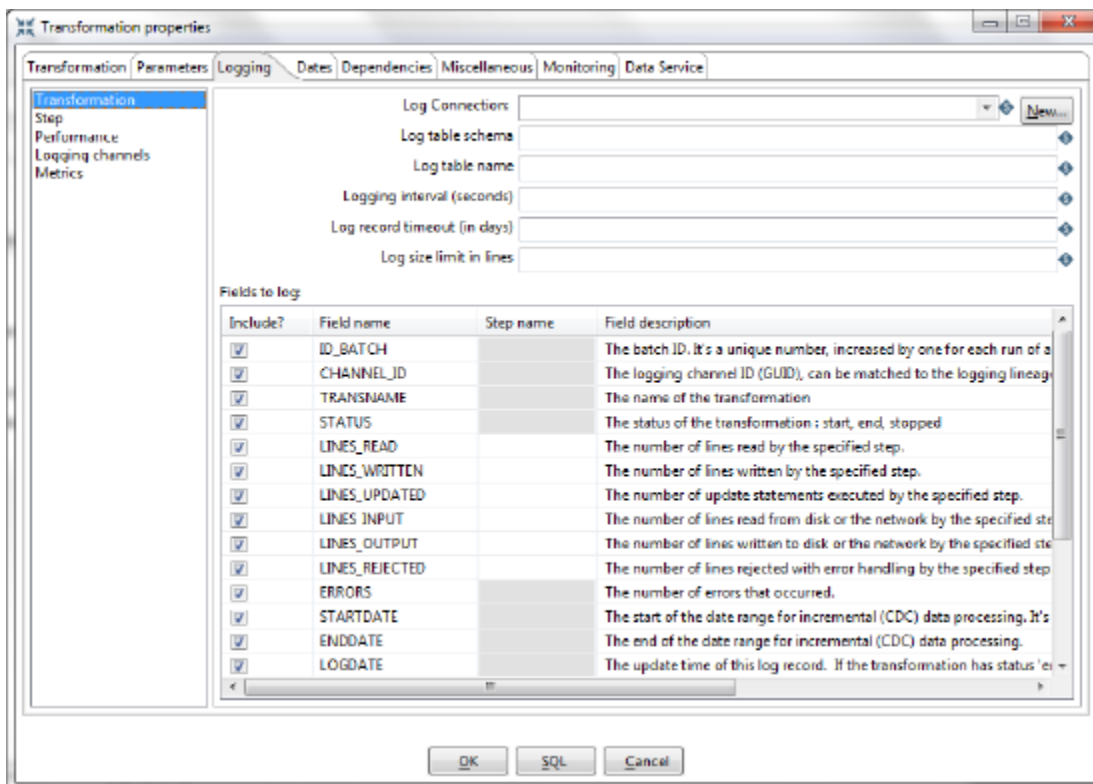
This section contains information on DI Server and client tool logging and status monitoring.

- [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. Here is how to turn on logging in Data Integration.

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
<code>max_log_lines</code>	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.
<code>max_log_timeout_minutes</code>	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.
<code>object_timeout_minutes</code>	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](#)
- [Delete a Checkpoint](#)
- [Set Up a Checkpoint Log](#)

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

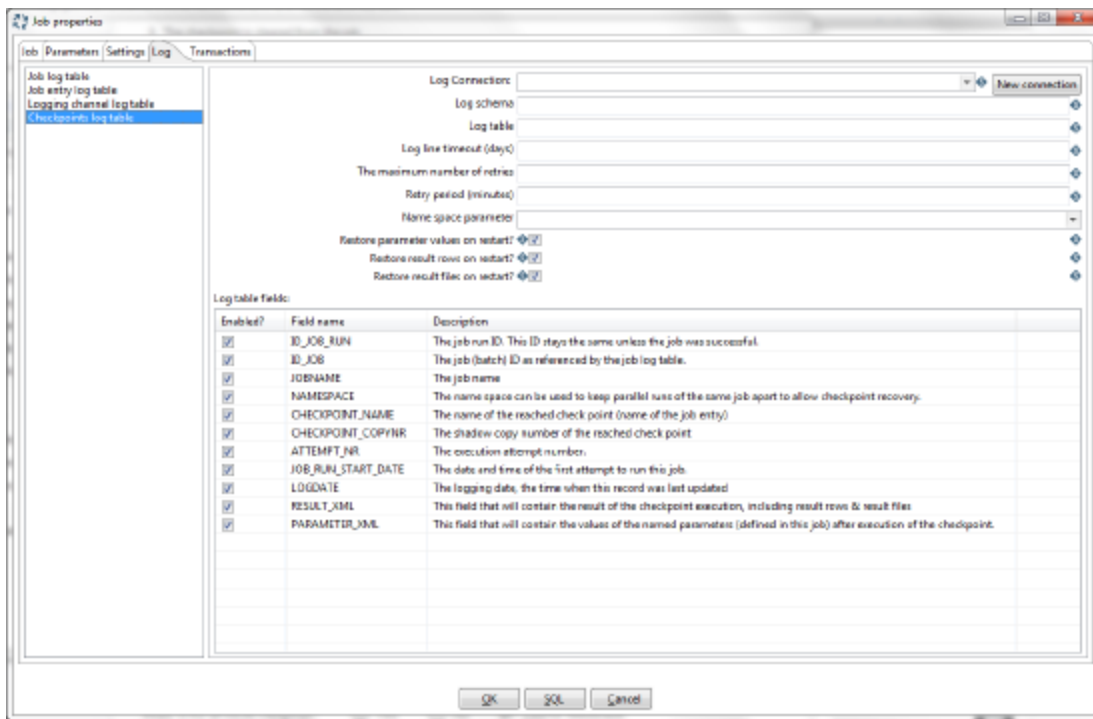
To delete a checkpoint, complete these steps.

