## Contents

**Copyleft**

**What is Talend Studio?**

**Projects and Business Models**
- Working with projects
- Working with business models

**Data services**
- Data services: concepts and principles
- Designing Jobs and Routes
- Designing services
- Managing Jobs, Routes and Services
- Mapping data flows

**Centralizing metadata for Data Integration**
- Objectives
- Centralizing database metadata
- Centralizing JDBC metadata
- Centralizing SAS metadata
- Centralizing File Delimited metadata
- Centralizing File Positional metadata
- Centralizing File Regex metadata
- Centralizing XML file metadata
- Centralizing File Excel metadata
- Centralizing File LDIF metadata
- Centralizing JSON file metadata
- Centralizing LDAP connection metadata
- Centralizing Azure Storage metadata
- Centralizing Google Drive metadata
- Centralizing Marketo metadata
- Centralizing Salesforce metadata
- Centralizing Snowflake metadata
- Setting up a generic schema
- Centralizing MDM metadata
- Centralizing Web Service metadata
- Centralizing an FTP connection
- Working with Hierarchical Mapper
- Exporting metadata as context and reusing context parameters to set up a connection
- Using centralized metadata in a Job

**Using routines**
- Managing routines
- System routines

**Appendices**
- Customizing Talend Studio and setting Studio preferences
- Using SQL templates
- SQL template writing rules
Adapted for 7.0.1. Supersedes previous releases.

Publication date: April 13, 2018

This documentation is provided under the terms of the Creative Commons Public License (CCPL).

For more information about what you can and cannot do with this documentation in accordance with the CCPL, please read: http://creativecommons.org/licenses/by-nc-sa/2.0/.

Notices

Talend and Talend ESB are trademarks of Talend, Inc.

Talend, Talend Integration Factory, Talend Service Factory, and Talend ESB are trademarks of Talend, Inc.


All brands, product names, company names, trademarks and service marks are the properties of their respective owners.

License Agreement

The software described in this documentation is licensed under the Apache License, Version 2.0 (the "License"); you may not use this software except in compliance with the License. You may obtain a copy of the License at http://www.apache.org/licenses/LICENSE-2.0.html. Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

What is Talend Studio?

Talend provides you with a range of open source and subscription Studios you can use to create your projects and manage data of any type or volume.

Using the graphical User Interface and hundreds of pre-built components and connectors, you can design your Jobs or Routes with a drag-and-drop interface and native code generation.
Projects and Business Models

Working with projects

Creating a project

A project is the highest physical structure for storing all different types of items. Once you launch your Talend Studio and before you start a Business Model, a data integration Job, a Route, or any other tasks, you need first create or import a project.

About this task
To create a project at the initial startup of the Studio, do the following:

Procedure
1. Launch Talend Studio
2. On the login window, select the Create a new project option and enter a project name in the field.

3. Click Finish to create the project and open it in the Studio.

What to do next
To create a new project after the initial startup of the Studio, do the following:
1. On the login window, select the Create a new project option and enter a project name in the field.
2. Click **Create** to create the project. The newly created project is displayed on the list of existing projects.

3. Select the project on the list and click **Finish** to open the project in the Studio.

Later, if you want to switch between projects, on the Studio menu bar, use the combination **File > Switch Project or Workspace**.

**Importing a demo project**

Talend provides you with different demo projects you can import into your Talend Studio. Available demos depend on the product you are using and may include ready to use Jobs or data services which help you understand the functionalities of different **Talend** components.

You can import the demo project either from the login window of your studio as a separate project, or from the **Integration** perspective into your current project.
To import a demo project as a separate project in the studio:

1. Launch your Talend Studio and from the login window select **Import a demo project** and then click **Select**.
2. In the open dialog box, select the demo project you want to import and click **Finish**.
   
   **Warning:** The demo projects available in the dialog box may vary depending on the product you are using.
3. In the dialog box that opens, type in a name for the demo project you want to import and click **Finish**.
   
   A bar is displayed to show the progress of the operation.
4. On the login window, select from the project list the demo project you imported and then click **Finish** to open the demo project in the studio.
   
   All the samples of the demo project are imported into the studio under different folders in the repository tree view including the input files and metadata connection necessary to run the demo samples.

To import the demo project into your current project in the studio:

1. Launch your studio and in the **Integration** perspective, click the icon on the toolbar.
2. In the open dialog box, select the demo project to import and click **Finish**.
   
   A bar is displayed to show the progress of the operation and then a confirmation message opens.
3. Click **OK**.

**Importing projects**

In Talend Studio, you can import one or more projects you already created with previous releases of the Studio.

To import a single project, do the following:

1. From the Studio login window, select **Import an existing project** then click **Select** to open the [Import] wizard.
2. Click the **Import project as** button and enter a name for your new project in the *Project Name* field.

3. Click **Select root directory** or **Select archive file** depending on the source you want to import from.

4. Click **Browse...** to select the workspace directory/archive file of the specific project folder. By default, the workspace in selection is the current release's one. Browse up to reach the previous release workspace directory or the archive file containing the projects to import.

5. Click **Finish** to validate the operation and return to the login window.

To import several projects simultaneously, do the following:

1. From the Studio login window, select **Import an existing project** then click **Select** to open the [Import] wizard.

2. Click **Import several projects**.

3. Click **Select root directory** or **Select archive file** depending on the source you want to import from.

4. Click **Browse...** to select the workspace directory/archive file of the specific project folder. By default, the workspace in selection is the current release's one. Browse up to reach the previous release workspace directory or the archive file containing the projects to import.
5. Select the **Copy projects into workspace** check box to make a copy of the imported project instead of moving it. This option is available only when you import several projects from a root directory.

   **Note:** If you want to remove the original project folders from the Talend Studio workspace directory you import from, clear this check box. But we strongly recommend you to keep it selected for backup purposes.

6. Select the **Hide projects that already exist in the workspace** check box to hide existing projects from the **Projects** list. This option is available only when you import several projects.

7. From the **Projects** list, select the projects to import and click **Finish** to validate the operation.

Upon successful project import, the names of the imported projects are displayed on the **Project** list of the login window.
You can now select the imported project you want to open in Talend Studio and click Finish to launch the Studio.

**Note:** A generation initialization window might come up when launching the application. Wait until the initialization is complete.

### Exporting a project

Talend Studio allows you to export projects created or imported in the current instance of Talend Studio.

**Procedure**

1. On the toolbar of the Studio main window, click to open the [Export Talend projects in archive file] dialog box.
2. Select the check boxes of the projects you want to export. You can select only parts of the project through the **Filter Types...** link, if need be (for advanced users).

3. In the **To archive file** field, type in the name of or browse to the archive file where you want to export the selected projects.

4. In the **Option** area, select the compression format and the structure type you prefer.

5. Click **Finish** to validate the changes.

**Results**

The archived file that holds the exported projects is created in the defined place.

**Working with business models**

**What is a Business Model**

**Talend**’s Business Models allow data integration project stakeholders to graphically represent their needs regardless of the technical implementation requirements. Business Models help the IT operation staff understand these expressed needs and translate them into technical processes. They typically include both the systems and processes already operating in the enterprise, as well as the ones that will be needed in the future.
Designing Business Models is part of the enterprises' best practices that organizations should adopt at a very early stage of a data integration project in order to ensure its success. Because Business Models usually help detect and resolve quickly project bottlenecks and weak points, they help limit the budget overspendings and/or reduce the upfront investment. Then during and after the project implementation, Business Models can be reviewed and corrected to reflect any required change.

A Business Model is a non technical view of a business workflow need.

Generally, a typical Business Model will include the strategic systems or processes already up and running in your company as well as new needs. You can symbolize these systems, processes and needs using multiple shapes and create the connections among them. Likely, all of them can be easily described using repository attributes and formatting tools.

In the design workspace of the Integration perspective of Talend Studio, you can use multiple tools in order to:

- draw your business needs,
- create and assign numerous repository items to your model objects,
- define the business model properties of your model objects.

**Creating a Business Model**

**Procedure**

1. In the Repository tree view of the Integration perspective, right-click the Business Models node and select Create Business Model.

The creation wizard guides you through the steps to create a new Business Model.

2. Enter the Business Model properties according to the following table:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>the name of the new Business Model. A message comes up if you enter prohibited characters.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Purpose</td>
<td>Business Model purpose or any useful information regarding the Business Model use.</td>
</tr>
<tr>
<td>Description</td>
<td>Business Model description.</td>
</tr>
<tr>
<td>Author</td>
<td>a read-only field that shows by default the current user login.</td>
</tr>
<tr>
<td>Locker</td>
<td>a read-only field that shows by default the login of the user who owns the lock on the current Business Model. This field is empty when you are creating a Business Model and has data only when you are editing the properties of an existing Business Model.</td>
</tr>
<tr>
<td>Version</td>
<td>a read-only field. You can manually increment the version using the M and m buttons.</td>
</tr>
<tr>
<td>Status</td>
<td>a list to select from the status of the Business Model you are creating.</td>
</tr>
<tr>
<td>Path</td>
<td>a list to select from the folder in which the Business Model will be created.</td>
</tr>
</tbody>
</table>

3. The **Modeler** opens up on the empty design workspace. You can create as many models as you want and open them all.

The **Modeler** is made of the following panels:

- the **Integration** perspective’s design workspace
- a **Palette** of shapes and lines specific to the business modeling
- the **Business Model** panel showing specific information about all or part of the model.
Modeling a Business Model

If you have multiple tabs opened on your design workspace, click the relevant tab in order to show the appropriate model information.

In the Business Model view, you can see information relative to the active model.

Use the Palette to drop the relevant shapes on the design workspace and connect them together with branches and arrange or improve the model visual aspect by zooming in or out.

This Palette offers graphical representations for objects interacting within a Business Model.

The objects can be of different types, from strategic system to output document or decision step. Each one having a specific role in your Business Model according to the description, definition and assignment you give to it.

All objects are represented in the Palette as shapes, and can be included in the model.

Note that you must click the business folder to display the library of shapes on the Palette.

Shapes

Select the shape corresponding to the relevant object you want to include in your Business Model. Double-click it or click the shape in the Palette and drop it in the modeling area.

Alternatively, for a quick access to the shape library, keep your cursor still on the modeling area for a couple of seconds to display the quick access toolbar:
For instance, if your business process includes a decision step, select the diamond shape in the **Palette** to add this decision step to your model.

**Note:** When you move the pointer over the quick access toolbar, a tooltip helps you to identify the shapes.

Then a simple click will do to make it show on the modeling area.

The shape is placed in a dotted black frame. Pull the corner dots to resize it as necessary.

Also, a blue-edged input box allows you to add a label to the shape. Give an expressive name in order to be able to identify at a glance the role of this shape in the model.

Two arrows below the added shape allow you to create connections with other shapes. You can hence quickly define sequence order or dependencies between shapes.

Related topic: **Connecting shapes** on page 17.

The available shapes include:

<table>
<thead>
<tr>
<th>Callout</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision</td>
<td>The diamond shape generally represents an <em>if</em> condition in the model. Allows to take context-sensitive actions.</td>
</tr>
<tr>
<td>Action</td>
<td>The square shape can be used to symbolize actions of any nature, such as transformation, translation or formatting.</td>
</tr>
<tr>
<td>Terminal</td>
<td>The rounded corner square can illustrate any type of output terminal.</td>
</tr>
<tr>
<td>Data</td>
<td>A parallelogram shape symbolize data of any type.</td>
</tr>
<tr>
<td>Document</td>
<td>Inserts a Document object which can be any type of document and can be used as input or output for the data processed.</td>
</tr>
<tr>
<td>Input</td>
<td>Inserts an input object allowing the user to type in or manually provide data to be processed.</td>
</tr>
<tr>
<td>List</td>
<td>forms a list with the extracted data. The list can be defined to hold a certain nature of data.</td>
</tr>
<tr>
<td>Database</td>
<td>Inserts a database object which can hold the input or output data to be processed.</td>
</tr>
<tr>
<td>Actor</td>
<td>This schematic character symbolizes players in the decision-support as well technical processes.</td>
</tr>
<tr>
<td>Ellipse</td>
<td>Inserts an ellipse shape.</td>
</tr>
<tr>
<td>Gear</td>
<td>This gearing piece can be used to illustrate pieces of code programmed manually that should be replaced by a <em>Talend</em> Job for example.</td>
</tr>
</tbody>
</table>
Connecting shapes

About this task

When designing your Business Model, you want to implement relations between a source shape and a target shape.

There are two possible ways to connect shapes in your design workspace:

- Select the relevant Relationship tool in the Palette. Then, in the design workspace, pull a link from one shape to the other to draw a connection between them.
- Or, you can implement both the relationship and the element to be related to or from, in a few clicks.

Procedure

1. Simply move the mouse pointer over a shape that you already dropped on your design workspace, in order to display the double connection arrows.
2. Select the relevant arrow to implement the correct directional connection if need be.
3. Drag a link towards an empty area of the design workspace and release to display the connections popup menu.
4. Select the appropriate connection from the list. You can choose among Create Relationship To, Create Directional Relationship To or Create Bidirectional Relationship To.
5. Then, select the appropriate element to connect to, among the items listed.

Results

You can create a connection to an existing element of the model. Select Existing Element in the popup menu and choose the existing element you want to connect to in the displaying list box.
The connection is automatically created with the selected shape.

The nature of this connection can be defined using Repository elements, and can be formatted and labelled in the Properties panel, see Business Models on page 20.

When creating a connection, an input box allows you to add a label to the connection you have created. Choose a meaningful name to help you identify the type of relationship you created.

Note: You can also add notes and comments to your model to help you identify elements or connections at a later date.

Related topic: Commenting and arrange a model on page 18.

**Commenting and arrange a model**

The tools of the Palette allow you to customize your model:

<table>
<thead>
<tr>
<th>Callout</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td>Select and move the shapes and lines around in the design workspace’s modeling area.</td>
</tr>
<tr>
<td>Zoom</td>
<td>Zoom in to a part of the model. To watch more accurately part of the model. To zoom out, press Shift and click the modeling area.</td>
</tr>
<tr>
<td>Note/Text/Note attachment</td>
<td>Allows comments and notes to be added in order to store any useful information regarding the model or part of it.</td>
</tr>
</tbody>
</table>

**Adding a note or free text**

To add a note, select the Note icon in the Palette, docked to the right of the design workspace.
Alternatively right-click the model or the shape you want to link the note to, and select Add Note. Or select the Note tool in the quick access toolbar.

A sticky note displays on the modeling area. If the note is linked to a particular shape, a line is automatically drawn to the shape.

Type in the text in the input box or, if the latter does not show, type in directly on the sticky note.

If you want to link your notes and specific shapes of your model, click the down arrow next to the Note tool on the Palette and select Note attachment. Pull the black arrow towards an empty area of the design workspace, and release. The popup menu offers you to attach a new Note to the selected shape.

You can also select the Add Text feature to type in free text directly in the modeling area. You can access this feature in the Note drop-down menu of the Palette or via a shortcut located next to the Add Note feature on the quick access toolbar.

**Arranging the model view**

You can also rearrange the look and feel of your model via the right-click menu.
Place your cursor in the design area, right-click to display the menu and select Arrange all. The shapes automatically move around to give the best possible reading of the model.

Alternatively, you can select manually the whole model or part of it.

To do so, right-click any part of the modeling area, and click Select.

You can select:

- **All** shapes and connectors of the model,
- **All shapes** used in the design workspace,
- **All connectors** branching together the shapes.

From this menu you can also zoom in and out to part of the model and change the view of the model.

**Business Models**

The information in the **Business Models** view corresponds to the current selection, if any. This can be the whole model if you selected all shapes of it or more specifically one of the shapes it is made of. If nothing is selected, the **Business Models** tab gives general information about the model.

The **Business Models** view contains different types of information grouped in the **Main**, **Appearance**, **Rules & Grid**, and **Assignment** tabs.

The **Main** tab displays basic information about the selected item in the design workspace. For more information about the **Main** tab, see Displaying Job configuration tabs/views on page 464.

**Appearance tab**

From the **Appearance** tab you can apply filling or border colors, change the appearance of shapes and lines in order to customize your Business Model or make it easier to read.

The **Business Model** view includes the following formats:

- fill the shape with selected color.
- color the shape border
- insert text above the shape
- insert gradient colors to the shape
- insert shadow to the shape

You can also move and manage shapes of your model using the edition tools. Right-click the relevant shape to access these editing tools.

**Rulers and Grid tab**

To display the **Rulers & Grid** tab, click [ ] on the Palette, then click any empty area of the design workspace to deselect any current selection.

Click the **Rulers & Grid** tab to access the ruler and grid setting view.
In the **Display** area, select the **Show Ruler** check box to show the **Ruler**, the **Show Grid** check box to show the **Grid**, or both check boxes. **Grid in front** sends the grid to the front of the model.

In the **Measurement** area, select the ruling unit among **Centimeters**, **Inches** or **Pixels**.

In the **Grid Line** area, click the **Color** button to set the color of the grid lines and select their style from the **Style** list.

Select the **Snap To Grid** check box to bring the shapes into line with the grid or the **Snap To Shapes** check box to bring the shapes into line with the shapes already dropped in the Business Model.

You can also click the **Restore Defaults** button to restore the default settings.

**Assignment tab**

The **Assignment** tab displays in a tabular form details of the **Repository** attributes you allocated to a shape or a connection.

To display any assignment information in the table, select a shape or a connection in the active model, then click the **Assignment** tab in the **Business Model** view.
You can also display the assignment list placing the mouse over the shape you assigned information to.

You can modify some information or attach a comment. Also, if you update data from the Repository tree view, assignment information gets automatically updated.

For further information about how to assign elements to a Business Model, see Assigning repository elements to a Business Model on page 22.

**Assigning repository elements to a Business Model**

The Assignment tab in the Business Models view lists the elements from the Repository tree view which have been assigned to a shape in the Business Model.
You can define or describe a particular object in your Business Model by simply associating it with various types of information, for example by adding metadata items.

You can set the nature of the metadata to be assigned or processed, thus facilitating the Job design phase.

To assign a metadata item, simply drop it from the Repository tree view to the relevant shape in the design workspace.

The Assignment table, located underneath the design workspace, gets automatically updated accordingly with the assigned information of the selected object.

The types of items that you can assign are:

<table>
<thead>
<tr>
<th>Element</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job designs</td>
<td>If any Job Designs developed for other projects in the same repository are available, you can reuse them as metadata in the active Business Model.</td>
</tr>
<tr>
<td>Metadata</td>
<td>You can assign any descriptive data stored in the repository to any of the objects used in the model. It can be connection information to a database for example.</td>
</tr>
<tr>
<td>Business Models</td>
<td>You can use in the active model all other Business Models stored in the repository of the same project.</td>
</tr>
<tr>
<td>Documentation</td>
<td>You can assign any type of documentation in any format. It can be a technical documentation, some guidelines in text format or a simple description of your databases.</td>
</tr>
<tr>
<td>Routines (Code)</td>
<td>If you have developed some routines in a previous project, to automate tasks for example, you can assign them to your Business Model. Routines are stored in the Code folder of the Repository tree view.</td>
</tr>
</tbody>
</table>

For more information about the Repository elements, see What is a Job design? on page 25.
Data services

Data services: concepts and principles

Talend ESB functional architecture

Talend Studio functional architecture is an architectural model that identifies Talend Studio functions, interactions and corresponding IT needs. The overall architecture has been described by isolating specific functionalities in different functional blocks.

The following chart illustrates the main architectural functional blocks used to handle your enterprise integration tasks.

Three different types of functional block are defined:

- The **Client** block includes a Talend Studio where you can carry out data integration or data service processes, mediation routes and services. For more information, see their respective chapters of the present user guide.

- The **Talend Execution Servers** block represents one or more Talend Runtimes (execution container) deployed inside your information system. Talend Runtime enables you to deploy and execute the Jobs, Routes and Services created in the Studio. For more information on how to deploy items in Talend Runtime, see Exporting a Service for deployment on page 155 and for more information about Talend Runtime itself, see the Talend ESB Infrastructure Services Configuration Guide.

  One single Talend Runtime can be used for all the Infrastructure services, ESB providers and consumers. But it is a typical set to have the ESB Infrastructure services on a dedicated container, and then deploy the participants (providers and consumers) on different containers. If you have several Talend Runtimes on which to deploy the Services and Routes, you will be able to load balance their execution according to your needs. All instances of Talend Runtime will communicate between each other via the Service Locator to identify the one more likely to deploy and execute them.

- The **Monitoring Database** block represents the Service Activity Monitoring database to monitor service calls.
The Service Activity Monitoring allows the end-users to monitor service calls. It provides monitoring and consolidated event information that the end-user can use to understand the underlying requests and replies that compose the event, monitor faults that may be unexpectedly generated and support the system management decisions. For more information on the Service Activity Monitoring, see its corresponding chapter in Talend ESB Infrastructure Services Configuration Guide.

For more information on the installation of all these components, see the Talend Installation and Migration Guide available on the Talend Open Studio for ESB download page http://www.talend.com/download.php.

Designing Jobs and Routes

What is a Job design?

Note:

Data service Jobs will simply be referred to as Jobs in the following documentation.

A Job Design is the runnable layer of a business model. It is a graphical design, of one or more components connected together, that allows you to set up and run dataflow management processes. A Job Design translates business needs into code, routines and programs, in other words it technically implements your data flow.

The Jobs you design can address all of the different sources and targets that you need for data integration and data service processes and any other related process.

When you design a Job in Talend Studio, you can:

• put in place data integration and data service actions using a library of technical components.
• change the default setting of components or create new components or family of components to match your exact needs.
• set connections and relationships between components in order to define the sequence and the nature of actions.
• access code at any time to edit or document the components in the designed Job.
• create and add items to the repository for reuse and sharing purposes (in other projects or Jobs or with other users).

Warning:

In order to be able to execute the Jobs you design in Talend Studio, you need to install an Oracle JVM 1.8 (IBM JVM is not supported). You can download it from http://www.oracle.com/technetwork/java/javase/downloads/index.html.

Getting started with a basic Job

This section provides a continuous example that will help you create, add components to, configure, and execute a simple Job. This Job will be named A_Basic_Job and will read a text file, display its content on the Run console, and then write the data into another text file.
Creating a Job

About this task

Talend Studio enables you to create a Job by dropping different technical components from the Palette onto the design workspace and then connecting these components together.

To create the example Job described in this section, proceed as follows:

Procedure

1. In the Repository tree view of the Integration perspective, right-click the Job Designs node and select Create job from the contextual menu.

The [New Job] wizard opens to help you define the main properties of the new Job.
2. Fill the Job properties as shown in the previous screenshot. The fields correspond to the following properties:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>the name of the new Job. Note that a message comes up if you enter prohibited characters.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Job purpose or any useful information regarding the Job use.</td>
</tr>
<tr>
<td>Description</td>
<td>Job description containing any information that helps you describe what the Job does and how it does it.</td>
</tr>
<tr>
<td>Author</td>
<td>a read-only field that shows by default the current user login.</td>
</tr>
<tr>
<td>Locker</td>
<td>a read-only field that shows by default the login of the user who owns the lock on the current Job. This field is empty when you are creating a Job and has data only when you are editing the properties of an existing Job.</td>
</tr>
<tr>
<td>Version</td>
<td>a read-only field. You can manually increment the version using the M and m buttons. For more information, see Managing Job and Route versions on page 182.</td>
</tr>
<tr>
<td>Status</td>
<td>a list to select from the status of the Job you are creating.</td>
</tr>
<tr>
<td>Path</td>
<td>a list to select from the folder in which the Job will be created.</td>
</tr>
</tbody>
</table>

3. An empty design workspace opens up showing the name of the Job as a tab label.
Results

The Job you created is now listed under the **Job Designs** node in the **Repository** tree view.

You can open one or more of the created Jobs by simply double-clicking the Job label in the **Repository** tree view.

Adding components to the Job

Now that the Job is created, components have to be added to the design workspace, a **tFileInputDelimited**, a **tLogRow**, and a **tFileOutputDelimited** in this example.

There are several ways to add a component onto the design workspace. You can:

- find your component on the **Palette** by typing the search keyword(s) in the search field of the **Palette** and drop it onto the design workspace.
- add a component by directly typing your search keyword(s) on the design workspace.
- add an output component by dragging from an input component already existing on the design workspace.
- drag and drop a centralized metadata item from the **Metadata** node onto the design workspace, and then select the component of interest from the **Components** dialog box.

This section describes the first three methods. For details about how to drop a component from the **Metadata** node, see **Centralizing database metadata** on page 261.

Dropping the first component from the Palette

**About this task**

The first component of this example will be added from the **Palette**. This component defines the first task executed by the Job. In this example, as you first want to read a text file, you will use the **tFileInputDelimited** component.

To drop a component from the **Palette**, proceed as follows:
Procedure

1. Enter the search keyword(s) in the search field of the Palette and press Enter to validate your search.
   The keyword(s) can be the partial or full name of the component, or a phrase describing its functionality if you don’t know its name, for example, tfileinputde, fileinput, or read file row by row. The Palette filters to the only families where the component can be found. If you cannot find the Palette view in the Studio, see Changing the Palette layout and settings on page 460.

   Note:
   To use a descriptive phrase as keywords for a fuzzy search, make sure the Also search from Help when performing a component searching check box is selected on the Preferences > Palette Settings view. For more information, see Palette preferences (Talend > Palette Settings) on page 481.

2. Select the component you want to use and click on the design workspace where you want to drop the component.

Results

Note that you can also drop a note to your Job the same way you drop components.

Each newly-added component is shown in a blue box to show that it as an individual Subjob.
Adding the second component by typing on the design workspace

About this task

The second component of our Job will be added by typing its name directly on the workspace, instead of dropping it from the Palette or from the Metadata node.

Prerequisite: Make sure you have selected the Enable Component Creation Assistant check box in the Studio preferences. For more information, see Using centralized metadata in a Job on page 415.

To add a component directly on the workspace, proceed as follows:

Procedure

1. Click where you want to add the component on the design workspace, and type your keywords, which can be the full or partial name of the component, or a phrase describing its functionality if you don’t know its name. In our example, start typing tLog.

   Note:
   To use a descriptive phrase as keywords for a fuzzy search, make sure the Also search from Help when performing a component searching check box is selected on the Preferences > Palette Settings view. For more information, see Palette preferences (Talend > Palette Settings) on page 481.

   A list box appears below the text field displaying all the matching components in alphabetical order.

   ![List box displaying components](image)

2. Double-click the desired component to add it on the workspace, tLogRow in our example.

Adding an output component by dragging from an input one

About this task

Now you will add the third component, a tFileOutputDelimited, to write the data read from the source file into another text file. We will add the component by dragging from the tLogRow component, which serves as an input component to the new one to be added.

Procedure

1. Click the tLogRow component to show the o icon docked to it.
2. Drag and drop the o icon where you want to add a new component.
A text field and a component list appear. The component list shows all the components that can be connected with the input component.

3. To narrow the search, type in the text field the name of the component you want to add or part of it, or a phrase describing the component’s functionality if you don’t know its name, and then double-click the component of interest, **tFileOutputDelimited** in this example, on the component list to add it onto the design workspace. The new component is automatically connected with the input component **tLogRow**, using a **Row > Main** connection.

**Note:**

To use a descriptive phrase as keywords for a fuzzy search, make sure the **Also search from Help when performing a component searching** check box is selected on the **Preferences > Palette Settings** view. For more information, see **Palette preferences (Talend > Palette Settings)** on page 481.
Connecting the components together

Now that the components have been added on the workspace, they have to be connected together. Components connected together form a subjob. Jobs are composed of one or several subjobs carrying out various processes.

In this example, as the `tLogRow` and `tFileOutputDelimited` components are already connected, you only need to connect the `tFileInputDelimited` to the `tLogRow` component.

To connect the components together, use either of the following methods:

You can also drop components in the middle of a Row link. For more information, see Adding a component between two connected components on page 45.

For more information on using various types of connections, see Using connections in a Job on page 63.

Right-click and click again

Procedure

1. Right-click the source component, `tFileInputDelimited` in this example.
2. In the contextual menu that opens, select the type of connection you want to use to link the components, Row > Main in this example.
3. Click the target component to create the link, `tLogRow` in this example.

![Diagram showing component connections]

Note that a black crossed circle is displayed if the target component is not compatible with the link.

According to the nature and the role of the components you want to link together, several types of link are available. Only the authorized connections are listed in the contextual menu.

Drag and drop

Procedure

1. Click the input component, `tFileInputDelimited` in this example.
2. When the O icon appears, click it and drag the cursor to the destination component, **tLogRow** in this example.

A **Row > Main** connection is automatically created between the two components.

While this method requires less operation steps, it works only with these types of **Row** connections: **Main, Lookup, Output, Filter, and Reject**, depending on the nature and role of the components you are connecting.

**Configuring the components**

Now that the components are linked, their properties should be defined.

For more advanced details regarding the components properties, see [Defining component properties](#) on page 49.

**Configuring the tFileInputDelimited component**

**Procedure**

1. Double-click the **tFileInputDelimited** component to open its **Basic settings** view.

2. Click the [...] button next to the **File Name/Stream** field.
3. Browse your system or enter the path to the input file, **customers.txt** in this example.
4. In the **Header** field, enter 1.
5. Click the [...] button next to **Edit schema**.
6. In the Schema Editor that opens, click three times the [+] button to add three columns.
7. Name the three columns `id`, `CustomerName` and `CustomerAddress` respectively and click **OK** to close the editor.

![Schema of tFileInputDelimited_1](image)

8. In the pop-up that opens, click **OK** accept the propagation of the changes. This allows you to copy the schema you created to the next component, **tLogRow** in this example.

![Propagate](image)

**Configuring the tLogRow component**

**Procedure**

1. Double-click the **tLogRow** component to open its **Basic settings** view.
2. In the **Mode** area, select **Table (print values in cells of a table)**. By doing so, the contents of the `customers.txt` file will be printed in a table and therefore more readable.

![tLogRow_1](image)
Configuring the tFileOutputDelimited component

Procedure

1. Double-click the tFileOutputDelimited component to open its Basic settings view.

   ![Screenshot of tFileOutputDelimited component settings](image)

2. Click the [...] button next to the File Name field.
3. Browse your system or enter the path to the output file, `customers.csv` in this example.
4. Select the Include Header check box.
5. If needed, click the Sync columns button to retrieve the schema from the input component.

Executing the Job

About this task

Now that components are configured, the Job can be executed.

To do so, proceed as follows:

Procedure

1. Press Ctrl+S to save the Job.
2. Go to Run tab, and click on Run to execute the Job.

Results

The file is read row by row and the extracted fields are displayed on the Run console and written to the specified output file.
What is a Route

A Route is a rule defining how messages will be moved from one service (or endpoint) to another. It is a graphical design, of two or more components connected together, that allows you to easily set up and test routing and mediation rules.

The Routes you design can address all of the different sources and targets that you need for your routing processes.

When you design a Route in Talend Studio, you can:

• put in place routing or mediation rules using a library of technical components based on the standard Enterprise Integration Patterns.

• change the default setting of components or create new components or family of components to match your exact needs.

• create and add items to the repository for reuse and sharing purposes (in other projects or Routes or with other users).

⚠️ Warning:

In order to be able to execute the Routes you design in Talend Studio, you need to install an Oracle JVM 1.8 (IBM JVM is not supported). You can download it from http://www.oracle.com/technetwork/java/javase/downloads/index.html.

Getting started with a basic Route

This section provides a continuous example that will help you create, add components to, configure, and execute a simple Route.
This Route will be named A_Basic_Route and will start a message exchange, set the message body, and then print the log messages in the execution console.

Creating a Route

About this task

Talend Studio enables you to create Routes by dropping different mediation components from the Palette onto the design workspace and then connecting these components together.

These created Routes are all stored in a central repository. You can create different folders to better classify them.

To create the example Route described in this section, proceed as follows:

Procedure

1. In the Repository tree view of the Integration perspective, right-click the Routes node and select Create Route from the contextual menu.

The [New Route] wizard opens to help you define the main properties of the new Route.

2. Fill the Route properties as shown in the previous screenshot.

The fields correspond to the following properties:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>the name of the new Route. Note that a message comes up if you enter prohibited characters.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Route purpose or any useful information regarding the Route use.</td>
</tr>
<tr>
<td>Description</td>
<td>Route description containing any information that helps you describe what the Route does and how it does it.</td>
</tr>
<tr>
<td>Author</td>
<td>a read-only field that shows by default the current user login.</td>
</tr>
<tr>
<td>Locker</td>
<td>a read-only field that shows by default the login of the user who owns the lock on the current Route. This field is empty when you are creating a Route and has data only when you are editing the properties of an existing Route.</td>
</tr>
<tr>
<td>Version</td>
<td>a read-only field. You can manually increment the version using the M and m buttons. For more information, see Managing Job and Route versions on page 182.</td>
</tr>
<tr>
<td>Status</td>
<td>a list to select from the status of the Route you are creating.</td>
</tr>
<tr>
<td>Path</td>
<td>a list to select from the folder in which the Route will be created.</td>
</tr>
</tbody>
</table>

3. An empty design workspace opens up showing the name of the Route as a tab label.

**Results**

The Route you created is now listed under the Routes node in the Repository tree view.

You can open one or more of the created Routes by simply double-clicking the Route label in the Repository tree view.

**Adding components to the Route**

Now that the Route is created, you need to add components to the design workspace, a cTimer, a cSetBody, and a cLog in this example.
There are several ways to add a component onto the design workspace. You can:

- find your component on the **Palette** by typing the search keyword(s) in the search field of the **Palette** and drop it onto the design workspace. The keyword(s) can be the partial or full name of the component, or a phrase describing its functionality if you don’t know its name.

- add a component by directly typing the partial or full name of the component on the design workspace.

- add an output component by dragging from an input component already existing on the design workspace.

**Adding the first Route component from the Palette**

**About this task**

The first component of this example will be added from the **Palette**, the **cTimer** to trigger the message exchange.

To drop a component from the **Palette**, proceed as follows:

**Procedure**

1. Enter the search keyword(s) in the search field of the **Palette** and press **Enter** to validate your search.
   
   The keyword(s) can be the partial or full name of the component, or a phrase describing its functionality if you don’t know its name, for example, `timer`, or `generate message exchange`. The **Palette** filters to the only families where the component can be found. If you cannot find the **Palette** view in the Studio, see Changing the Palette layout and settings on page 460.

   **Note:**

   If you use a descriptive phrase as keywords for a fuzzy search, make sure the **Also search from Help when performing a component searching** check box is selected on the **Preferences > Palette Settings** view. For more information, see Palette preferences (Talend > Palette Settings) on page 481.
2. Select the component you want to use and click on the design workspace where you want to drop the component.

Results
Note that you can also drop a note to your Route the same way you drop components.

Typing on the design workspace to add the second Route component

About this task
The second component of our Route will be added by typing its name directly on the workspace, instead of dropping it from the Palette.

Prerequisite: Make sure you have selected the Enable Component Creation Assistant check box in the Studio preferences. For more information, see Using centralized metadata in a Job on page 415.
To add a component directly on the workspace, proceed as follows:

**Procedure**

1. Click where you want to add the component on the design workspace, and type your keywords, which can be the full or partial name of the component, or a phrase describing its functionality if you don't know its name. In our example, start typing `cset`.

   **Note:**
   To use a descriptive phrase as keywords for a fuzzy search, make sure the **Also search from Help when performing a component searching** check box is selected on the **Preferences > Palette Settings** view. For more information, see **Palette preferences (Talend > Palette Settings)** on page 481.

   A list box appears below the text field displaying all the matching components in alphabetical order.

2. Double-click the desired component to add it on the workspace, **cSetBody** in our example.

   **Dragging from an input Route component to add an output one**

   **About this task**

   Now you will add the third component, a **cLog**, to log the message exchanges. We will add the component by dragging from the **cSetBody** component, which serves as an input component to the new one to be added.

   **Procedure**

   1. Click the **cSetBody** component to show the o icon docked to it.
   2. Drag and drop the o icon where you want to add a new component.

      A text field and a component list appear. The component list shows all the components that can be connected with the input component.
3. To narrow the search, type in the text field the name of the component you want to add or part of it, or a phrase describing the component’s functionality if you don’t know its name, and then double-click the component of interest, **cLog** in this example, on the component list to add it onto the design workspace. The new component is automatically connected with the input component **cSetBody**, using a **Row > Route** connection.

   **Note:**
   To use a descriptive phrase as keywords for a fuzzy search, make sure the **Also search from Help when performing a component searching** check box is selected on the **Preferences > Palette Settings** view. For more information, see Palette preferences (Talend > Palette Settings) on page 481.

**Connecting the Route components**

Now that the components have been added on the workspace, they have to be connected together.

In this example, as the **cSetBody** and **cLog** components are already connected, you only need to connect the **cTimer** to the **cSetBody** component.

To connect the components together, use either of the following methods:

You can also drop components in the middle of a **Row** link. For more information, see Adding a component between two connected components on page 45.

For more information on using various types of connections, see Using connections in a Route on page 70.

**Route link by right-click and click**

**Procedure**

1. Right-click the source component, **cTimer** in this example.
2. In the contextual menu that opens, select the type of connection you want to use to link the components, **Row > Route** in this example.

3. Click the target component to create the link, **cSetBody** in this example.

![Diagram showing the linking process](image)

Note that a black crossed circle is displayed if the target component is not compatible with the link.

According to the nature and the role of the components you want to link together, several types of link are available. Only the authorized connections are listed in the contextual menu.

**Drag and drop to create the Route link**

**Procedure**

1. Click the input component, **cTimer** in this example.

2. When the O icon appears, click it and drag the cursor to the destination component, **cSetBody** in this example.

   A **Row > Route** connection is automatically created between the two components.

![Diagram showing the linking process](image)

While this method requires less operation steps, it works only with the **Row > Route** connection.

**Configuring the components**

**About this task**

Now that the components are linked, their properties should be defined.

For more advanced details regarding the components properties, see Defining component properties on page 49.

Label the components for better identification of their roles, **Starter** for **cTimer**, **Set_message_body** for **cSetBody**, and **LogMessages** for **cLog**.

**Note:**

It is recommended to label each component with a unique name to better identify its role in the Route. This is especially useful for the code generation of some components, for
example, the cSOAP component. For more information, see Talend ESB Mediation Components documentation in Talend Help Center.

Procedure

1. Double-click the cTimer component to open its Basic settings view.

2. In the Repeat field, enter 1 to generate the message exchange one time. Keep the default settings of the other options.

3. Double-click the cSetBody component to open its Basic settings view.

4. Select Constant in the Language list and enter "Hello World!" in the Expression field as the message body.

5. Keep the default settings of the cLog component to log the message exchanges.
Executing the Route

About this task
Now that components are configured, the Route can be executed. To do so, proceed as follows:

Procedure
1. Press Ctrl+S to save the Route.
2. Go to Run tab, and click on Run to execute the Route.

Results
The logs of the message exchange are printed in the console.

Working with components

The sections below give detailed information about various subjects related to handling components in Jobs and Routes, including:

- Adding a component between two connected components on page 45
- Defining component properties on page 49
- Finding Jobs containing a specific component on page 58
- Setting default values in the schema of a component in a Job on page 60
- Using Camel components in a Route on page 62

Adding a component between two connected components

When designing a Job or Route, you can insert a component between two components linked by a Row or Route connection, provided that the new component can serve as a middle component between the two.

The examples below show different options for you to insert a tMap between a tFileInputDelimited and LogRow linked by a Row > Main connection. For how to connect components in a Job, see
Connecting the components together on page 32. For more information about various types of connections, see Connection types on page 63.

**Dropping the component from the Palette onto the connection**

**Procedure**

1. From the **Palette**, locate and select **tMap**.
2. Drag the component and drop it onto the **Row** connection.

If you are prompted to give a name to the output connection from the newly added component, which is true in the case of a **tMap**, type in a name and click **OK** to close the dialog box.

**Note:**

You may be asked to retrieve the schema of the target component. In that case, click **OK** to accept or click **No** to deny.

The component is inserted in the middle of the connection, which is now divided into two connections.

**Adding the component by typing on the connection**

**Procedure**

1. Click on the connection that links the two existing components to select it.
2. Type the name of the new component you want to add, tMap in this example, and double click the component on the suggested list to add it onto the connection.

3. If you are prompted to give a name to the output connection from the newly added component, which is true in the case of a tMap, type in a name and click OK to close the dialog box.

Note:
You may be asked to retrieve the schema of the target component. In that case, click OK to accept or click No to deny.

The component is inserted in the middle of the connection, which is now divided in two connections.
Adding the component to the design workspace and moving the existing connection

Procedure

1. Add the new component, **tMap** in this example, onto the design workspace by either dropping it from the **Palette** or clicking in the design workspace and typing the component name.

2. Select the connection and move your mouse pointer towards the end of the connection until the mouse pointer becomes a + symbol.

3. Drag the connection from the **tLogRow** component and drop it onto the **tMap** component.
4. Connect the tMap component to the tLogRow using a Row > Main connection.

Defining component properties

The properties information for each component in a Job or Route allows to set the actual technical implementation of the active Job.

Each component is defined by basic and advanced properties shown respectively on the Basic Settings tab and the Advanced Settings tab of the Component view of the selected component in the design workspace. The Component view gathers also other collateral information related to the component in use, including View and Documentation tabs.

Basic Settings tab

About this task

The Basic Settings tab is part of the Component view, which is located on the lower part of the designing editor of the Integration perspective of Talend Studio.

Each component has specific basic settings according to its function requirements within the Job or Route.