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 PostgreSQL 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 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
<ul style="list-style-type: none"> • dim_batch • dim_component • dim_content_item • dim_date • dim_execution • dim_executor • dim_instance • dim_log_table • dim_session • dim_state • dim_step • dim_time 	<ul style="list-style-type: none"> • fact_component • fact_execution • fact_instance • fact_jobentry_execution • fact_perf_execution • fact_session • fact_step_execution • pro_audit_staging • pro_audit_tracker • 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 **live_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 <i>without</i> 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 learn more about how to schedule a regular clean up of the PDI Operations Mart, review the [Scheduling Transformations and Jobs From Spoon](#) article.

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. <i>*Reserved for future use.</i>
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
<code>step_entry_table_name</code>	The name of the table containing the step/entry logging information
<code>step_entry_schema_name</code>	The name of the database schema corresponding to the location of the step/entry logging table
<code>perf_table_conn_name</code>	The name of the database connection corresponding to the location of the performance logging table
<code>perf_table_name</code>	The name of the table containing the performance logging information
<code>perf_schema_name</code>	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
<code>time_tk</code>	A technical key (TK) for linking facts to time-of-day information
<code>hms</code>	A string representing the time of day as hours-minutes-seconds ("00:01:35", e.g.)
<code>hm</code>	A string representing the time of day as hours-minutes ("23:59", e.g.)
<code>ampm</code>	A string representing whether the time-of-day is AM or PM. Values are "am" or "pm".
<code>hour</code>	The integer number corresponding to the hour of the day (0-23)
<code>hour12</code>	The integer number corresponding to the hour of the day with respect to AM/PM (0-11)
<code>minute</code>	The integer number corresponding to the minute of the hour (0-59)
<code>second</code>	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.). <i>*Reserved for future use.</i>

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 <code>TRUE</code> , the parameter purges shared objects from the repository. This parameter must be used with the <code>purgefile</code> parameter. If you try to purge shared objects without including the <code>purgefile</code> parameter in the command line, an error occurs. If you set the <code>purgeSharedObjects</code> parameter to <code>FALSE</code> , it does not purge shared objects. If you include the <code>purgeSharedObjects</code> parameter in the command, but you don't set it to <code>TRUE</code> or <code>FALSE</code> , the Purge Utility will assume that it is set to <code>TRUE</code> .
-versionCount	<p>You must include only one of these: <code>versionCount</code>, <code>purgeBeforeDate</code>, <code>purgeFiles</code>, or <code>purgeRevisions</code></p>	Deletes entire version history except the for last <code>versionCount</code> versions. Set this value to an integer.
-purgeBeforeDate		Deletes all versions before <code>purgeBeforeDate</code> . The format for the date must be <code>mm/dd/yyyy</code> .
-purgeFiles		When set to <code>TRUE</code> , 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 <code>purgeSharedObject</code> parameter as well. If you set the <code>purgeFiles</code> parameter to <code>FALSE</code> , it does not purge files. If you include the <code>purgeFiles</code> parameter in the command, but you don't set it to <code>TRUE</code> or <code>FALSE</code> , the Purge Utility will assume that it is set to <code>TRUE</code> .
-purgeRevisions		When set to <code>TRUE</code> , all revisions are purged, but the current file remains unchanged. If you set the <code>purgeRevisions</code> parameter to <code>FALSE</code> , it does not purge revisions. If you include the <code>purgeRevisions</code> parameter in the command, but you don't set it to <code>TRUE</code> or <code>FALSE</code> , the Purge Utility will assume that it is set to <code>TRUE</code> .
-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: <code>purge-utility-log-YYYYMMdd-HHmmss.txt</code> . <code>YYYYMMdd-HHmmss</code> indicates the date and time that the log file was created (e.g. <code>purge-utility-log-20140313-154741.txt</code>).
-logLevel	N	Indicates the types and levels of detail the logs should contain. Values are: <code>ALL</code> , <code>DEBUG</code> , <code>ERROR</code> , <code>FATAL</code> , <code>TRACE</code> , <code>INFO</code> , <code>OFF</code> , and <code>WARN</code> . By default the log is set to <code>INFO</code> . 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** 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.