Note:

Some components require code to be input or functions to be set. Make sure you use Java code in properties.
For File and Database components in a Job, you can centralize properties in metadata files located in the Metadata directory of the Repository tree view. This means that on the Basic Settings tab you can set properties on the spot, using the Built-In Property Type or use the properties you stored in the Metadata Manager using the Repository Property Type. The latter option helps you save time.

Select Repository as Property Type and choose the metadata file holding the relevant information. Related topic: Centralizing database metadata on page 261.

Alternatively, you can drop the Metadata item from the Repository tree view directly to the component already dropped on the design workspace, for its properties to be filled in automatically.

If you selected the Built-in mode and set manually the properties of a component, you can also save those properties as metadata in the Repository. To do so:

**Procedure**

1. Click the floppy disk icon. The metadata creation wizard corresponding to the component opens.
2. Follow the steps in the wizard. For more information about the creation of metadata items, see Centralizing database metadata on page 261.
3. The metadata displays under the Metadata node of the Repository.

**Results**

For all components that handle a data flow (most components), you can define a Talend schema in order to describe and possibly select the data to be processed. Like the Properties data, this schema is either Built-in or stored remotely in the Repository in a metadata file that you created. A detailed description of the Schema setting is provided in the next sections.

**Setting a built-in schema in a Job**

A schema created as Built-in is meant for a single use in a Job, hence cannot be reused in another Job.

Select Built-in in the Property Type list of the Basic settings view, and click the Edit Schema button to create your built-in schema by adding columns and describing their content, according to the input file definition.

![Schema of tFileInputDelimited_1](image)

Make sure the data type in the Type column is correctly defined.

For more information regarding Java data types, including date pattern, see Java API Specification.
Below are the commonly used **Talend** data types:

- **Object**: a generic Talend data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

In all output properties, you also have to define the schema of the output. To retrieve the schema defined in the input schema, click the **Sync columns** tab in the **Basic settings** view.

⚠️ **Warning:**

When creating a database table, you are recommended to specify the **Length** field for all columns of type String, Integer or Long and specify the **Precision** field for all columns of type Double, Float or BigDecimal in the schema of the component used. Otherwise, unexpected errors may occur.

**Setting a repository schema in a Job**

If you often use certain database connections or specific files when creating your Jobs, you can avoid defining the same properties over and over again by creating metadata files and storing them in the **Metadata** node in the **Repository** tree view of the **Integration** perspective.

To recall a metadata file into your current Job, select **Repository** in the **Schema** list and then select the relevant metadata file. Or, drop the metadata item from the **Repository** tree view directly to the component already dropped on the design workspace. Then click **Edit Schema** to check that the data is appropriate.
You can edit a repository schema used in a Job from the Basic settings view. However, note that the schema hence becomes Built-in in the current Job.

You can also use a repository schema partially. For more information, see Using a repository schema partially in a Job on page 52.

**Note:**

You cannot change the schema stored in the repository from this window. To edit the schema stored remotely, right-click it under the Metadata node and select the corresponding edit option (Edit connection or Edit file) from the contextual menu.

Related topics: Centralizing database metadata on page 261.

**Using a repository schema partially in a Job**

When using a repository schema, if you do not want to use all the predefined columns, you can select particular columns without changing the schema into a built-in one.

The following describes how to use a repository schema partially for a database input component. The procedure may vary slightly according to the component you are using.

**Procedure**

1. Click the [...] button next to Edit schema on the Basic settings tab. The [Edit parameter using repository] dialog box appears. By default, the option View schema is selected.
2. Click **OK**. The [Schema] dialog box pops up, which displays all columns in the schema. The **Used Column** check box before each column name indicates whether the column is used.

3. Select the columns you want to use.

4. Click **OK**. A message box appears, which prompts you to do a guess query.

   **Note:**

   The guess query operation is needed only for the database metadata.
5. Click **OK** to close the message box. The [Propagate] dialog box appears. Click **Yes** to propagate the changes and close the dialog box.

![Propagate dialog box](image)

6. On the **Basic settings** tab, click **Guess Query**. The selected column names are displayed in the **Query** area as expected.

   ![customers(tMysqlInput_1)(MySQL)](image)

   - **Database**: MySQL
   - **Property Type**: Repository
   - **DB Version**: MySQL
   - **Host**: localhost
   - **Port**: 3306
   - **Username**: root
   - **Password**: *********
   - **Schema**: DB (MySQL): customers - customers
   - **Table Name**: customers
   - **Query Type**: Guess Query
   - **Query**: 

   ```
   SELECT customers.id,
   customers.CustomerName,
   customers.CustomerAddress,
   customers.idState,
   customers.id2,
   customers.RegTime,
   customers.RegisterTime,
   customers.Sum1,
   customers.Sum2,
   customers.Sum3,
   customers.Sum4,
   customers.Sum5,
   customers.Sum6,
   customers.Sum7

   FROM customers
   ```

   **Results**

   For more information about how to set a repository schema, see Setting a repository schema in a Job on page 51.

   **Setting a field dynamically (Ctrl+Space bar)**

   **About this task**

   On any field of your component **Properties** view, you can use the **Ctrl+Space** bar to access the global and context variable list and set the relevant field value dynamically.
**Procedure**

1. Place the cursor on any field of the **Component** view.
2. Press **Ctrl+Space bar** to access the proposal list.
3. Select on the list the relevant parameters you need. Appended to the variable list, a information panel provides details about the selected parameter.

This can be any parameter including: error messages, number of lines processed, or else... The list varies according to the component in selection or the context you are working in.

Related topic: Using contexts and variables on page 73.

**Advanced settings tab**

Some components, especially **File** and **Databases** components in Jobs, provides numerous advanced use possibilities.

The content of the **Advanced settings** tab changes according to the selected component.

Generally you will find on this tab the parameters that are not required for a basic or usual use of the component but may be required for a use out of the standard scope.

**Measuring data flows**

You can also find in the **Advanced settings** view the option **tStatCatcher Statistics** that allows you, if selected, to display logs and statistics about the current Job without using dedicated components. For
more information regarding the stats & log features, see Automating the use of statistics & logs on page 108.

**Dynamic settings tab of components in a Job**

**About this task**

The **Basic settings** and **Advanced settings** tabs of all components display various check boxes and drop-down lists for component parameters. Usually, available values for these types of parameters can only be edited when designing your Job.

The **Dynamic settings** tab, on the **Component** view, allows you to customize these parameters into code or variable.

This feature allows you, for example, to define these parameters as variables and thus let them become context-dependent, whereas they are not meant to be by default.

Another benefit of this feature is that you can now change the context setting at execution time. This makes full sense when you intend to export your Job in order to deploy it onto a Job execution server for example.

To customize these types of parameters, as context variables for example, follow the following steps:

**Procedure**

1. Select the relevant component basic settings or advanced settings view that contains the parameter you want to define as a variable.
2. Click the **Dynamic settings** tab.
3. Click the **plus** button to display a new parameter line in the table.
4. Click the **Name** of the parameter displaying to show the list of available parameters. For example: **Print operations**
5. Then click in the facing **Code** column cell and set the code to be used. For example: `context.verbose` if you create the corresponding context variable, called `verbose`.

   **Note:**

   As code, you can input a context variable or a piece of Java code.

The corresponding lists or check boxes thus become unavailable and are highlighted in yellow in the **Basic settings** or **Advanced settings** tab.
**Results**

Note: If you want to set a parameter as context variable, make sure you create the corresponding variable in the Contexts view.

For more information regarding the context variable definition, see Defining context variables in the Contexts view on page 74.

For use cases showing how to define a dynamic parameter, see Talend Help Center (https://help.talend.com).

**View tab**

The View tab of the Component view allows you to change the default display format of components on the design workspace.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label format</td>
<td>Free text label showing on the design workspace. Variables can be set to retrieve and display values from other fields. The field tooltip usually shows the corresponding variable where the field value is stored.</td>
</tr>
<tr>
<td>Hint format</td>
<td>Hidden tooltip, showing only when you mouse over the component.</td>
</tr>
<tr>
<td>Connection format</td>
<td>Indicates the type of connection accepted by the component.</td>
</tr>
</tbody>
</table>

You can graphically highlight both Label and Hint text with HTML formatting tags:

- Bold: `<b> YourLabelOrHint </b>`
- Italic: `<i> YourLabelOrHint </i>`
- Return carriage: `YourLabelOrHint <br> ContdOnNextLine`
- Color: `<Font color= '#RGBcolor'> YourLabelOrHint </Font>`

To change your preferences of this View panel, click Window>Preferences>Talend>Designer.

**Documentation tab**

Feel free to add any useful comment or chunk of text or documentation to your component.
In the **Documentation** tab, you can add your text in the **Comment** field. Then, select the **Show Information** check box and an information icon display next to the corresponding component in the design workspace.

You can show the Documentation in your hint tooltip using the associated variable `_COMMENT_`, so that when you place your mouse on this icon, the text written in the **Comment** field displays in a tooltip box.

For advanced use of Documentations, you can use the **Documentation** view in order to store and reuse any type of documentation.

### Finding Jobs containing a specific component

**About this task**

**Note:**

You should open one Job at least in the Studio to display the **Palette** to the right of the design workspace and thus start the search.

From the **Palette**, you can search for all the Jobs that use the selected component. To do so:

**Procedure**

1. In the **Palette**, right-click the component you want to look for and select **Find Component in Jobs**.
A progress indicator displays to show the percentage of the search operation that has been completed then the [Find a Job] dialog box displays listing all the Jobs that use the selected component.
2. From the list of Jobs, click the desired Job and then click **OK** to open it on the design workspace.

**Setting default values in the schema of a component in a Job**

**About this task**

You can set default values in the schema of certain components to replace null values retrieved from the data source.

**Note:**

At present, only `tFileInputDelimited`, `tFileInputExcel`, and `tFixedFlowInput` support default values in the schema.

In the following example, the company and city fields of some records of the source CSV file are left blank, as shown below. The input component reads data from the source file and completes the missing information using the default values set in the schema, *Talend* and *Paris* respectively.

```plaintext
id;firstName;lastName;company;city;phone
1;Michael;Jackson;IBM;Roma;2323
2;Elisa;Black;Microsoft;London;4499
3;Michael;Dujardin;;8872
4;Marie;Dolvina;;6655
5;Jean;Perfide;;3344
6;Emilie;Taldor;Oracle;Madrid;2266
7;Anne-Laure;Paldufier;Apple;;4422
```

To set default values:
Procedure

1. Double-click the input component **tFileInputDelimited** to show its **Basic settings** view.

In this example, the metadata for the input component is stored in the Repository. For information about metadata creation in the Repository, see *Centralizing database metadata* on page 261.

2. Click the [...] button next to **Edit schema**, and select the **Change to built-in property** option from the pop-up dialog box to open the schema editor.

3. Enter **Talend** between quotation marks in the **Default** field for the **company** column, enter **Paris** between quotation marks in the **Default** field for the **city** column, and click **OK** to close the schema editor.
4. Configure the output component **tLogRow** to display the execution result the way you want, and then run the Job.

```
Starting job Job_1 at 15:57 09/06/2015.
[statistics] connecting to socket on port 3454
[statistics] connected
______________________________
<table>
<thead>
<tr>
<th>id</th>
<th>firstName</th>
<th>LastName</th>
<th>company</th>
<th>city</th>
<th>phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Michael</td>
<td>Jackson</td>
<td>IBM</td>
<td>Roma</td>
<td>2323</td>
</tr>
<tr>
<td>2</td>
<td>Elisa</td>
<td>Black</td>
<td>Microsoft</td>
<td>London</td>
<td>4499</td>
</tr>
<tr>
<td>3</td>
<td>Michael</td>
<td>Dujardin</td>
<td>Talend</td>
<td>Paris</td>
<td>8872</td>
</tr>
<tr>
<td>4</td>
<td>Marie</td>
<td>Delvina</td>
<td>Talend</td>
<td>Paris</td>
<td>6655</td>
</tr>
<tr>
<td>5</td>
<td>Jean</td>
<td>Perdide</td>
<td>Talend</td>
<td>Paris</td>
<td>3344</td>
</tr>
<tr>
<td>6</td>
<td>Eudie</td>
<td>Toldor</td>
<td>Oracle</td>
<td>Madrid</td>
<td>2266</td>
</tr>
<tr>
<td>7</td>
<td>Anne-Laure</td>
<td>Paldufier</td>
<td>Apple</td>
<td>Paris</td>
<td>4422</td>
</tr>
</tbody>
</table>

[statistics] disconnected
Job Job_1 ended at 15:57 19/06/2015 [exit code=0]
```

In the output data flow, the missing information is completed according to the set default values.

**Using Camel components in a Route**

There are many Camel components such as camel-mina, camel-http4 and others which are supported, but not directly included in the **Palette**. These Camel components require the generic **cMessagingEndpoint** to use them, and their libraries need to be added to the Route. All versions of the Camel components published before the Talend Studio are supported.

⚠️ **Warning:**

The process of using a Camel external component in a Route is different from using an external or user component in a Job. For more information about how to use external or user components in a Job, see How to define the user component folder (Talend > Components) on page 475.

The following screenshot shows an example of the camel-mina component being used.

```
jobSocketIn(cMessagingEndpoint_3)
```

To add the library of camel-mina to the Route, you can use the same **cMessagingEndpoint** component, and add **mina** to the **Dependencies** list in its **Advanced settings** view.
Or you can use a `cConfig` and add the library of camel-mina to the `Dependencies` list of the `cConfig` component.


**Using connections in a Job**

In Talend Studio, a Job or a subjob is composed of a group of components logically linked to one another via connections. You need to use the connections to define how the components in use are coordinated. This section will describe the types of connections and their related settings.

**Connection types**

There are various types of connections which define either the data to be processed, the data output, or the Job logical sequence.
Right-click a component on the design workspace to display a contextual menu that lists all available connections for the selected component.

The sections below describe all available connection types.

**Row connection**

A Row connection handles the actual data. The Row connections can be **Main**, **Lookup**, **Reject**, **Output**, **Uniques/Duplicates**, or **Combine** according to the nature of the flow processed.

**Main**

This type of row connection is the most commonly used connection. It passes on data flows from one component to the other, iterating on each row and reading input data according to the component properties setting (schema).

Data transferred through main rows are characterized by a schema definition which describes the data structure in the input file.

**Note:**

You cannot connect two Input components together using a Row > Main connection. Only one incoming Row connection is possible per component. You will not be able to link twice the same target component using a main Row connection. The second Row connection will be called Lookup.

To connect two components using a Main connection, right-click the input component and select Row > Main on the connection list.

Alternatively, you can click the component to highlight it, then right-click it or click the O icon that appears on side of it and drag the cursor towards the destination component. This will automatically create a Row > Main type of connection.

For information on using multiple Row connections, see Multiple Input/Output on page 66.

**Lookup**

This row connection connects a sub-flow component to a main flow component (which should be allowed to receive more than one incoming flow). This connection is used only in the case of multiple input flows.
A **Lookup** row can be changed into a main row at any time (and reversely, a main row can be changed to a lookup row). To do so, right-click the row to be changed, and on the pop-up menu, click **Set this connection as Main**.

Related topic: Multiple Input/Output on page 66.

**Filter**

This row connection connects specifically a **tFilterRow** component to an output component. This row connection gathers the data matching the filtering criteria. This particular component offers also a **Reject** connection to fetch the non-matching data flow.

**Rejects**

This row connection connects a processing component to an output component. This row connection gathers the data that does NOT match the filter or are not valid for the expected output. This connection allows you to track the data that could not be processed for any reason (wrong type, undefined null value, etc.). On some components, this connection is enabled when the **Die on error** option is deactivated.

**ErrorReject**

This row connection connects a **tMap** component to an output component. This connection is enabled when you clear the **Die on error** check box in the **tMap editor** and it gathers data that could not be processed (wrong type, undefined null value, unparseable dates, etc.).

Related topic: Handling errors on page 227.

**Output**

This row connection connects a **tMap** component to one or several output components. As the Job output can be multiple, you get prompted to give a name for each output row created.

**Note:**

The system also remembers deleted output connection names (and properties if they were defined). This way, you do not have to fill in again property data in case you want to reuse them.

Related topic: Multiple Input/Output on page 66.
Data services

**Uniques/Duplicates**

These row connection connect a tUniqRow to output components.

The **Uniques** connection gathers the rows that are found first in the incoming flow. This flow of unique data is directed to the relevant output component or else to another processing subjob.

The **Duplicates** connection gathers the possible duplicates of the first encountered rows. This reject flow is directed to the relevant output component, for analysis for example.

**Multiple Input/Output**

Some components help handle data through multiple inputs and/or multiple outputs. These are often processing-type components such as the tMap.

If this requires a join or some transformation in one flow, you want to use the tMap component, which is dedicated to this use.

For further information regarding data mapping, see Map editor interfaces on page 205.

**Combine**

This type of row connection connects one CombinedSQL component to another.

When right-clicking the CombinedSQL component to be connected to the next one, select **Row > Combine**.

**Iterate connection**

The **Iterate** connection can be used to loop on files contained in a directory, on rows contained in a file or on DB entries.

A component can be the target of only one Iterate connection. The Iterate connection is mainly to be connected to the start component of a flow (in a subjob).

Some components such as the tFileList component are meant to be connected through an iterate connection with the next component. For how to set an Iterate connection, see Iterate connection settings on page 69.

**Note:**

The name of the Iterate connection is read-only unlike other types of connections.

**Trigger connections**

Trigger connections define the processing sequence, so no data is handled through these connections.

The connection in use will create a dependency between Jobs or subjobs which therefore will be triggered one after the other according to the trigger nature.

Trigger connections fall into two categories:

- subjob triggers: On Subjob Ok, On Subjob Error and Run if,
• component triggers: **On Component Ok**, **On Component Error** and **Run if**.

**OnSubjobOK** *(previously Then Run)*: This connection is used to trigger the next subjob on the condition that the main subjob completed without error. This connection is to be used only from the start component of the Job.

These connections are used to orchestrate the subjobs forming the Job or to easily troubleshoot and handle unexpected errors.

**OnSubjobError**: This connection is used to trigger the next subjob in case the first (main) subjob does not complete correctly. This “on error” subjob helps flagging the bottleneck or handle the error if possible.

**OnComponentOK** and **OnComponentError** are component triggers. They can be used with any source component on the subjob.

**OnComponentOK** will only trigger the target component once the execution of the source component is complete without error. Its main use could be to trigger a notification subjob for example.

**OnComponentError** will trigger the sub-job or component as soon as an error is encountered in the primary Job.

**Run if** triggers a subjob or component in case the condition defined is met. For further information about **Run if**, see **Run if connection settings** on page 69.

For how to set a trigger condition, see **Trigger connection settings** on page 69.

**Link connection**

The **Link** connection can only be used with ELT components. These connections transfer table schema information to the ELT mapper component in order to be used in specific DB query statements.

The **Link** connection therefore does not handle actual data but only the metadata regarding the table to be operated on.

When right-clicking the ELT component to be connected, select **Link > New Output**.

⚠️ **Warning:**

Be aware that the name you provide to the connection must reflect the actual table name.
In fact, the connection name will be used in the SQL statement generated through the ETL Mapper, therefore the same name should never be used twice.

**Defining connection settings**

You can display the properties of a connection by selecting it and clicking the Component view tab, or by right-clicking the connection and selecting **Settings** from the contextual menu. This section summarizes connection property settings.

**Row connection settings**

**About this task**

The **Basic settings** vertical tab of the Component view of the connection displays the schema of the data flow handled by the connection. You can change the schema by clicking the **Edit schema** button. For more information, see Setting a built-in schema in a Job on page 50.

The **Advanced settings** vertical tab lets you monitor the data flow over the connection in a Job without using a separate **tFlowMeter** component. The measured information will be interpreted and displayed in a monitoring tool such Talend Activity Monitoring Console (available with Talend subscription-based products).

To monitor the data over the connection, perform the following settings in the **Advanced settings** vertical tab:

---

**Steps:**

1. **Use input connection name as label**
2. **Mode**
   - **Absolute**
3. **Thresholds**
   - **Label**
   - **Low end**
   - **Top end**
   - **Color**

**To Monitor this connection**: Select the checkbox to enable monitoring.
Procedure

1. Select the **Monitor this connection** check box.
2. From the **Mode** list, select **Absolute** to log the actual number of rows passes over the connection, or **Relative** to log the ratio (%) of the number of rows passed over this connection against a reference connection. If you select **Relative**, you need to select a reference connection from the **Connections List** list.
3. Click the plus button to add a line in the **Thresholds** table and define a range of the number of rows to be logged.

Results

For more information about flow metrics, see Talend Help Center (https://help.talend.com).

Iterate connection settings

When you configure an Iterate connection, you are actually enabling parallel iterations. For further information, see Launching parallel iterations to read data on page 204.

Trigger connection settings

Run if connection settings

About this task

In the **Basic settings** view of a **Run if** connection, you can set the condition to the Subjob in Java. You can use variables in your condition. Pressing **Ctrl+Space** allows you to access all global and context variables. For more information, see Using variables in a Job or Route on page 85.

⚠️ Warning:

When adding a comment after the condition, be sure to enclose it between /* and */ even if it is a single-line comment.

In the following example, a message is triggered if the input file contains 0 rows of data.
Procedure

1. Create a Job and drop three components to the design workspace: a `tFileInputDelimited`, a `tLogRow`, and a `tMsgBox`.

2. Connect the components as follows:
   - Right-click the `tFileInputDelimited` component, select `Row > Main` from the contextual menu, and click the `tLogRow` component.
   - Right-click the `tFileInputDelimited` component, select `Trigger > Run if` from the contextual menu, and click the `tMsgBox` component.

3. Configure the `tFileInputDelimited` component so that it reads a file that contains no data rows.

4. Select the `Run if` connection between the `tFileInputDelimited` component and the `tMsgBox` component, and click the `Component` view. In the `Condition` field on the `Basic settings` tab, pressing `Ctrl+Space` to access the variable list, and select the `NB_LINE` variable of the `tFileInputDelimited` component. Edit the condition as follows:

   ```java
   ((Integer)globalMap.get("tFileInputDelimited_1_NB_LINE")) == 0
   ```

5. Go to the `Component` view of the `tMsgBox` component, and enter a message, "No data is read from the file" for example, in the `Message` field.

6. Save and run the Job. You should see the message you defined in the `tMsgBox` component.

Using connections in a Route

In Talend Studio, a Route is composed of a group of components logically linked to one another via connections. This section will describe the types of connections available for a Route and their related settings.
**Route connection types**

There are various types of connections which define how to route your messages within a camel Route.

Right-click a component on the design workspace to display a contextual menu that lists all available connections for the selected component.

The sections below describe all available connection types.

**Row connections for a Route**

A **Row** connection handles the messages to be routed. The **Row** connections can be **try**, **catch**, **finally** or **route** according to the component selected.

**route**

This type of connection is the most commonly used connection. It passes on messages from one endpoint to the other, or from one endpoint to a processor and from a processor to another endpoint.

**try**

This link connects specifically a **cTry** component to a receiving component to be able to handle error in part of your Route.

To isolate the part of your Route likely to generate an error, you can put it in a Try block via the **cTry** component and its **try** link. Once isolated, if the Route generates an error, the error will by sent to the error handler unless a Catch block is found right after the Try block. For more information, see the **catch** section below.

**catch**

The **catch** link can only be used with a **cTry** component and if a **try** link has already been used in order to isolate a part of a Route likely to generate an error.

So, the **catch** link catches the errors generated by the Route put in a Try block and enable you to handle it, if necessary, and continue the Route, if possible.

**finally**

The **finally** link can only be used with a **cTry** component and if a **try** link has already been used to isolate part of a Route likely to generate an error.

The **finally** link will enable you to execute final instructions regardless of any problem that may occur in the Try and/or Catch block, to close a connection to a database, for example.

**Trigger connections**

Trigger connections define specific channels to route messages in according to specific conditions. Messages will be filtered and routed to specific Routes according to defined conditions.

**when**

The **when** link connects specifically a **cMessageRouter** component to receiving components to filter and route messages in one or several output Routes according to specified conditions.

These conditions can be defined in the **Connection** settings of each **when** link you create in your Route. Messages not matching the condition set can be retrieved with an **otherwise** link. For more information, see the **otherwise** section below.
The otherwise link can only be used with a cMessageRouter component and if at least one when link has already been used to filter and route messages.

So, the otherwise link retrieves all messages that are not matching the conditions defined in the several when links.

Note:
It is recommended not to put any message handling after the when or the otherwise link. Always use a Mock/Direct endpoint to replace them and make a new Route to handle the messages.

How to define connection settings of a Route

You can display the properties of a connection by selecting it and clicking the Component view tab, or by right-clicking the connection and selecting Settings from the contextual menu. This section summarizes connection property settings.

Catch connection settings

About this task

You can set a Catch link to catch the exception thrown by the try link of the cTry component.

Procedure

1. Simply select the Catch link of your Route to display the related Basic settings view of the Components tab.
2. In the Exceptions field, type in the name of the exception class that is likely to occur in the try routing. If you type in java.lang.Exception.class, mother of all exceptions, any exception will be caught. But you can try to fine-tune the exception generated by specifying a more precise exception class.

Results

When executing your Route, if an exception occurs in routing following a try link, it will be caught by the catch link corresponding better to the exception. For more information, see Row connection on page 64.

When connection settings

About this task

You can set a When link to filter messages according to a condition and route those filtered messages:
Procedure

1. Simply select the **When** link of your routing to display the related **Basic settings** view of the Components tab.
2. In the **Type** list, select the type of condition you want to use in the routing.
3. In the **Condition** field, type in the condition you want to use to filter your messages.

![When link in routing](image)

**Basic settings**

- **Type**: xpath
- **Condition**: "person/city = 'London'"

Results

When executing your Route, messages matching the condition defined in the **when** link will be passed to the following component and messages not matching it can either be lost or retrieved via an **otherwise** link. For more information, see Catch connection settings on page 72 and for a scenario using those links, see Talend Help Center (https://help.talend.com).

Using contexts and variables

Variables represent values which change throughout the execution of a program. A global variable is a system variable which can be accessed by any module or function. It retains its value after the function or program using it has completed execution. A context variable is a variable which is defined by the user for a particular context.

Depending on the circumstances the Job or Route is being used in, you might want to manage it differently for various execution types, known as contexts (Prod and Test in the example given below). For instance, there might be various testing stages you want to perform and validate before a Job or Route is ready to go live for production use.

A context is characterized by parameters. These parameters are mostly context-sensitive variables which will be added to the list of variables for reuse in the component-specific properties on the Component view through the Ctrl+Space keystrokes.

Talend Studio offers you the possibility to create multiple context data sets. Furthermore you can either create context data sets on a one-shot basis from the context tab of a Job or Route, or you can centralize the context data sets in the **Contexts** node of the **Repository** tree view in order to reuse them in different Jobs or Routes.

For a Job, you can define the values of your context variables when creating them, or load your context parameters dynamically, either explicitly using the **tContextLoad** component or implicitly using the Implicit Context Load feature, when your Jobs are executed.

This section describes how to create contexts and variables and define context parameter values. For an example of loading context parameters dynamically using the **tContextLoad** component, see Talend Help Center (https://help.talend.com). For an example of loading context parameters dynamically using the Implicit Context Load feature, see Talend Help Center (https://help.talend.com) at https://help.talend.com.
Defining context variables for a Job or Route

You can define context variables for a particular Job or Route in two ways:

- Using the **Contexts** view of the Job or Route. See Defining context variables in the Contexts view on page 74.
- Using the **F5** key from the **Component** view of a component. See Defining variables from the Component view on page 75.

Defining context variables in the Contexts view

The **Contexts** view is positioned among the configuration tabs below design workspace. The **Contexts** tab view shows all of the variables that have been defined in the current Job or Route and context variables imported into the current Job.

From this view, you can manage your built-in variables:

- Create and manage built-in contexts.
- Create, edit and delete built-in variables.
- Reorganize the context variables.
- Add built-in context variables to the Repository.
- Import variables from a Repository context source for use in the current Job.
- Edit Repository-stored context variables and update the changes to the Repository.
- Remove imported Repository variables from the current Job or Route.

The following example will demonstrate how to define two contexts named **Prod** and **Test** and a set of variables - `host`, `port`, `database`, `username`, `password`, and `table_name` - under the two contexts for a Job.

Defining contexts

**Procedure**

1. Open the Job in the design workspace.
2. Select **Window > Show view > Talend > Contexts** to open the **Contexts** view in the Integration perspective.
3. Select the default context and click **Edit** to rename it, **Prod** in this example. Click **OK**.
Defining variables

**Procedure**

1. Click the [+] button at the bottom of the **Contexts** view to add lines in the table.

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Type</th>
<th>Comment</th>
<th>Value</th>
<th>Prompt</th>
<th>Value</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>host</td>
<td>String</td>
<td>*</td>
<td>&quot;localhost&quot;</td>
<td></td>
<td>host?</td>
<td>&quot;192.168.0.10&quot;</td>
</tr>
<tr>
<td>2</td>
<td>port</td>
<td>String</td>
<td>*</td>
<td>&quot;3306&quot;</td>
<td></td>
<td>port?</td>
<td>&quot;3306&quot;</td>
</tr>
<tr>
<td>3</td>
<td>database</td>
<td>String</td>
<td>*</td>
<td>&quot;test&quot;</td>
<td></td>
<td>database?</td>
<td>&quot;prod_db&quot;</td>
</tr>
<tr>
<td>4</td>
<td>username</td>
<td>String</td>
<td>*</td>
<td>&quot;user&quot;</td>
<td></td>
<td>username?</td>
<td>&quot;prod_user&quot;</td>
</tr>
<tr>
<td>5</td>
<td>password</td>
<td>Password</td>
<td>*</td>
<td>&quot;********&quot;</td>
<td></td>
<td>password?</td>
<td>&quot;******&quot;</td>
</tr>
<tr>
<td>6</td>
<td>table_name</td>
<td>String</td>
<td>*</td>
<td>&quot;testtable&quot;</td>
<td></td>
<td>table_name?</td>
<td>&quot;addresses&quot;</td>
</tr>
</tbody>
</table>

2. Click in the **Name** field and enter the name of the variable you are creating.
   
   Name the first variable `host` for this example.

3. Repeat the above steps to define all the variables for the different contexts.
   
   - `port`, type **String**,
   - `database`, type **String**,
   - `username`, type **String**,
   - `password`, type **Password**,
   - `table_name`, type **String**.

   All the variables created and their values under different contexts are displayed in the table and are ready for use in your Job. You can further edit the variables in this view if needed.

   You can also add a built-in context variable to the Repository to make it reusable across different Jobs. For more information, see Adding a built-in context variable to the Repository on page 82.

**Results**

Related topics:

- Defining variables from the Component view on page 75
- Centralizing context variables in the Repository on page 77
- Using variables in a Job or Route on page 85
- Running a Job or Route in a selected context on page 86

**Defining variables from the Component view**

**About this task**

The quickest way to create a single context variable is to use the **F5** key from the **Component** view.

The following example demonstrates how to create a context variable while configuring a file path for a component in a Job.

**Procedure**

1. On the relevant **Component** view, place your cursor in the field you want to parameterize.

2. Press **F5** to display the [New Context Parameter] dialog box:
3. Give a **Name** to this new variable, fill in the **Comment** field if needed, and choose the **Type**.

4. Enter a **Prompt** to be displayed to confirm the use of this variable in the current Job execution (generally used for test purpose only), select the **Prompt for value** check box to display the prompt message and an editable value field at the execution time.

5. If you filled in a value already in the corresponding properties field, this value is displayed in the **Default value** field. Else, type in the default value you want to use for one context.

6. Click **Finish** to validate.

7. Go to the **Contexts** view tab. Notice that the context variables tab lists the newly created variables. The newly created variables are listed in the **Contexts** view.

**Results**

**Note:**

The variable name should follow some typing rules and should not contain any forbidden characters, such as space character.

The variable created this way is automatically stored in all existing contexts, but you can subsequently change the value independently in each context. For more information on how to create or edit a context, see **Defining contexts** on page 74.

**Related topics:**

- **Defining context variables in the Contexts view** on page 74
- **Centralizing context variables in the Repository** on page 77
- **Using variables in a Job or Route** on page 85
- **Running a Job or Route in a selected context** on page 86
Centralizing context variables in the Repository

Context variables centrally stored in the Repository can be reused across various Jobs or Routes. You can store context variables in the Repository in different ways:

- Creating a context group using the [Create / Edit a context group] wizard. See Creating a context group and define context variables in it on page 77 for details.
- Adding a built-in context variable to an existing or new context group in the Repository. See Adding a built-in context variable to the Repository on page 82 for details.
- Saving a context from metadata. See Creating a context from a Metadata on page 83 for more information.

Creating a context group and define context variables in it

The following example will demonstrate how to use the [Create / Edit a context group] wizard to create a context group named TalendDB that contains two contexts named Prod and Test and define a set of variables - host, port, database, username, password, and table_name - under the two contexts in the Repository, for reuse in database handling Jobs.

Once you created and adapted as many context sets as you want, click Finish to validate. The group of contexts thus displays under the Contexts node in the Repository tree view. You can further edit the context group, contexts, and context variables in the wizard by right-clicking the Contexts node and selecting Edit context group from the contextual menu.

Related topics:
- Adding a built-in context variable to the Repository on page 82
- Creating a context from a Metadata on page 83
- Applying Repository context variables to a Job or Route on page 83
- Defining context variables for a Job or Route on page 74.
- Using variables in a Job or Route on page 85
- Running a Job or Route in a selected context on page 86

Creating the context group and contexts

Procedure

1. Right-click the Contexts node in the Repository tree view and select Create context group from the contextual menu.
   A 2-step wizard appears to help you define the various contexts and context parameters.
2. In Step 1 of 2, type in a name for the context group to be created, TalendDB in this example, and add any general information such as a description if required. The information you provide in the Description field will appear as a tooltip when you move your mouse over the context group in the Repository.
3. Click **Next** to go to Step 2 of 2, which allows you to define the various contexts and variables that you need.

A context named **Default** has been created and set as the default one by the system.

4. Click the [+] button at the upper right corner of the wizard to define contexts. The **[Configure Contexts]** dialog box pops up.
5. Select the context Default, click the Edit... button and enter Prod in the [Rename Context] dialog box that opens to rename the context Default to Prod. Then click OK to close the dialog box.

6. Click the New... button and enter Test in the [New Context] dialog box. Then click OK to close the dialog box.

7. Select the check box preceding the context you want to set as the default context. You can also set the default context by selecting the context name from the Default context environment list on the wizard.

   If needed, move a context up or down by selecting it and clicking the Up or Down button.

   In this example, set Test as the default context and move it up.
8. Click **OK** to validate your context definition and close the **[Configure Contexts]** dialog box. The newly created contexts are shown in the context variables table of the wizard.

![Image of context configuration dialog]

**Defining context variables**

**Procedure**

1. Click the [*] button at the bottom of the wizard to add a parameter line in the table.
2. Click in the **Name** field and enter the name of the variable you are creating, **host** in this example.
3. From the **Type** list, select the type of the variable corresponding to the component field where it will be used, **String** for the variable **host** in this example.
4. If needed, click in the **Comment** field and enter a comment to describe the variable.
5. Click in **Value** field and enter the variable value under each context.
   For different variable types, the **Value** field appear slightly different when you click in it and functions differently:

<table>
<thead>
<tr>
<th>Type</th>
<th>Value field</th>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>String (default type)</td>
<td>Editable text field</td>
<td>null</td>
</tr>
<tr>
<td>Boolean</td>
<td>Drop-down list box with two options: true and false</td>
<td></td>
</tr>
<tr>
<td>Character, Double, Integer, Long, Short, Object, BigDecimal</td>
<td>Editable text field</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Editable text field, with a button to open the [Select Date &amp; Time] dialog box.</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Value field</td>
<td>Default value</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>File</td>
<td>Editable text field, with a button to open the [Open] dialog box for file selection.</td>
<td></td>
</tr>
<tr>
<td>Directory</td>
<td>Editable text field, with a button to open the [Browse for Folder] dialog box for folder selection.</td>
<td></td>
</tr>
<tr>
<td>List of Value</td>
<td>Editable text field, with a button to open the [Configure Values] dialog box for list creation and configuration.</td>
<td>(Empty)</td>
</tr>
<tr>
<td>Password</td>
<td>Editable text field; text entered appears encrypted.</td>
<td></td>
</tr>
</tbody>
</table>

⚠️ **Warning:**

It is recommended that you enclose the values of string type variables between double quotation marks to avoid possible errors during Job execution.

6. If needed, select the check box next the variable of interest and enter the prompt message in the corresponding **Prompt** field. This allows you to see a prompt for the variable value and to edit it at the execution time.

   You can show/hide a **Prompt** column of the table by clicking the black right/left pointing triangle next to the relevant context name.

7. Repeat the steps above to define all the variables in this example.

   - `port`, type **String**,
   - `database`, type **String**,
   - `username`, type **String**,
   - `password`, type **Password**,
   - `table_name`, type **String**
All the variables created and their values under different contexts are displayed in the table and are ready for use in your Job. You can further edit the variables if needed.

Adding a built-in context variable to the Repository

About this task

You can save a built-in context variable defined in a Job or Route to a new context group, or an existing context group provided that the context variable does not already exist in the group.

Procedure

1. In the **Context** tab view of a Job or Route, right-click the context variable you want to add to the Repository and select **Add to repository context** from the contextual menu to open the [Repository Content] dialog box.

2. In the dialog box, do either of the following:
   - to add your context variable to a new context group, select **Create new context group** and enter a name for the new context group in the **Group Name** field, and then click **OK**.
   - to add your context variable to an existing context group, select the context group and click **OK**.

⚠️ **Warning:**

When adding a built-in context variable to an existing context group, make sure that the variable does not already exist in the context group.

In this example, add the context variable **password** defined in a Job to a new context group named **DB_login**.
The context variable is added to the Repository context group of your choice, along with the defined built-in contexts, and it appears as a Repository-stored context variable in the **Contexts** tab view.

### Related topics:
- Creating a context group and define context variables in it on page 77
- Creating a context from a Metadata on page 83
- Applying Repository context variables to a Job or Route on page 83
- Defining context variables for a Job or Route on page 74
- Using variables in a Job or Route on page 85
- Running a Job or Route in a selected context on page 86

### Creating a context from a Metadata

When creating or editing a metadata connection (through a File or DB metadata wizard), you have the possibility to save the connection parameters as context variables in a newly created context group under the **Contexts** node of the Repository. To do so, complete your connection details and click the **Export as context** button in the second step of the wizard.

For more information about this feature, see Exporting metadata as context and reusing context parameters to set up a connection on page 405.

### Applying Repository context variables to a Job or Route

Once a context group is created and stored in the **Repository**, there are two ways of applying it to a Job:

- **Drop a context group.** This way, the group is applied as a whole. See Dropping a context group onto a Job or Route on page 83 for details.

- **Use the button.** This way, the variables of a context group can be applied separately. See Applying context variables to a Job or Route using the context button on page 84 for details.

### Dropping a context group onto a Job or Route

**About this task**

To drop a context group onto a Job or Route, proceed as follows:

**Procedure**

1. Double-click the Job or Route to which a context group is to be added.
2. Once the Job or Route is opened, drop the context group of your choice either onto the design workspace or onto the **Contexts** view beneath the workspace.

![Diagram showing context group drop](image)

The **Contexts** view shows all the contexts and variables of the group. You can:

- edit the contexts by clicking the [+\] button at the upper right corner of the **Contexts** view.

- delete the whole group or any variable by selecting the group name or the variable and clicking the [X] button.

- save any imported context variable as a built-in variable by right-click it and selecting **Add to built-in** from the contextual menu.

- double-click any context variable to open the context group in the **Create / Edit a context group** wizard and update changes to the Repository.

**Applying context variables to a Job or Route using the context button**

**About this task**

To use the context button to apply context variables to a Job or Route, proceed as follows:

**Procedure**

1. Double-click the Job or Route to which a context variable is to be added.

2. Once the Job or Route is opened in the workspace, click the **Contexts** view beneath the workspace to open it.

3. At the bottom of the **Contexts** view, click the **[wizard]** button to open the wizard to select the context variables to be applied.
4. In the wizard, select the context variables you need to apply or clear those you do not need to.

   **Note:** The context variables that have been applied are automatically selected and cannot be cleared.

5. Click **OK** to apply the selected context variables to the Job or Route.

   The **Contexts** view shows the context group and the selected context variables. You can edit the contexts by clicking the [+ ] button at the upper right corner of the **Contexts** view, delete the whole group or any variable by selecting the group name or the variable and clicking the [X] button, but you cannot edit Repository-stored variables in this view.

### Using variables in a Job or Route

**About this task**

You can use an existing global variable, a context variable defined in your Job or Route, or a Repository-stored context variable applied to your Job in any component properties field.

**Procedure**

1. In the relevant **Component** view, place your mouse in the field you want to parameterize and press **Ctrl+Space** to display a full list of all the global variables and those context variables defined in or applied to your Job or Route.

   The list grows along with new user-defined variables (context variables).
2. Double-click the variable of your choice to fill it in the field.

Results

Related topics:

• Defining context variables for a Job or Route on page 74
• Centralizing context variables in the Repository on page 77
• Applying Repository context variables to a Job or Route on page 83
• Running a Job or Route in a selected context on page 86

Running a Job or Route in a selected context

You can select the context you want the Job or Route design to be executed in.

Click the Run tab, and in the Context area, select the relevant context among the various ones you created.

If you did not create any context, only the Default context shows on the list.

All the context variables you created for the selected context display, along with their respective values, in a table underneath.

To make a change permanent in a variable value, you need to change it on the Context view if your variable is of type built-in or in the Context group of the repository.

Related topics:
• Defining context variables for a Job or Route on page 74
• Centralizing context variables in the Repository on page 77
• Applying Repository context variables to a Job or Route on page 83
• Using variables in a Job or Route on page 85

Handling Jobs: advanced subjects

The sections below give detail information about various advanced configuration situations of a data integration Job including handling multiple input and output flows, using SQL queries, using external components in the Job, scheduling a task to run your Job.

Mapping data flows

The most common way to handle multiple input and output flows in your Job including transformations and data re-routing is to use the tMap component.

For more information about the principles of using this component, see What is a Job design? on page 25.


Creating queries using the SQLBuilder

SQLBuilder helps you create your SQL queries and monitor the changes between DB tables and metadata tables. This editor is available in all DBInput and DBSQLRow components (specific or generic).

You can create a query using the SQLbuilder whether your database table schema is stored in the Repository tree view or built-in directly in the Job.

Fill in the DB connection details and select the appropriate repository entry if you defined it.

Remove the default query statement in the Query field of the Basic settings view of the Component panel. Then click the [...] button to open the [SQL Builder] editor.
The [SQL Builder] editor is made of the following panels:

- Current Schema,
- Database structure,
- Query editor made of editor and designer tabs,
- Query execution view,
- Schema view.

The Database structure shows the tables for which a schema was defined either in the repository database entry or in your built-in connection.

The schema view, in the bottom right corner of the editor, shows the column description.

**Comparing database structures**

On the Database Structure panel, you can see all tables stored in the DB connection metadata entry in the Repository tree view, or in case of built-in schema, the tables of the database itself.

**Note:**

The connection to the database, in case of built-in schema or in case of a refreshing operation of a repository schema might take quite some time.

Click the refresh icon to display the differences between the DB metadata tables and the actual DB tables.
The **Diff** icons point out that the table contains differences or gaps. Expand the table node to show the exact column containing the differences.

The red highlight shows that the content of the column contains differences or that the column is missing from the actual database table.

The blue highlight shows that the column is missing from the table stored in **Repository > Metadata**.

**Creating a query**

**About this task**

The **[SQL Builder]** editor is a multiple-tab editor that allows you to write or graphically design as many queries as you want.

To create a new query, complete the following:

**Procedure**

1. Right-click the table or on the table column and select **Generate Select Statement** on the pop-up list.
2. Click the empty tab showing by default and type in your SQL query or press **Ctrl+Space** to access the autocompletion list. The tooltip bubble shows the whole path to the table or table section you want to search in.
Alternatively, the graphical query Designer allows you to handle tables easily and have real-time generation of the corresponding query in the Edit tab.

3. Click the Designer tab to switch from the manual Edit mode to the graphical mode.

   Note:
   You may get a message while switching from one view to the other as some SQL statements cannot be interpreted graphically.

4. If you selected a table, all columns are selected by default. Clear the check box facing the relevant columns to exclude them from the selection.

5. Add more tables in a simple right-click. On the Designer view, right-click and select Add tables in the pop-up list then select the relevant table to be added.
   If joins between these tables already exist, these joins are automatically set up graphically in the editor.
   You can also create a join between tables very easily. Right-click the first table columns to be linked and select Equal on the pop-up list, to join it with the relevant field of the second table.
The SQL statement corresponding to your graphical handlings is also displayed on the viewer part of the editor or click the **Edit** tab to switch back to the manual **Edit** mode.

**Note:**

In the **Designer** view, you cannot include graphically filter criteria. You need to add these in the **Edit** view.

6. Once your query is complete, execute it by clicking the **icon on the toolbar.
   The toolbar of the query editor allows you to access quickly usual commands such as: execute, open, save and clear.
   The results of the active query are displayed on the **Results** view in the lower left corner.

7. If needed, you can select the **context mode** check box to keep the original query statement and customize it properly in the **Query** area of the component. For example, if a context parameter is used in the query statement, you cannot execute it by clicking the **icon on the toolbar.

8. Click **OK**. The query statement will be loaded automatically in the **Query** area of the component.

**Storing a query in the repository**

To be able to retrieve and reuse queries, we recommend you to store them in the repository.

In the **SQL Builder** editor, click the icon on the toolbar to bind the query with the DB connection and schema in case these are also stored in the repository.

The query can then be accessed from the **Database structure** view, on the left-hand side of the editor.

**Downloading/uploading Talend Community components**

Talend Studio enables you to access a list of all community components in **Talend Exchange** that are compatible with your current version of Talend Studio. You can then download and install these components to use them later in the Job designs you carry out in the Studio. From Talend Studio, you can also upload components you have created to **Talend Exchange** to share with other community users.
A click on the **Exchange** link on the toolbar of Talend Studio opens the **Exchange** tab view on the design workspace, where you can find lists of:

- components available in **Talend Exchange** for you to download and install,
- components you downloaded and installed in previous versions of Talend Studio but not installed yet in your current Studio,
- components you have created and uploaded to **Talend Exchange** to share with other **Talend Community** users.

Note that the approach explained in this section is to be used for the above-mentioned components only.

**Note:**

- Before you can download community components or upload your own components to the community, you need to sign in to **Talend Exchange** from your Studio first. If you did not sign in to **Talend Exchange** when launching the Studio, you still have a chance to sign in from the **Talend Exchange** preferences settings page. For more information, see **Exchange preferences** (**Talend > Exchange**) on page 478.
- The community components available for download are not validated by **Talend**. This explains why you may encounter component loading errors sometimes when trying to install certain community components, why an installed community component may have a different name in the **Palette** than in the **Exchange** tab view, and why you may not be able to find a component in the **Palette** after it is seemingly installed successfully.

### Installing community components from Talend Exchange

#### About this task

To install community components from **Talend Exchange** to the **Palette** of your current Talend Studio:

#### Procedure

1. Click the **Exchange** link on the toolbar of Talend Studio to open the **Exchange** tab view on the design workspace.
2. In the Available Extensions view, if needed, enter a full component name or part of it in the text field and click the fresh button to find quickly the component you are interested in.

3. Click the view/download link for the component of interest to display the component download page.

4. View the information about the component, including component description and review comments from community users, or write your own review comments and/or rate the component if you want. For more information on reviewing and rating a community component, see Reviewing and rate a community component on page 94.

   4. View the information about the component, including component description and review comments from community users, or write your own review comments and/or rate the component if you want. For more information on reviewing and rating a community component, see Reviewing and rate a community component on page 94.

If needed, click the left arrow button to return to the component list page.

5. Click the Install button in the right part of the component download page to start the download and installation process.

   5. Click the Install button in the right part of the component download page to start the download and installation process.

   A progress indicator appears to show the completion percentage of the download and installation process. Upon successful installation of the component, the Downloaded Extensions view opens and displays the status of the component, which is Installed.
Reinstalling or update community components

About this task

From the Exchange tab view, you can reinstall components you already downloaded and installed in your previous version of Talend Studio or install the updated version of Talend Studio or components in your current Studio.

Note:

By default, while you are connected to Talend Exchange, a dialog box appears to notify you whenever an update to an installed community component is available. If you often check for community component updates and you do not want that dialog box to appear again, you can turn it off in Talend Exchange preferences settings. For more information, see Exchange preferences (Talend > Exchange) on page 478.

To reinstall a community component you already downloaded or update an installed one, do the following:

Procedure

1. From the Exchange tab view, click Downloaded Extensions to display the list of components you have already downloaded from Talend Exchange.

   In the Downloaded Extensions view, the components you have installed in your previous version of Talend Studio but not in your current Studio have an Install link in the Install/Update column, and those with updates available in Talend Exchange have an Update link.

2. Click the Install or Update link for the component of interest to start the installation process.

   A progress indicator appears to show the completion percentage of the installation process. Upon successful installation, the Downloaded Extensions view displays the status of the component, which is Installed.

Reviewing and rate a community component

About this task

To review and rate a community component:
Procedure

1. From the Available Extensions view, click the view/download link for the component you want to review or rate to open the community component download page.

2. On the component download page, click the write a review link to open the [Review the component] dialog box.

3. Fill in the required information, including a title and a review comment, click one of the five stars to rate the component, and click Submit Review to submit your review to the Talend Exchange server.

   Upon validation by the Talend Exchange moderator, your review is published on Talend Exchange and displayed in the User Review area of the component download page.

Uploading a component you created to Talend Exchange

About this task

You can create your own components for use in your Jobs in Talend Studio and upload them to Talend Exchange to share with other Talend Community users. For information on how to create your own components and deploy them in Talend Studio, see How to define the user component folder (Talend > Components) on page 475.

To upload a component you created to Talend Exchange, complete the following:

Procedure

1. From the Exchange tab view, click My Extensions to open the My Extensions view.
2. Click the **Add New Extension** link in the upper right part of the view to open the component upload page.

![Add New Extension](image)

3. Complete the required information, including the component title, initial version, Studio compatibility information, and component description, fill in or browse to the path to the source package in the **File** field, and click the **Upload Extension** button.

Upon successful upload, the component is listed in the **My Extensions** view, where you can update, modify and delete any component you have uploaded to **Talend Exchange**.

![My Extensions](image)

**Managing components you uploaded to Talend Exchange**

From the **Exchange** tab view, you can manage components you have uploaded to **Talend Exchange**, including updating component version, modifying component information, and deleting components from **Talend Exchange**.

To update the version of a component, complete the following:
1. From the **My Extensions** view, click the ![icon](image) icon in the **Operation** column for the component you want to update to open the component update page.

![Update Extension](image)

2. Fill in the initial version and Studio compatibility information, fill in or browse to the path to the source package in the **File** field, and click the **Update Extension** button.

Upon successful upload of the updated component, the component is replaced with the new version on **Talend Exchange** and the **My Extension** view displays the component's new version and update date.

To modify the information of a component uploaded to **Talend Exchange**, complete the following:

1. From the **My Extensions** view, click the ![icon](image) icon in the **Operation** column for the component you want to modify information for to open the component information editing page.

![Modify Extension](image)
2. Complete the Studio compatibility information and component description, and click the Modify Extension button to update the component information to Talend Exchange.

To delete a component you have uploaded to Talend Exchange, click ✗ icon for the component from the My Extensions view. The component is then removed from Talend Exchange and is no longer displayed on the component list in the My Extensions view.

Using the tPrejob and tPostjob components

The tPrejob and tPostjob components are designed to make the execution of tasks before and after a given job easier to manage. These components differ from other components in that they do not actually process data and they do not have any components properties to be configured. A key feature of these components is that they are always guaranteed to be executed, even if the main data Job fails. Therefore, they are very useful for setup and teardown actions for a given Job.

Note:

As tPrejob and tPostjob are not meant to take part in any data processing, they cannot be part of a multi-thread execution. They are meant to help you make your Job design clearer.

To use these tPrejob and tPostjob components, simply drop them onto the design workspace as you would do with any other components, and then connect tPrejob to a component or subjob that is meant to perform a pre-job task, and tPostjob to a component or subjob that is meant to perform a post-job task, using Trigger connections. An orange square on the pre- and post-job parts indicates that they are different types of subjobs.

Tasks that require the use of a tPrejob component include:

- Loading context information required for the subjob execution.
- Opening a database connection.
- Making sure that a file exists.

Tasks that require the use of a tPostjob component include:

- Cleaning up temporary files created during the processing of the main data Job.
- Closing a database connection or a connection to an external service.
• Any task required to be executed, even if the preceding Job or subjobs failed.

For a use case that uses the tPrejob and tPostjob components, see Talend Help Center (https://help.talend.com).

**Using the Use Output Stream feature**

The Use Output Stream feature allows you to process the data in byte-arrays using a java.io.output stream() class which writes data using binary stream without data buffering. When processing data with a linear format, for example, when all data is of String format, this feature will help you improve the overall output performance.

The Use Output Stream feature can be found in the Basic settings view of a number of components such as tFileOutputDelimited.

To use this feature, select Use Output Stream check box in the Basic settings view of a component that has this feature. In the Output Stream field that is thus enabled, define your output stream using a command.

**Note:**

Prior to use the output stream feature, you have to open a stream. For a detailed example of the illustration of this prerequisite and the usage of the Use Output Stream feature, see see Talend Help Center (https://help.talend.com) at https://help.talend.com.

**Handling Jobs: miscellaneous subjects**

The sections below give detail information about various subjects related to the management of a data integration Job including:

• Using folders on page 100
• Sharing a database connection on page 100
• Adding notes to a Job design on page 103
• Displaying the code or the outline of your Job on page 104
• Managing the subjob display on page 105
• Defining options on the Job view on page 107
Using folders

About this task
You can organize your Jobs into folders.

To create a folder, proceed as follows:

Procedure
1. In the Repository tree view of the Integration perspective, right-click Job Designs and select Create folder from the contextual menu.

   The [New folder] dialog box displays.

2. In the Label field, enter a name for the folder and then click Finish to confirm your changes and close the dialog box.

   The created folder is listed under the Job Designs node in the Repository tree view.

Results

Note:
If you have already created Jobs that you want to move into this new folder, simply drop them into the folder.

Sharing a database connection

About this task
If you have various Jobs using the same database connection, you can factorize the connection by using the Use or register a shared DB Connection option so that the connection can be shared between parent and child Jobs.

This option has been added to all database connection components in order to reduce the number of connections to open and close.

Warning:
The Use or register a shared DB Connection option of all database connection components is incompatible with the Use dynamic job and Use an independent process to run subjob options.
of the `tRunJob` component. Using a shared database connection together with a `tRunJob` component with either of these two options enabled will cause your Job to fail.

Assume that you have two related Jobs (a parent Job and a child Job) that both need to connect to your remote MySQL database. To use a shared database connection in the two Jobs, to the following:

**Procedure**

1. Add a `tMysqlConnection` (assuming that you work with a MySQL database) to both the parent and the child Job, if they are not using a database connection component.
2. Connect each `tMysqlConnection` to the relevant component in your Jobs using a Trigger > On Subjob Ok link.
3. In the Basic settings view of the `tMysqlConnection` component that will run first, fill in the database connection details if the database connection is not centrally stored in the Repository.
4. Select the Use or register a shared DB Connection check box, and give a name to the connection in the Shared DB Connection Name field.

You are now able to re-use the connection in your child Job.

5. In the Basic settings view of the other `tMysqlConnection` component, which is in the other Job, simply select Use or register a shared DB Connection check box, and fill the Shared DB Connection Name field with the same name as in the parent Job.

**Note:**

Among the different Jobs sharing the same database connection, you need to define the database connection details only in the first Job that needs to open the database connection.
Results

For a complete use case, see Talend Help Center (https://help.talend.com).

Handling error icons on components or Jobs

When the properties of a component are not properly defined and contain one or several errors that can prevent the Job code to compile properly, error icons will automatically show next to the component icon on the design workspace and the Job name in the Repository tree view.

Warnings and error icons on components

When a component is not properly defined or if the link to the next component does not exist yet, a red checked circle or a warning sign is docked at the component icon.

Mouse over the component, to display the tooltip messages or warnings along with the label. This context-sensitive help informs you about any missing data or component status.

Note:

When the tooltip messages of a component indicate that a module is required, you must install this module for this component using the Module view. This view is hidden by default. For further information about how to install external modules using this view, see the Talend Installation and Upgrade Guide.

Error icons on Jobs

When the component settings contain one or several errors that can prevent the Job code to compile properly, an icon will automatically show next to the Job name in the Repository tree view.
The error icon displays as well on the tab next to the Job name when you open the Job on the design workspace.

The compilation or code generation does only take place when carrying out one of the following operations:

- opening a Job,
- clicking on the **Code Viewer** tab,
- executing a Job (clicking on **Run Job**),
- saving the Job.

Hence, the red error icon will only show then.

When you execute the Job, a warning dialog box opens to list the source and description of any error in the current Job.

![Error found dialog box](image)

Click **Cancel** to stop your Job execution or click **Continue** to continue it.

For information on errors on components, see *Warnings and error icons on components* on page 102.

**Adding notes to a Job design**

In the **Palette**, click the **Misc** family and then drop the **Note** element to the design workspace to add a text comment to a particular component or to the whole Job.

![Note element in palette](image)

You can change the note format. To do so, select the note you want to format and click the **Basic setting** tab of the **Component** view.
Select the **Opacity** check box to display the background color. By default, this box is selected when you drop a note on the design workspace. If you clear this box, the background becomes transparent.

You can select options from the **Fonts and Colors** list to change the font style, size, color, and so on as well as the background and border color of your note.

You can select the **Adjust horizontal** and **Adjust vertical** boxes to define the vertical and horizontal alignment of the text of your note.

The content of the **Text** field is the text displayed on your note.

**Displaying the code or the outline of your Job**

This panel is located below the **Repository** tree view. It displays detailed information about the open Job or Business Model in the design workspace.

The Information panel is composed of two tabs, **Outline** and **Code Viewer**, which provide information regarding the displayed diagram (either Job or Business Model).

**Outline**

The **Outline** tab offers a quick view of the business model or the open Job on the design workspace and also a tree view of all used elements in the Job or Business Model. As the design workspace, like any other window area, can be resized to suit your needs, the **Outline** view provides a convenient way for you to check out where on your design workspace you are located.
This graphical representation of the diagram highlights in a blue rectangle the diagram part showing in the design workspace.

Click the blue-highlighted view and hold down the mouse button. Then, move the rectangle over the Job.

The view in the design workspace moves accordingly.

The Outline view can also be displaying a folder tree view of components in use in the current diagram. Expand the node of a component, to show the list of variables available for this component.

To switch from the graphical outline view to the tree view, click either icon docked at the top right of the panel.

**Code viewer**

The Code viewer tab provides lines of code generated for the selected component, behind the active Job design view, as well the run menu including Start, Body and End elements.

**Note:**

This view only concerns the Job design code, as no code is generated from Business Models.

Using a graphical colored code view, the tab shows the code of the component selected in the design workspace. This is a partial view of the primary Code tab docked at the bottom of the design workspace, which shows the code generated for the whole Job.

**Managing the subjob display**

A subjob is graphically defined by a blue square gathering all connected components that belong to this subjob. Each individual component can be considered as a subjob when they are not yet connected to one another.
This blue highlight helps you easily distinguish one subjob from another.

**Note:**

A Job can be made of one single subjob. An orange square shows the prejob and postjob parts which are different types of subjobs.

For more information about prejob and postjob, see Using the tPrejob and tPostjob components on page 98.

**Formatting subjobs**

**About this task**

You can modify the subjob color and its title color. To do so, select your subjob and click the **Component view**.

In the **Basic setting** view, select the **Show subjob title** check box if you want to add a title to your subjob, then fill in a title.

To modify the title color and the subjob color:

**Procedure**

1. In the **Basic settings** view, click the **Title color/Subjob color** button to display the [Colors] dialog box.
2. Set your colors as desired. By default, the title color is blue and the subjob color is transparent blue.

**Collapsing the subjobs**

If your Job is made of numerous subjobs, you can collapse them to improve the readability of the whole Job. The minus (|-) and plus (|+) signs on the top right-hand corner of the subjob allow you to collapse and restore the complete subjob.
Click the minus sign ([-]) to collapse the subjob. When reduced, only the first component of the subjob is displayed.

Click the plus sign ([+]) to restore your subjob.

**Removing the subjob background color**

If you do not want your subjobs to be highlighted, you can remove the background color on all or specific subjobs.

To remove the background color of all your subjobs, click the **Toggle Subjobs** icon on the toolbar of Talend Studio.

To remove the background color of a specific subjob, right-click the subjob and select the **Hide subjob** option on the pop-up menu.

**Defining options on the Job view**

On the **Job** view located on the bottom part of the design workspace, you can define Job’s optional functions. This view is made of two tabs: **Stats & Logs** tab and **Extra** tab.
The **Stats & Logs** tab allows you to automate the use of **Stats & Logs** features and the Context loading feature. For more information, see Automating the use of statistics & logs on page 108.

The **Extra** tab lists various options you can set to automate some features such as the context parameters use, in the Implicit Context Loading area. For more information, see Using the features in the Extra tab on page 109.

**Automating the use of statistics & logs**

**About this task**

If you have a great need of log, statistics and other measurement of your data flows, you are facing the issue of having too many log-related components loading your Job Designs. You can automate the use of **tFlowMeterCatcher**, **tStatCatcher**, **tLogCatcher** component functionalities without using the components in your Job via the **Stats & Logs** tab.

The **Stats & Logs** panel is located on the **Job** tab underneath the design workspace and prevents your Jobs Designs to be overloaded by components.

**Note:**

This setting supersedes the log-related components with a general log configuration.

To set the **Stats & Logs** properties:

**Procedure**

1. Click the **Job** tab.
2. Select the **Stats & Logs** panel to display the configuration view.

![Stats & Logs panel screenshot](image)

3. Set the relevant details depending on the output you prefer (console, file or database).
4. Select the relevant **Catch** check box according to your needs.

**Results**

**Note:**
You can save the settings into your Project Settings by clicking the button. This way, you can access such settings via File > Edit project settings > Job settings > Stats & Logs or via the button on the toolbar.

When you use Stats & Logs functions in your Job, you can apply them to all its subjobs.

To do so, click the Apply to subjobs button in the Stats & Logs panel of the Job view and the selected stats & logs functions of the main Job will be selected for all of its subjobs.

**Using the features in the Extra tab**

The Extra tab offers some optional function parameters.

- Select the Multithread execution check box to allow two Job executions to start at the same time.

- Set the Implicit tContextLoad option parameters to avoid using the tContextLoad component on your Job and automate the use of context parameters.

  Choose between File and Database as source of your context parameters and set manually the file or database access.

  Set notifications (error-warning-info) for unexpected behaviors linked to context parameter setting.


- When you fill in Implicit tContextLoad manually, you can store these parameters in your project by clicking the Save to project settings button, and thus reuse these parameters for other components in different Jobs.

- Select the Use Project Settings check box to recuperate the context parameters you have already defined in the Project Settings view.

  The Implicit tContextLoad option becomes available and all fields are filled in automatically.

  For more information about context parameters, see Context settings on page 455.

- Click Reload from project settings to update the context parameters list with the latest context parameters from the project settings.

**Handling Routes : Advanced subjects**

The sections below give detail information about various advanced configuration situations of a mediation Route including using Route resources, using Beans, and using Spring configuration to enrich your Route design.
Using Route Resources

The Route designer allows you to created external Resources that can be used in Routes, for example, an XQuery file for camel-saxon, a WSDL file for camel-cxf, and so on. This section will show you how to create a Route Resource and how to use it in a Route.

Creating a Route Resource

About this task

To create a new Route resource:

Procedure

1. In the Repository of the Integration perspective, right-click the Resources node and select Create Resource from the contextual menu.

The [New Route Resource] wizard opens to help you define the main properties of the new Route Resource.

2. Enter the Resource properties as the following:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source File</td>
<td>the path to a local or remote file to create the Resource from an existing file.</td>
</tr>
<tr>
<td>Name</td>
<td>the name of the new Resource. A message comes up if you enter prohibited characters.</td>
</tr>
<tr>
<td>Purpose</td>
<td>the purpose of the Resource or any useful information regarding the Resource use.</td>
</tr>
<tr>
<td>Description</td>
<td>Resource description.</td>
</tr>
<tr>
<td>Author</td>
<td>a read-only field that shows by default the current user login.</td>
</tr>
<tr>
<td>Locker</td>
<td>a read-only field that shows by default the login of the user who owns the lock on the current Resource. This field is empty when you are creating a Resource and has data only when you are editing the properties of an existing Resource.</td>
</tr>
<tr>
<td>Version</td>
<td>a read-only field. You can manually increment the version using the M and m buttons. For more information, see Managing Job and Route versions on page 182.</td>
</tr>
<tr>
<td>Status</td>
<td>a list to select from the status of the Resource you are creating.</td>
</tr>
<tr>
<td>Path</td>
<td>a list to select from the folder in which the Resource will be created.</td>
</tr>
</tbody>
</table>

3. Click **Finish** to create the Resource.

If you create the Resource from scratch, an empty Resource opens in the editor on the design workspace.

If you create the Resource from an existing file, the content of the source file is displayed in the editor on the design workspace.
4. Edit the code of your Resource and save it.

**Managing Route Resource versions**

When you create a Route Resource in the **Integration** perspective of Talend Studio, by default its version is 0.1 where 0 stands for the major version and 1 for the minor version.

You can create many versions of the same Route Resource. To do that:

1. Close your Route Resource if it is open on the design workspace, otherwise, its properties will be read-only and thus you can not modify them.

2. In the **Repository** tree view, right-click your Route Resource and select **Edit properties** in the drop-down list.

The **[Edit properties]** dialog box is opened.
3. Next to the Version field, click the M button to increment the major version and the m button to increment the minor version.

4. Click Finish to validate the modification.

**Note:**

By default, when you open a Route Resource, you open its last version.

To change the version of your Route Resource, you can also:

1. Close your Route Resource if it is open on the design workspace, otherwise, its properties will be read-only and thus you can not modify them.

2. In the Repository tree view, right-click your Route Resource and select Open another version in the context menu.

3. In the dialog box, select the Create check box and click the M button to increment the major version and the m button to increment the minor version.
4. Click **Finish** to validate the modification and open this new version of your Route Resource. You can also save a Route Resource and increment its version in the same time, by clicking **File > Save as**...

**Note:**

This option does not overwrite your current Route Resource. It saves your Route Resource as another new Route Resource with another version.

You can access a list of different versions of the Route Resource. To do that:

1. Right-click it in the **Repository** tree view and select **Open another version** in the context menu.
2. Select the version of the Route Resource you want to edit and click **Finish** to open it in the design workspace.

**Using a Route Resource**

Once created, you can use the Route Resources in the **Mediation** components **cSOAP** and **cMessagingEndpoint**, and in Spring configuration. For real-life use cases, see the scenarios provided for **cSOAP**, **cMessagingEndpoint**, and **cSEDA** in Talend Help Center ([https://help.talend.com](https://help.talend.com)).

To manage the Route Resources in a Route, double-click the Route to open it in the design workspace and click the **Dependencies** tab to show the Manifest editor.
To add a Resource, in the Resources area, click Add... and select the Resource you want from tree view in the dialog. Click OK.

Once added, you can choose from the different versions of the Resource by clicking the Version field in the Resources table and select the one you want to use from the drop-down list.
To remove a Route Resource from the Route, simply select it from the list and click **Remove**. You can not remove a built-in Route Resource.

To copy the path of a Route Resource, select it in the table and click **Copy Path** so that you can use it in the Route.

Click **OK** to validate your modifications.

**Note:**
Route Resources used in Routes cannot be deleted from the repository.

When exporting a Route, the Route Resources that are called in the Route are exported together with the Route into the ESB Runtime KAR file. For more information about how to export Routes, see **Building Routes** on page 169.

**Using Beans**

Talend Studio offers you the possibility to create Java Beans that can easily be called by the Mediation components in Routes. This way, you will be able to easily reuse libraries, components, applets, or other classes.

Beans are stored under the **Code** node in the **Repository**.

**Note:**
You can also define beans in the Spring tab and use them in the Route. For more information about the Spring tab, see **Using Spring configuration** on page 120.

**Creating a Bean**

**About this task**

To create a new bean:

**Procedure**

1. In the **Repository** of the **Integration** perspective, expand the **Code** folder.
2. Right-click the **Beans** node.
3. Select **Create Bean** from the contextual menu.
The [New Bean] wizard opens to help you define the main properties of the new Bean.

4. Enter the Bean properties as the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>the name of the new Bean. A message comes up if you enter prohibited characters.</td>
</tr>
<tr>
<td>Purpose</td>
<td>the purpose of the Bean or any useful information regarding the Bean use.</td>
</tr>
<tr>
<td>Description</td>
<td>Bean description.</td>
</tr>
<tr>
<td>Author</td>
<td>a read-only field that shows by default the current user login.</td>
</tr>
<tr>
<td>Locker</td>
<td>a read-only field that shows by default the login of the user who owns the lock on the current Bean. This field is empty when you are creating a Bean and has data only when you are editing the properties of an existing Bean.</td>
</tr>
<tr>
<td>Version</td>
<td>a read-only field. You can manually increment the version using the M and m buttons. For more information, see Managing Job and Route versions on page 182.</td>
</tr>
<tr>
<td>Status</td>
<td>a list to select from the status of the Bean you are creating.</td>
</tr>
<tr>
<td>Path</td>
<td>a list to select from the folder in which the Bean will be created.</td>
</tr>
</tbody>
</table>

5. Click Finish to create the Bean. An example bean opens in the editor on the design workspace.
6. Type in the code of your Bean.

**Using a Bean**

Once created, you can use the Beans in the Mediation components. To do so, go to the Component view of the relevant component to define its properties:

For some components (for example cBean, cDynamicRouter, etc.), you can directly call Beans:

1. In the Beans class field of those components, type in `beans.BEAN_NAME.class` and the corresponding bean will be called.

2. If the Bean called has more than one method, you can specify which method you want to call by selecting the Specify the method check box and typing its name in the field displaying.

For some components (for example cAggregate, cMulticast, etc.), you can call Beans as an aggregation strategy:

1. Select the Use aggregation strategy check box.

2. In the Strategy field, type in the name of the Bean without any prefix or extension.

For more information on how to create Routes, see Creating a Route on page 37.

For more information on the properties and usage of the Mediation components, see Talend ESB Mediation Components documentation in Talend Help Center.
Using Spring configuration

Spring is an application development framework for enterprise Java. Apache Camel is designed to work nicely with the Spring Framework. The Route designer of Talend Studio allows you to add a Spring context to a Route for configuration purpose. You can define beans and resources in Spring XML DSL and then use them in Routes. This makes it possible for developers to combine Java and Spring codes in the configuration of Routes. It is particularly useful when there is no explicit component available in the palette.

To be able to use the Spring configuration, your knowledge of Spring is required. For more information about Spring, see the site http://www.springsource.org/. For the Spring support of Apache Camel, see http://camel.apache.org/spring.html.

To add a Spring context to a Route, you need first to create the Route. For more information about how to create a Route, see Creating a Route on page 37.

The Spring tab is located in the lower half of the design workspace. When you create a Route in the design workspace, a default Spring configuration is set in the Spring view.

By default, the Apache Camel JMX Notification is declared in the Spring configuration. You can configure it as needed and call it in the Route. For more information about Apache Camel JMX Notification, see http://camel.apache.org/camel-jmx.html.

Enter the code you want to implement in this view. The screenshot above shows an example of using a bean to call a previously defined Route Resource named RouteWithSpring:

```xml
<bean id="properties" class="org.apache.camel.component.properties.PropertiesComponent">
    <property name="location" value="classpath:RouteWithSpring.properties"/>
</bean>
```

For more information about creating and using Route Resources, see Using Route Resources on page 110.
The following code gives another example that defines a message routing from the endpoint \texttt{vm:a} to \texttt{log:vm}:

```
<camel:camelContext>
  <camel:route>
    <camel:from uri="vm:a" />
    <camel:to uri="log:vm" />
  </camel:route>
</camel:camelContext>
```

When you export a Route, the Spring XML file will be also exported in the KAR file.

Click the \textbf{Restore Default} button to change back to the default Spring configuration.

For a real-life use case of how to use Spring configuration in a Route, see the scenario provided for cSEDA in Talend Help Center (https://help.talend.com).

\textbf{Warning:}
When the Spring configuration is wrong, the Route may fail to start.

\section*{Desiging services}

\subsection*{What is a Service}

The \textbf{Integration} perspective of Talend Studio combines data integration with Web services and enables the graphical design of a Service which includes a WSDL file and one or more data service Jobs that addresses all of the different sources and targets required to publish the Web service. The WSDL editor makes it possible to create and edit WSDL files graphically, automating most of the tasks involved with these processes.

When you design a Service in the \textbf{Integration} perspective of Talend Studio, you can:

- Create new WSDL files or import existing WSDL files for structured viewing.
- Create, set, and delete WSDL objects.
- Access the structured view at any time to edit or document the WSDL objects in the Service.
- Associate Services with data service Jobs.
- Create and add items to the repository for reuse and sharing purposes (in other projects or Services or with other users).

\textbf{Warning:} In order to be able to execute the data service Jobs you design in Talend Studio, you need to install an Oracle JVM 1.8 (IBM JVM is not supported). You can download it from http://www.oracle.com/technetwork/java/javase/downloads/index.html.

\subsection*{Getting started with a basic Service}

\textbf{Warning:} Until a Service is created, the design workspace is unavailable.

A Service consists of a WSDL file and one or more data service Jobs. Data service Jobs address all of the different sources and targets that you need for data integration processes and combine them with Web services. The properties of each WSDL objects and data service Job components require to be configured individually, in order to function properly.
Creating a Service

The Integration perspective of Talend Studio enables you to create a Service from an existing WSDL file or to create a new WSDL file from scratch using the WSDL editor.

You can also create different folders to better classify these Services.

To create a Service:

1. Open Talend Studio following the procedure detailed in the Getting Started Guide.

2. In the Repository tree view, right-click the Services node and select Create Service from the contextual menu.

3. The dialog box displays to help you define the main properties of the new Service.

Enter the Service properties as the following:
Data services

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>the name of the new Service. A message comes up if you enter prohibited characters.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Service purpose or any useful information regarding the Service use.</td>
</tr>
<tr>
<td>Description</td>
<td>Service description.</td>
</tr>
<tr>
<td>Author</td>
<td>a read-only field that shows by default the current user login.</td>
</tr>
<tr>
<td>Locker</td>
<td>a read-only field that shows by default the login of the user who owns the lock on the current Service. This field is empty when you are creating a Service and has data only when you are editing the properties of an existing Service.</td>
</tr>
<tr>
<td>Version</td>
<td>a read-only field. You can manually increment the version using the M and m buttons. For more information, see Managing Job and Route versions on page 182.</td>
</tr>
<tr>
<td>Status</td>
<td>a list to select from the status of the Services you are creating.</td>
</tr>
<tr>
<td>Path</td>
<td>a list to select from the folder in which the Service will be created.</td>
</tr>
</tbody>
</table>

4. Click **Next** to open the **Assign WSDL** view on the wizard. By default, the **Create new WSDL** option is selected allowing you to create a new WSDL file.

![Assign WSDL](image)

5. To import an existing WSDL file, click the **Import existing WSDL** radio button. Click **Browse...** next to the **WSDL file** field to navigate to an existing WSDL file. Select the **Import WSDL Schemas on finish** check box if you want to retrieve and store the schema from the WSDL file in the **Metadata** folder of the repository tree view.
6. Click **Finish** to close the wizard and the Service opens in the design workspace with a basic WSDL skeleton.

   ![Wizard screenshot]

The Service you just created is listed under the **Services** node in the **Repository** tree view. The port type and the operation objects are displayed on the tree. The exclamation icon means that this defined Web service is not yet used.

![Repository tree view]
7. You can also assign an existing WSDL file to a Service after the creation by right clicking on the Service from the Repository tree view and select Assign WSDL from contextual menu to show the Assign WSDL wizard.

8. Double click the Service you just created from the Repository tree view, or right click the Service and select Open WSDL Editor from contextual menu to open the Service in the design workspace.

9. Edit the WSDL file in the WSDL editor. For more information, see Editing a WSDL file on page 126.

10. Create or assign one or more data service Jobs to the Service to implement the Web service. For more information, see Assigning a data service Job to a service operation on page 150.

   Note: You can open one or more of the created Services by simply double-clicking the Service label in the Repository tree view.

To create different folders for your Services, complete the following:

1. In the Repository tree view, right-click Services and select Create folder from the contextual menu. The [New folder] dialog box displays.
2. In the **Label** field, enter a name for the folder and then click **Finish** to confirm your changes and close the dialog box.

The created folder is listed under the **Services** node in the **Repository** tree view.

**Note:** If you have already created Services that you want to move into this new folder, simply drag and drop them into the folder.

For a scenario showing how to create a real-life data service, see Talend Help Center (https://help.talend.com) at https://help.talend.com.

You can now:

- Edit the generated WSDL file. For more information, see **Editing a WSDL file** on page 126.
- Export your Service for a deployment on Talend Runtime. For more information, see **Exporting a Service for deployment** on page 155.

**Editing a WSDL file**

Talend Studio provides a graphical way to browse and edit your WSDL file in the WSDL editor. Each type of top level WSDL object is shown within a tabular view (for example, service, binding, port type). Each tabular view contains one or more rows that represent the structure of the object. The service, binding, and port type objects are linked. A line is displayed to denote a reference (or association) between these objects.
The screenshot above gives a basic WSDL skeleton which contains:

- **a service**, used to aggregate a set of related ports which specify addresses for bindings, thus defining a single communication endpoint.

- **a binding**, specifies concrete protocol and data format specifications for the operations and messages defined by a particular port type.

- **a port type**, a set of abstract operations that each refer to an input message and output messages.

The WSDL editor allows you to edit a WSDL file in the **Properties** view.

The **Properties** view is located on the lower part of the designing editor of Talend Studio and displays a list of attributes and editable attribute values of a selected WSDL object and contains the following tabs to edit:

- **General** tab, displays a list of object attributes.
- **Documentation** tab, specifies the information you want the user to read.
- **Extensions** tab, used to add extension components.

**Adding a Service**

**About this task**

The service object is a collection of related ports and specifies the location of the Service.

To create a new Service, complete the following steps:

**Procedure**

1. Right click in the blank area of the design workspace to show the contextual menu and select **Add Service**.

A new service object is added in the design workspace with a port.
2. Click the service object to show its **Properties** view.

3. In the **Properties** view, click the **General** tab. In the **Name** field, type in the name of the Service. The name of the Service provides it with a unique name among all the Services defined within in the enclosing WSDL file.

4. Type in any information about the Service you want the user to read in the **Documentation** tab.

5. To manage extensions, click the **Extensions** tab. You can either add, sort, or remove extensions.

**Results**

You can add ports to your Service. A port defines an individual endpoint by specifying a single address for a binding. For more information, see **Adding a port to a Service** on page 129.
Adding a port to a Service

About this task

A port defines an individual endpoint by specifying a single address for a binding. The port contains a **Binding** attribute that references a binding and an address element that provides a specification for the endpoint.

Services are used to group sets of related ports together. Ports within a Service have the following relationship:

- None of the ports communicate with each other (for example, the output of one port is not the input of another).
- If a Service has several ports that share a port type, but employ different bindings or addresses, the ports are alternatives. Each port provides semantically equivalent behavior (within the transport and message format limitations imposed by each binding).
- You can determine a Service’s port types by examining its ports. Using this information, a user can determine if a given machine supports all the operations needed to complete a given task.

To add a port to a Service, complete the following steps:

**Procedure**

1. In the design workspace, right click the Service you want to add a port to and select **Add Port** in the contextual menu.

2. The **Port Wizard** displays. Fill in the **Name** for the port. The name of the port should provide it with a unique name among all the ports defined within the Service.
3. Select a **Binding** for the port. For more information on how to set a binding, see Setting a binding on page 132.

4. Select a Protocol for the port from the **Protocol** list and enter the address of the port into the **Address** field that appears.

5. Click **Finish** to validate the creation. The port is added to the Service and its **Properties** view displays.
6. To select the new port, click the port in the service object. You can change the information you entered about this port any time in the **General** tab of its **Properties** view.

7. Type any information about the port you want the user to read in the **Documentation** tab of the **Properties** view.

8. To manage extensions, click the **Extensions** tab. You can either add, sort, or remove extensions.
Results

You can create a new binding for your port or re-use an existing one. A binding defines the message format and protocol details for operations and messages defined by a particular port type. For more information, see Setting a binding on page 132.

Setting a binding

A binding is a top level WSDL object that provides a concrete specification regarding the transmission of messages to and from a Web service. A binding references exactly one port type. The structure of a binding corresponds very closely to that of the port type. The binding contains extensibility elements (for example, SOAP, HTTP, and MIME) that specify protocol specific details. Each port within a Service references exactly one binding.

You can create a binding by right clicking in any blank area in the design workspace and selecting Add Binding in the contextual menu. You can create a new binding or reuse an existing one.

Creating a new binding

Procedure

1. Right-click the port and select Set Binding->New Binding.

2. The [New Binding] dialog box is displayed. Type in the name of the binding in the Name field. The name should be unique among all bindings defined within the enclosing WSDL file. Click OK.

The new binding is created in the design workspace and connected to the port.
3. Click the binding you just created in the design workspace to show its **Properties** view.

4. To specify the name of the binding, type it in the **Name** field or click the bulb icon beside the **Name** field to invoke the rename refactoring.

   When clicking on the bulb icon, a [Save All Modified Resources] dialog box displays prompting you to save all modified resources before proceed.

   Click **OK** and the [Rename wizard] appears.
Type in a new name in the **New name** field. Select the **Update references** check box to propagate this change to the enclosing WSDL file. Click **Preview** to have a look at the original source and the refactored source.

Click **OK** to validate the change and close the dialog box.

5. Click the **PortType** field to set the port type of the binding. You can select the port type you want from the list which contains the port types in your current file, select **New...** to open the **[New PortType]** wizard and create a new port type, or select **Browse...** to open the **[Specify Port Type]** wizard. For more information, see Setting a port type on page 139.
6. Click the **Generate Binding Content...** button to show the [Binding Wizard] and specify the details of the binding.

The **Name** field shows the name of the binding to be specified. The **PortType** field shows the port type that the binding references. You can also select the port type you want from the list which contains the port types in your current file. Select the binding options you want to use in the **Protocol** list. The options are **SOAP** and **HTTP**. Use the **SOAP** protocol when you want to exchange structured and typed information. Use the **HTTP** protocol when you want your application client to just request or update information.

If you select **SOAP** you can then select the encoding style you want to use:
• **document literal.** Document style messages, literal encoding. Use this style of binding when you want to send SOAP messages that can be validated by an XML validator. All the data types in the SOAP message body are defined in a schema, so the WSDL parts must point to schema elements.

• **rpc literal.** RPC style messages, literal encoding. Use this style of binding when you want to specify the operation method names in your SOAP messages so a server can dispatch the specified methods. Data types must be defined, so the WSDL parts must point to XSD types.

• **rpc encoded.** RPC style messages and SOAP encoding. Use this style of binding when you want to encode data graphs in your SOAP messages so a server can deserialize the object data. Data types must be defined, so the WSDL parts must point to XSD types.

If you select **HTTP** you can select whether to create an HTTP getter or setter.
**Data services**

- **HTTP GET.** A GET request fetches data from a Web server based on an URL value and a set of HTTP headers. Use this method when you want to retrieve information specified in the request.

- **HTTP POST.** A POST request sends additional data to the server, specified after the URL and the headers. Use this method when you want to send data enclosed in the body of the request.

Select the **Overwrite existing binding information** check box if you are modifying an existing binding.

**Note:** Changes of service elements are not automatically propagated to bindings. You need to regenerate the binding content and select the **Overwrite existing binding information** check box in the binding wizard to reflect changes in the WSDL.

Click **Finish** to validate your specification and close the wizard.

7. Type any information about the binding you want the user to read in the **Documentation** tab.

8. To manage extensions, click the **Extensions** tab. You can either add, sort, or remove extensions.
Reusing an existing binding

About this task
To reuse an existing binding for your port, complete the following steps:

Procedure
1. In the design workspace, right-click your port and click Set Binding>Existing Binding.

2. The [Specify Binding] wizard displays. In the Name field, type a search string to filter the list or leave the field blank to view all.
3. You can change the scope of the list by selecting one of the following options:
   - **Workspace**: lists the bindings available in your workspace.
   - **Enclosing Project**: lists the bindings available in the project that contains your file.
   - **Current Resource**: lists the binding types available in your current file.
   - **Working Sets**: lists the bindings available in a specified set of files. To specify a working set, click **Choose**. You can select files from an existing working set or create a new working set. Once you have selected the files, click **OK**.

4. The bindings will be listed in the **Components** area. The **Declaration Location** field shows where the selected binding is located. Select the binding you want and click **OK**. The binding is connected to the port in the design workspace.

5. For more information on how to modify the binding in the **Properties** view, see Creating a new binding on page 132.

### Setting a port type

A port type is a named set of abstract operations and the abstract messages involved. Each operation refers to an input message and output messages. A port type is referenced by a binding object. Each binding references exactly one port type. Since each port refers to exactly one binding, each port has exactly one port type.

You can create a port type by right clicking in any blank area in the design workspace and selecting **Add PortType**. As a convenience you can also add a port type via a binding. This allows you to create a port type and modify the binding to reference the new port type in one action.

You can either create a new port type for your binding, or reuse an existing one.

**Note**: Changes of service elements are not automatically propagated to bindings. You need to regenerate the binding content and select the **Overwrite existing binding information** check box in the binding wizard to reflect changes in the WSDL. For more information, see Setting a binding on page 132.

### Creating a new port type for a binding

**About this task**

If you want to create a new port type for your binding, complete the following steps:

**Procedure**

1. In the design workspace, right click on a binding object and click **Set PortType > New PortType**.
2. The [New PortType] wizard displays. Type the name of the port type in the Name field. The name should be unique name among all port types defined within the enclosing WSDL file. Click OK.

The new port type is created and connected to the binding in the design workspace.

3. Click the port type object you just created in the design workspace to show its Properties view.
4. The **General** tab allows you to define the name of the port type. To specify the name of the port type, type it in the **Name** field or click the bulb icon beside the **Name** field to open the **Rename** wizard.

When clicking on the bulb icon, a **Save All Modified Resources** dialog box displays prompting you to save all modified resources before proceed.

Click **OK** and the **Rename wizard** appears.

Type in a new name in the **New name** field. Select the **Update references** check box to propagate this change to the enclosing WSDL file. Click **Preview** to have a look at the original source and the refactored source. Click **OK** to validate the renaming and close the wizard.
5. Type any information about the port type you wish the user to read in the Documentation tab.

6. To manage extensions, click the Extensions tab. You can either add, sort, or remove extensions.

Results
Once you have created a port type, you can add operations to it to send and receive messages. For more information, see Creating a new binding on page 132.

Reusing an existing port type

About this task
To reuse an existing port type for your binding, complete the following steps:
Procedure

1. In the design view, right click on a binding object and click **Set PortType Existing PortType**.
2. The **Specify Port Type** wizard is displayed. In the **Name** field, type a search string to filter the list or leave the field blank to view all.

![Specify Port Type](image)

3. You can change the scope of the list by selecting one of the following options:
   - **Workspace**: lists the port types available in your workspace.
   - **Enclosing Project**: lists the port types available in the project that contains your file.
   - **Current Resource**: lists the port types available in your current file.
   - **Working Sets**: lists the port types available in a specified set of files. To specify a working set, click **Choose**. You can select files from an existing working set or create a new working set. Once you have selected the files, click **OK**.
4. The existing port types will be listed in the **Components** area. The **Declaration Location** field shows where the selected port type is located. Select the port type you want and click **OK**.
5. For more information on how to modify the port type in the **Properties** view, see [Creating a new port type for a binding](#) on page 139.

Adding an operation

**About this task**

An operation names the operation and lists the expected inputs and outputs. The operation element may also contain a fault sub-element that describes any error data that the operation may return.

Using an operation, you can declare four transmission primitives that an endpoint can support:
   - **One-way**: the endpoint receives a message.
- **Request-response**: the endpoint receives a message, and sends a correlated message.
- **Solicit-response**: the endpoint sends a message, and receives a correlated message.
- **Notification**: the endpoint sends a message.

You can add an operation to a port type or a port binding.

**Note**: Changes of service elements are not automatically propagated to bindings. You need to regenerate the binding content and select the **Overwrite existing binding information** check box in the binding wizard to reflect changes in the WSDL. For more information, see *Setting a binding* on page 132.

To add an operation to a port type, complete the following steps:

**Procedure**

1. In the design workspace, right-click your port type. Click **Add Operation**.

2. The **Properties** view of the new operation opens. In the **General** tab, type the name of the operation in the **Name** field.

3. Type any information about the operation you wish the user to read in the **Documentation** tab.

4. To manage extensions, click the **Extensions** tab. You can either add, sort, or remove extensions.

5. Right click on the operation to add input, output or fault objects. Depending on an operation’s inputs and outputs it can be classified as follows:
   - **One way operation**: input
   - **Request response operation**: input, output
- **Solicit response operation**: output, input
- **Notification operation**: output

**Results**

Note that if the operation is not defined in any binding, an error icon will automatically show on operation node in the **Repository** tree view.

**Adding a message**

Messages represent an abstract definition of the data being transmitted. A message consists of logical parts, each of which is associated with a definition within some type system. WSDL messages are top level objects that can be referenced by an operation’s input, output and fault elements (within a port type).

**Note**: Changes of service elements are not automatically propagated to bindings. You need to regenerate the binding content and select the **Overwrite existing binding information** check box in the binding wizard to reflect changes in the WSDL. For more information, see Setting a binding on page 132.

**Creating a new message**

**About this task**

To create a new message for your input, output, or fault element, complete the following steps:

**Procedure**

1. In the design workspace, right-click your input, output, or fault element and click **Set Message** > **New Message**.
2. The [New Message] wizard displays. Type the name of the message in the Name field. This name should be unique among all messages defined within the enclosing WSDL file. Click OK.

3. The new message will appear in the design workspace within the port type.

Reusing an existing message

**About this task**

If you want to reuse an existing message for your input, output, or fault element, follow these steps:

**Procedure**

1. In the design workspace, right-click your input, output, or fault element and click Set Message>Existing Message.
2. The [Specify Message] wizard is displayed. In the Name field, type a search string to filter the list or leave the field blank to view all the available messages in the Components area.

3. You can change the scope of the list by selecting one of the following options:
   - **Workspace**: lists the messages available in your workspace.
   - **Enclosing Project**: lists the messages available in the project that contains your file.
• **Current Resource**: lists the messages available in your current file.

• **Working Sets**: lists the messages available in a specified set of files. To specify a working set, click **Choose**. You can select files from an existing working set or create a new working set. Once you have selected the files, click **OK**.

4. The existing messages will be listed in the **Components** area. The **Declaration Location** field shows where the selected message is located. Select the message you want and click **OK**.

**Results**

You can now add parts to your message. Parts are a flexible mechanism for describing the logical abstract content of a message. For more information, see Adding a part to a message on page 148.

**Adding a part to a message**

**About this task**

All messages contain one or more parts. Parts are a flexible mechanism for describing the logical abstract content of a message. The message definition associates each part with a type using a message-typing attribute.

**Note**: Changes of service elements are not automatically propagated to bindings. You need to regenerate the binding content and select the **Overwrite existing binding information** check box in the binding wizard to reflect changes in the WSDL. For more information, see Setting a binding on page 132.

To add a part to a message, complete the following steps:

**Procedure**

1. In design workspace, right click an input, output, or fault object and click **Add Part**.

![Image of adding a part to a message]

The part is added to the input, output, or fault's message reference.
2. Select the part by clicking the part in the port type object and click the General tab in the Properties view.

3. In the Name field, type the name of the part.

4. Your part can refer to either a Type or an Element. Select the appropriate option as the Reference Kind.

5. If you selected Type, you now have the option of selecting an XML schema data type from the Type list. The list of types comes from any available referenced XML schemas.

6. If you selected Element, you now have the option of selecting an XML schema element from the Element list. The list of elements comes from any available referenced XML schemas.

Creating a new type for your WSDL file

Types describe all the data types used between the client and server. WSDL is not tied exclusively to a specific typing system, but it uses the W3C XML Schema specification as its default choice.

WSDL allows type systems to be added via extensibility elements. An extensibility element may appear under the types element to identify the type definition system being used and to provide an XML container element for the type definitions.

To add an XSD type or element to your WSDL file, in the design workspace, click the arrow icon to the right of the port type object.

The XML schema editor opens.
For more information about XML schemas, see the site http://help.eclipse.org/indigo/topic/org.eclipse.wst.xsdeditor.doc.user/topics/cxmlsced.html.

**Note:** Changes of service elements are not automatically propagated to bindings. You need to regenerate the binding content and select the **Overwrite existing binding information** check box in the binding wizard to reflect changes in the WSDL. For more information, see Setting a binding on page 132.

### Assigning a data service Job to a service operation

**About this task**

After the WSDL file is created, you need to associate each of the operations in the WSDL file with a data service provider Job to implement the Web service. You can either create a new data service Job or assign an existing one to it.

Note that if the operation is not defined in any binding, an error icon will automatically show on operation node in the **Repository** tree view and you cannot assign a Job to it.

To do so:

**Procedure**

1. Right click the operation node of a Service in the Repository tree view and select **Assign Job** in the contextual menu.
   
   If the operation is not defined in any binding, the **Assign Job** option is not available in the contextual menu.
2. The [Assign Job] wizard opens, prompting you to Create a new Job and Assign it to this Service Operation or Assign an existing Job to this Service Operation.

   - To create a new Job, select the Create a new Job and Assign it to this Service Operation option and click Next.

   The [New Job] wizard opens. By default, a name of the Job is already set in the Name field, which is the operation name. Change it and enter the Job properties as you want. For more information on how to define the Job properties, see Creating a Job on page 26.
A draft Job is opened on the design workspace with the tESBProviderRequest and the tESBProviderResponse components already selected and configured. The Property Type of tESBProviderResponse is set as Repository and the name of the operation is retrieved by default. tESBProviderRequest will listen to all requests sent to the specified Web service and tESBProviderResponse will send back the response corresponding to the request. These two components can be found in the Web Services group of the ESB family on the Palette. You can design your data service provider Job according to your own need for the data integration process and execute the Job to publish the Web service.
For more information on how to design a Job, see What is a Job design? on page 25. For details about tESBProviderRequest and tESBProviderResponse, see Talend Help Center (https://help.talend.com).

For a scenario showing how to create a real-life data service Job, see Talend Help Center (https://help.talend.com) at https://help.talend.com.

- To assign an existing data service Job to the operation, select the Assign an existing Job to this Service Operation option and click Next.

The [Assign Job] wizard appears. You can type a search string to filter the list of Jobs or leave the field blank to view all the available Jobs. Select the Job you want from the tree view and click Finish to assign it to the operation.
3. Once the Job is assigned to the service operation, you can open it in the design workspace by double clicking the operation or right clicking the operation and select Edit Job in the context menu. But if the operation is not defined in any binding, such operations will not work, even if a Job was assigned to it.

**Monitoring the log messages of a data service Job**

When you run a data service Job in the Studio, the progress of the execution is displayed in the console on the Basic Run or Debug Run tab of the Run view. The log is provided by the Apache CXF logging utility shipped with the Service builder. By default the message level is set to INFO. It includes any error message as well as start and end messages. It also shows the Job output in case you used a tLogRow component in the Job design.

This INFO logging level is fixed and can not be changed in Talend Studio when using the tLogRow component. However, the tLogCatcher component can be used and offers more logging capabilities. For more information on tLogCatcher, see Talend Help Center (https://help.talend.com). Otherwise, when deploying your Service in the Talend Runtime, you can decide the level used by the Talend Runtime to log information. For more information about the logging system of Talend Runtime, see the Talend Open Studio for ESB Container Administration Guide.

The following screenshot shows an example of the log with error messages.
For more information about how to run a Job, see Executing the Job on page 35.

Exporting a Service for deployment

The Integration perspective of Talend Studio enables you to export a Service to a .kar file that can be deployed at runtime. To do so:

Procedure

1. In the Repository tree view, right-click the Service you want to export and select Export Service from the contextual menu.

2. The [Export service] wizard displays. Click Browse to browse to where you want to store the exported Service.
3. **Note**: Talend Studio provides a default Maven script template for this option. You can customize this template based on your actual needs. For more information, see Customizing Maven build script templates on page 442.

4. Click **Finish** to complete the export operation and close the wizard.

**Results**

A .kar file for the Service is created in the defined place that can be deployed on your Talend Runtime.

Note that the archive file for the Service contains all the dependent libraries required to start the Service in Runtime. But the JDBC jar is an exception. If a data source for the same database is configured in the runtime container, with the JDBC jar, there will be LinkageError during the execution of the Service. So in this case, it is recommended to use the data source instead for connecting to databases.

When exporting a Service, all the contexts used in the Service are also included in the archive file. When you deploy the .kar file in runtime, the default context configured in the Service will be used.

To change the default context after you deploy the Service to runtime, complete the following steps:

1. Go to subdirectory `<TalendRuntimePath>\container\etc` of Talend Runtime installation directory.

2. Create a configuration file named `<yourservicename>.cfg` and set the context in this file: `context=<contextName>`

3. Restart runtime.

**Handling Services: miscellaneous subjects**

The sections below give detailed information about various subjects related to the management of a Service.
**Importing WSDL schemas**

The **Import WSDL Schemas** option of the Service allows you to retrieve and store the schemas from the WSDL file in the **Metadata** folder of the repository tree view.

To do so, right click the Service in the repository tree view and select the **Import WSDL Schemas** option from the contextual menu.

The schema of the WSDL file is then imported to the **Metadata** folder in the repository tree view under the **File XML** node.
For more information about how to use the Metadata manager, see What is a Job design? on page 25.

**Setting the Runtime options**

**About this task**

To do so:

**Procedure**

1. Right-click a Service in the repository tree view and select **ESB Runtime Options** from the contextual menu.
The wizard appears allowing you to set the Runtime options.

2. Set the Runtime options as required.
<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Business Correlation</td>
<td>Select this check box to enable the correlation option so that chained service calls will be grouped under the same correlation ID. The service will extract the correlation ID from the request header and store it in the component variable of the data service Job for further use in the flow.</td>
</tr>
<tr>
<td>Use Service Activity Monitor</td>
<td>Select this check box to capture events and store this information to facilitate in-depth analysis of service activity and track-and-trace of messages throughout a business transaction. This can be used to analyze service response times, identify traffic patterns, perform root cause analysis and more. For more information, see Talend ESB Infrastructure Services Configuration Guide for Service Activity Monitoring.</td>
</tr>
<tr>
<td>Use Service Locator</td>
<td>Select this check box to maintain the availability of the service to help meet demands and service level agreements (SLAs).</td>
</tr>
<tr>
<td>Service Locator Custom Properties</td>
<td>Click <img src="image" alt="icon" /> to add as many properties as needed to the Service Locator Custom Properties table. Enter the name and the value of each property in the Property Name field and the Property Value field respectively to identify the service. The table is disabled when the Use Service Locator check box is cleared. For more information, see Talend ESB Infrastructure Services Configuration Guide for how to install and configure the Service Locator.</td>
</tr>
</tbody>
</table>
| Username / Password   | Select this check box to enable the Username token. When using the Username token, the web service provider requires the consumer to send the credentials as a part of the request and authentication is performed on the provider side.  

**Note:** Note that the authentication is the same for all services running in the same Talend ESB container.  
For more information on how to configure the authentication, see Talend ESB Infrastructure Services Configuration Guide for how to use STS with Talend Runtime. |
| SAML Token            | Select this check box to use the SAML token. When using the SAML token, the web service provider requires the consumer to make a SAML token issue request to the Security Token Service (STS) passing its credentials. On successful authentication the STS issues a SAML token. This SAML token is sent as a part of the request to the provider and the provider verifies the validity of the SAML token.  

**Note:** Note that the authentication is the same for all services running in the same Talend ESB container.  
For more information on how to configure the authentication, see Talend ESB Infrastructure Services Configuration Guide for how to use STS with Talend Runtime. |
| Log Messages          | Select this check box to log the content of the messages that are sent between the service and the consumer.                                                                                                 |

3. Click **OK** to validate your settings and close the wizard.
Managing Jobs, Routes and Services

Activating/Deactivating a component or a subjob or a Route

You can activate or deactivate a subjob or a Route directly connected to the selected component. You can also activate or deactivate a single component as well as all the subjobs or the whole Route Flow linked to a Start component. The Start component is the trigger of the Job. It has a green background.

When a component or a subjob or a Route is deactivated, you are not able to create or modify links from or to it. Moreover, at runtime, no code is generated for the deactivated component or subjob or Route.

Activate or deactivate a component

About this task

To activate or deactivate a component, proceed as follows:

Procedure

1. Right-click the component you want to activate or deactivate, the \texttt{tFixedFlowInput} component for example.
2. Select the option corresponding to the action you want to perform:
   - \textbf{Activate \texttt{tFixedFlowInput\_1}} if you want to activate it.
   - \textbf{Deactivate \texttt{tFixedFlowInput\_1}} if you want to deactivate it.

Activate or deactivate a subjob

About this task

To activate or deactivate a subjob, proceed as follows:

Procedure

1. Right-click any component composing the subjob.
2. Select the option corresponding to the action you want to perform:
   
   • **Activate current Subjob** if you want to activate it.
   
   • **Deactivate current Subjob** if you want to deactivate it.

**Activate or deactivate all linked subjobs**

**About this task**
To activate or deactivate all linked subjobs, proceed as follows:

**Procedure**
1. Right-click the Start component.
2. Select the option corresponding to the action you want to perform:
   
   • **Activate all linked Subjobs** if you want to activate them.
   
   • **Deactivate all linked Subjobs** if you want to deactivate them.

**Activate or deactivate a Route**

**About this task**
To activate or deactivate a Route, proceed as follows:

**Procedure**
1. Right-click any component composing the Route.
2. Select the option corresponding to the action you want to perform:
   
   • **Activate whole Route flow** if you want to activate it.
   
   • **Deactivate whole Route flow** if you want to deactivate it.

**Importing/exporting items and building Routes and Jobs**

Talend Studio enables you to import/export your Jobs, Routes, or items in your Jobs, Routes and Services from/to various projects or various versions of the Studio. It enables you as well to build Jobs, Routes and thus deploy and execute those created in the Studio on any server.

**Importing items**

You can import items from previous versions of Talend Studio or from a different project of your current version.

The items you can possibly import are multiple:

• Business Models
• Jobs Designs
• Routes
• Services
• Routines
• Documentation
• Metadata

To import items, right-click any entry such as **Job Designs**, **Routes**, **Services**, or **Business Models** in the **Repository** tree view and select **Import Items** from the contextual menu or directly click the icon on the toolbar to open the **[Import items]** dialog box and then select an import option.

To import items stored in a local directory, do the following:

1. Click the **Select root directory** option in the **[Import items]** dialog box.
2. Click **Browse** to browse down to the relevant project folder within the workspace directory. It should correspond to the project name you picked up.
3. If you only want to import very specific items such as some **Job Designs**, you can select the specific folder, such as Process where all the Job Designs for the project are stored. If you only have **Business Models** to import, select the specific folder: **BusinessProcess**, and click **OK**.

But if your project gathers various types of items (Business Models, Jobs Designs, Routes, Services, Metadata, Routines...), we recommend you to select the project folder to import all items in one go, and click **OK**.

4. If needed, select the **overwrite existing items** check box to overwrite existing items with those having the same names to be imported. This will refresh the **Items List**.

5. From the **Items List** which displays all valid items that can be imported, select the items that you want to import by selecting the corresponding check boxes.

6. Click **Finish** to validate the import.

To import items from an archive file (including source files and scripts), do the following:

1. Click the **Select archive file** option in the **[Import items]** dialog box.
2. Browse to the desired archive file and click **Open**.
3. If needed, select the **overwrite existing items** check box to overwrite existing items with those having the same names to be imported. This will refresh the **Items List**.
4. From the **Items List** which displays all valid items that can be imported, select the items that you want to import by selecting the corresponding check boxes.

5. Click **Finish** to validate the import.

To import items from **Talend Exchange**, do the following:
1. Click the Select archive file option in the [Import items] dialog box. Then, click BrowseTalendExchange to open the [Select an item from Talend Exchange] dialog box.

2. Select the desired category from the Category list, and select the desired version from the TOS_VERSION_FILTER list.

A progress bar appears to indicate that the extensions are being downloaded. At last, the extensions for the selected category and version will be shown in the dialog box.

3. Select the extension that you want to import from the list.

   Click Finish to close the dialog box.

4. If needed, select the overwrite existing items check box to overwrite existing items with those having the same names to be imported. This will refresh the Items List.

5. From the Items List which displays all valid items that can be imported, select the items that you want to import by selecting the corresponding check boxes.

6. Click Finish to validate the import.

   **Note:** If there are several versions of the same items, they will all be imported into the Project you are running, unless you already have identical items.
**Building Jobs**

**About this task**

The **Build Job** feature allows you to deploy and execute a Job on any server, independent of Talend Studio.

By executing build scripts generated from the templates defined in Project Settings, the **Build Job** feature adds all of the files required to execute the Job to an archive, including the `.bat` and `.sh` along with any context-parameter files or other related files.

**Note:**

Your Talend Studio provides a set of default build script templates. You can customize those templates to meet your actual needs. For more information, see Customizing Maven build script templates on page 442.

By default, when a Job is built, all the required jars are included in the `.bat` or `.sh` command. For a complex Job that involves many Jars, the number of characters in the batch command may exceed the limitation of command length on certain operating systems. To avoid failure of running the batch command due to this limitation, before building your Job, go to **Window > Preferences**, select **Talend > Import/Export**, and then select the **Add classpath jar in exported jobs** check box to wrap the Jars in a `classpath.jar` file added to the built Job.

Note that the SOAP data service Job including the `tESBProviderRequest` component that implements a service operation can not be built independently. The Job has to be built with the service it is assigned to. When you export a SOAP service, all the data service Jobs that implement the service operations are built in the service archive file as well.

To build Jobs, complete the following:

**Procedure**

1. In the **Repository** tree view, right-click the Job you want to build, and select **Build Job** to open the **[Build Job]** dialog box.

   **Note:**

   You can show/hide a tree view of all created Jobs in Talend Studio directly from the **[Build Job]** dialog box by clicking the ➔ and the ➙ buttons respectively. The Jobs you earlier selected in the Studio tree view display with selected check boxes. This accessibility helps to modify the selected items to be exported directly from the dialog box without having to close it and go back to the **Repository** tree view in Talend Studio to do that.
2. In the To archive file field, browse to the directory where you want to save your built Job.

3. From the Select the Job version area, select the version number of the Job you want to build if you have created more than one version of the Job.

4. Select the Build Type from the list between Standalone Job and OSGI Bundle For ESB.

   Note that data service Jobs that include the tRESTRequest component can only be built as OSGI Bundle For ESB. If the data service Job includes the tRESTClient or tESBConsumer component, and none of the Service Registry, Service Locator or Service Activity Monitor is enabled in the component, the data service Job can be built as OSGI Bundle For ESB or Standalone Job. With the Service Registry, Service Locator or Service Activity Monitor enabled, the data service Job including the tRESTClient or tESBConsumer component can only be built as OSGI Bundle For ESB.

5. Select the Extract the zip file check box if you want the archive file to be automatically extracted in the target directory.

6. In the Options area, select the file type(s) you want to add to the archive file. The check boxes corresponding to the file types necessary for the execution of the Job are selected by default. You can clear these check boxes depending on what you want to build.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell launcher</td>
<td>Select this check box to export the .bat and/or .sh files necessary to launch the built Job.</td>
</tr>
<tr>
<td></td>
<td>• <strong>All</strong>: exports the .bat and .sh files.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Unix</strong>: exports the .sh file.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Windows</strong>: exports the .bat file.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Context scripts | Select this check box to export ALL context parameters files and not just those you select in the corresponding list.  

**Note:**  
To export only one context, select the context that fits your needs from the **Context scripts** list, including the `.bat` or `.sh` files holding the appropriate context parameters. Then you can, if you wish, edit the `.bat` and `.sh` files to manually modify the context type. |
| Apply to children | Select this check box if you want to apply the context selected from the list to all child Jobs.                                                                                                             |
| Items          | Select this check box to export the sources used by the Job during its execution including the `.item` and `.properties` files, Java and **Talend** sources.  

**Note:**  
If you select the **Items** or **Source files** check box, you can reuse the built Job in a Talend Studio installed on another machine. These source files are only used in Talend Studio. |
| Java sources   | Select this check box to export the `.java` file holding Java classes generated by the Job when designing it.                                                                                           |

7. Click the **Override parameters’ values** button, if necessary.

In the window which opens you can update, add or remove context parameters and values of the Job context you selected in the list.

8. Click **Finish** to validate your changes, complete the build operation and close the dialog box.

**Results**

A zipped file for the Jobs is created in the defined place.

**Note:**  
If the Job to be built calls a user routine that contains one or more extra Java classes in parallel with the public class named the same as the user routine, the extra class or classes will not be included in the exported file. To export such classes, you need to include them within the class with the routine name as inner classes. For more information about user routines, see Managing user routines on page 419. For more information about classes and inner classes, see relevant Java manuals.

**Building a Job as a standalone Job**

In the case of a Plain Old Java Object export, if you want to reuse the Job in Talend Studio installed on another machine, make sure you selected the **Items** check box. These source files (`.item` and `.properties`) are only needed within Talend Studio.

Select a context from the list when offered. Then once you click the **Override parameters’ values** button below the **Context scripts** check box, the opened window will list all of the parameters of the selected context. In this window, you can configure the selected context as needs.

All contexts parameter files are exported along in addition to the one selected in the list.

**Note:**
After being exported, the context selection information is stored in the .bat or .sh file and the context settings are stored in the context .properties file.

**How to build a Job as an OSGI Bundle For ESB**

**About this task**

In the [Build Job] dialog box, you can change the build type in order to build the Job selection as an OSGI Bundle in order to deploy your Job in Talend ESB Container.

**Procedure**

1. In the **Job Version** area, select the version number of the Job you want to build if you have created more than one version of the Job.
2. In the **Build type** area, select **OSGI Bundle For ESB** to build your Job as an OSGI Bundle. The extension of your build automatically change to .jar as it is what Talend ESB Container is expecting.
3. Click the **Browse...** button to specify the folder in which building your Job.
4. Click **Finish** to build it.

**Building Routes**

The **Build Route** feature allows you to build a Route to an ESB Runtime KAR file in order to deploy it in Talend ESB Container.
Building a Route to an ESB Runtime KAR file

About this task

To build a Route to an ESB Runtime KAR file, complete the following:

Procedure

1. In the Repository tree view, right-click the Route you want to build, and select Build Route to open the [Build Route] dialog box.

   Note:
   You can show/hide a tree view of all created Jobs in Talend Studio directly from the [Build Route] dialog box by clicking the and the buttons respectively. This accessibility helps to modify the selected items to be exported directly from the dialog box without having to close it and go back to the Repository tree view in Talend Studio to do that.

2. In the To archive file field, browse to the directory where you want to save your built Route.

3. In the Route Version area, select the version number of the Route you want to build if you have created more than one version of the Route.

4. In the Build Type area, ESB Runtime Kar file is selected by default.

5. Click Finish to validate your changes, complete the export operation and close the dialog box.

Results

A .kar file for the Route is created in the defined place.
**Editing Route Manifest**

**About this task**

The Route designer allows you to manage the OSGI dependencies of a Route. To do so:

**Procedure**

1. Double-click the Route to open it in the design workspace. Click the **Dependencies** tab to show the Manifest editor.

2. In the **Import Packages** area, the built-in packages are displayed in italics. Click **Add** to add a new package.
3. In the [Add Import-Package] wizard, enter the properties according to the following table and click OK. The package that is added manually is displayed in black. You can also edit the properties by clicking the Edit button after adding the package and remove the package by clicking the Remove button.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter the name of the Import-Package.</td>
</tr>
<tr>
<td>Properties / Optional</td>
<td>Select this check box to resolve the package only when it is present.</td>
</tr>
<tr>
<td>Version to match / MinVersion</td>
<td>Specify the minimum of the package's version range that matches the Export-Package. If this attribute is not specified, the default value is 0.0.0. Select between inclusive and exclusive to include or exclude the specified version. This will be shown in the label of the package. ( and ) indicate exclusive. [ and ] indicates inclusive. (xxx) indicates single version.</td>
</tr>
<tr>
<td>Version to match / MaxVersion</td>
<td>Specify the maximum of the package's version range that matches the Export-Package. If this attribute is not specified, the default value is ∞. Select between inclusive and exclusive to include or exclude the specified version. This will be shown in the label of the package. ( and ) indicate exclusive. [ and ] indicates inclusive. (xxx) indicates single version.</td>
</tr>
</tbody>
</table>

4. In the Export Packages area, the built-in packages are displayed in italics. Click Add to add a new package.
5. In the [Add Export-Package] wizard, enter the properties according to the following table and click OK. The package that is added manually is displayed in black. You can also edit the properties by clicking the Edit button after adding the package and remove the package by clicking the Remove button.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter the name of the Export-Package.</td>
</tr>
<tr>
<td>Version exported / Version</td>
<td>Specify the version of the package. The major.mid.min.qualifiername format is supported. You can choose to use a qualifiername or not. If you enter a version of less than three digits, the default major.mid.min format will be used. For example, if you enter 1, the version will show as 1.0.0.</td>
</tr>
</tbody>
</table>

6. The search path for classes inside the bundle is displayed in the Bundle Classpath area. Click the Select All or the Deselect All button to include or exclude them from the OSGI bundle.

7. In the Require Bundles area, the built-in bundles are displayed in italics. Click Add to add a new bundle.
8. In the [Add Require-Bundle] wizard, enter the properties according to the following table and click OK. The bundle that is added manually is displayed in black. You can also edit the properties by clicking the Edit button after adding the bundle and remove the bundle by clicking the Remove button.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter the name of the Require-Bundle.</td>
</tr>
<tr>
<td>Properties / Optional</td>
<td>Select this check box to resolve the bundle only when it is present.</td>
</tr>
<tr>
<td>Version to Match / MinVersion</td>
<td>Specify the minimum of the bundle’s version range. If this attribute is not specified, the default value is 0.0.0. Select between Inclusive and Exclusive to include or exclude the specified version. This will be shown in the label of the package. ( and ) indicate exclusive. [ and ] indicates inclusive. (xxx) indicates single version.</td>
</tr>
<tr>
<td>Version to Match / MaxVersion</td>
<td>Specify the maximum of the bundle’s version range. If this attribute is not specified, the default value is ∞. Select between Inclusive and Exclusive to include or exclude the specified version. This will be shown in the label of the package. ( and ) indicate exclusive. [ and ] indicates inclusive. (xxx) indicates single version.</td>
</tr>
</tbody>
</table>

**Results**

From the Route Manifest editor, you can also:

- filter the packages, bundles, or classpaths by typing a search string in the Search field and delete the search string by clicking the button
- select the Hide Built-In Items check box to hide the built-in items
- click the button to refresh all dependencies according to the latest content of the Route
- click the Up or Down button to move an Import-Package or Require-Bundle that is manually added up or down in the list when there is more than one of them

**Exporting items**

**About this task**

You can export multiple items from the repository onto a directory or an archive file. Hence you have the possibility to export metadata information such as DB connection or Documentation along with your Job or your Business Model, or even your Routes and Services, for example.

To do so:

**Procedure**

1. In the Repository tree view, select the items you want to export.
2. To select several items at a time, press the Ctrl key and select the relevant items.
Warning:

If you want to export a database table metadata entry, make sure you select the whole DB connection, and not only the relevant table as this will prevent the export process to complete correctly.

3. Right-click while maintaining the Ctrl key down and select Export items on the pop-up menu:
You can select additional items on the tree for exportation if required.

4. Click Browse to browse to where you want to store the exported items. Alternatively, define the archive file where to compress the files for all selected items.

   **Note:**
   If you have several versions of the same item, they will all be exported.

   **Note:**
   Select the Export Dependencies check box if you want to set and export routine dependencies along with Jobs you are exporting. By default, all of the user routines are selected. For further information about routines, see What are routines on page 417.

5. Click Finish to close the dialog box and export the items.

**Changing context parameters in Jobs and Routes**

As explained in Building Jobs on page 166, you can edit the context parameters:

If you want to change the context selection, simply edit the .bat/.sh file and change the following setting: `--context=Prod` to the relevant context.
If you want to change individual parameters in the context selection, edit the .bat/.sh file and add the following setting according to your need:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>To change value1 for parameter key1</td>
<td>--context_param key1=value1</td>
</tr>
<tr>
<td>To change value1 and value2 for respective parameters key1 and key2</td>
<td>--context_param key1=value1 --context_param key2=value2</td>
</tr>
<tr>
<td>To change a value containing space characters such as in a file path</td>
<td>--context_param key1=&quot;path to file&quot;</td>
</tr>
</tbody>
</table>

### Managing repository items

Talend Studio enables you to edit the items centralized in the repository and to update the Jobs that use these items accordingly.

#### Handling updates in repository items

You can update the metadata, context parameters that are centralized in the Repository tree view any time in order to update the database connection or the context group details, for example.

When you modify any of the parameters of an entry in the Repository tree view, all Jobs using this repository entry will be impacted by the modification. This is why the system will prompt you to propagate these modifications to all the Jobs that use the repository entry.

The following sections explain how to modify the parameters of a repository entry and how to propagate the modifications to all or some of the Jobs that use the entry in question.

#### Modifying a repository item

**About this task**

To update the parameters of a repository item, complete the following:

**Procedure**

1. Expand the Metadata, or Contexts node in the Repository tree view and browse to the relevant entry that you need to update.
2. Right-click this entry and select the corresponding edit option in the contextual menu.
   - A respective wizard displays where you can edit each of the definition steps for the entry parameters.
   - When updating the entry parameters, you need to propagate the changes throughout numerous Jobs or all your Jobs that use this entry.
   - A prompt message pops up automatically at the end of your update/modification process when you click the Finish button in the wizard.
3. Click **Yes** to close the message and implement the changes throughout all Jobs impacted by these changes. For more information about the first way of propagating all your changes, see *Updating impacted Jobs automatically* on page 178.

   Click **No** if you want to close the message without propagating the changes. This will allow you to propagate your changes on the impacted Jobs manually on one by one basis. For more information on another way of propagating changes, see *Updating impacted Jobs manually* on page 179.

**Updating impacted Jobs automatically**

**About this task**

After you update the parameters of any item already centralized in the **Repository** tree view and used in different Jobs, a message will prompt you to propagate the modifications you did to all Jobs that use these parameters.

To update impacted Jobs, complete the following:

**Procedure**

1. In the **Modification** dialog box, click **Yes** to let the system scan your **Repository** tree view for the Jobs that get impacted by the changes you just made. This aims to automatically propagate the update throughout all your Jobs (open or not) in one click.

   The **Update Detection** dialog box displays to list all Jobs impacted by the parameters that are modified.
Note:
You can open the [Update Detection] dialog box any time if you right-click the item centralized in the Repository tree view and select Manage Dependencies from the context menu. For more information, see Updating impacted Jobs manually on page 179.

2. If needed, clear the check boxes that correspond to the Jobs you do not wish to update. You can update them any time later through the Detect Dependencies menu. For more information, see Updating impacted Jobs manually on page 179.

3. Click OK to close the dialog box and update all selected Jobs.

Updating impacted Jobs manually

About this task
Before propagating changes in the parameters of an item centralized in the tree view throughout the Jobs using this entry, you might want to view all Jobs that are impacted by the changes. To do that, complete the following:

Procedure
1. In the Repository tree view, expand the node holding the entry you want to check what Jobs use it.
2. Right-click the entry and select Detect Dependencies.
   A progress bar indicates the process of checking for all Jobs that use the modified metadata or context parameter. Then, a dialog box displays to list all Jobs that use the modified item.
3. Select the check boxes corresponding to the Jobs you want to update with the modified metadata or context parameter and clear those corresponding to the Jobs you do not want to update.

4. Click OK to validate and close the dialog box.

**Results**

**Note:** The Jobs that you choose not to update will be switched back to Built-in, as the link to the Repository cannot be maintained. It will thus keep their setting as it was before the change.

**Searching a Job in the repository**

**About this task**

If you want to open a specific Job in the Repository tree view of the current Integration perspective of Talend Studio and you can not find it for one reason or another, you can simply click on the quick access toolbar.

To find a Job in the Repository tree view, complete the following:

**Procedure**

1. On Talend Studio toolbar, click to open the [Find a Job] dialog box that lists automatically all the Jobs you created in the current Studio.
2. Enter the Job name or part of the Job name in the upper field. When you start typing your text in the field, the Job list is updated automatically to display only the Job(s) which name(s) match(es) the letters you typed in.
3. Select the desired Job from the list and click **Link Repository** to automatically browse to the selected Job in the **Repository** tree view.

4. If needed, click **Cancel** to close the dialog box and then right-click the selected Job in the **Repository** tree view to perform any of the available operations in the contextual menu. Otherwise, click **OK** to close the dialog box and open the selected Job on the design workspace.

**Managing Job and Route versions**

When you create a Job or a Route in Talend Studio, by default its version is 0.1, where 0 stands for the major version and 1 for the minor version.

You can create as many versions of the same Job or Route as you want. To do that:

1. Close your Job or Route if it is open on the design workspace. Otherwise, its properties will be read-only and thus you cannot modify them.

2. In the **Repository** tree view, right-click your Job or Route and select **Edit properties** from the drop-down list to open the [Edit properties] dialog box.

3. Next to the **Version** field, click the M button to increment the major version and the m button to increment the minor version.

4. Click **Finish** to validate the modification.

**Note:**

By default, when you open a Job or a Route, you open its last version.
Any previous version of the Job or the Route is read-only and thus cannot be modified.

To change the version of your Job or your Route, you can also:

1. Close your Job or your Route if it is open on the design workspace. Otherwise, its properties will be read-only and thus you cannot modify them.

2. In the Repository tree view, right-click your Job or your Route and select **Open another version** from the drop-down list.

3. In the dialog box, select the **Create new version and open it** check box and click the **M** button to increment the major version and the **m** button to increment the minor version.

4. Click **Finish** to validate the modification and open this new version of your Job or your Route.

You can also save your currently active Job or a Route and increment its version at the same time, by clicking **File > Save As...** and setting a new version in the [Save As] dialog box.

**Note:** If you give your Job or Route a new name, this option does not overwrite your current Job or Route, but it saves your Job or Route as a new one with the same version of the current Job or Route or with a new version if you specify one.

You can access a list of the different versions of a Job and Routes and perform certain operations. To do that:

1. In the Repository tree view, select the Job or the Route you want to consult the versions of.

2. On the configuration tabs panel, click the **Job** tab and then click **Version** to display the version list of the selected Job or Route.

3. Right-click the Job or the Route version you want to consult.

4. Do one of the followings:

<table>
<thead>
<tr>
<th>Select</th>
<th>To...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Edit Job /Route</strong></td>
<td>open the last version of the Job or Route.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This option is available only when you select the last version of the Job or Route.</td>
</tr>
<tr>
<td><strong>Read job /Route</strong></td>
<td>consult the Job in read-only mode.</td>
</tr>
<tr>
<td><strong>Open Job Hierarchy</strong></td>
<td>consult the hierarchy of the Job.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This option is only available for an integration Job and not for a Route.</td>
</tr>
<tr>
<td><strong>Edit properties</strong></td>
<td>edit Job or Route properties.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> The Job or Route should not be open on the design workspace, otherwise it will be in read-only mode.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This option is available only when you select the last version of the Job or Route.</td>
</tr>
<tr>
<td><strong>Run job/Route</strong></td>
<td>execute the Job or Route.</td>
</tr>
<tr>
<td><strong>Generate Doc As HTML</strong></td>
<td>generate details documentation about the Job or Route.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This option is only available for an integration Job and not for a Route.</td>
</tr>
</tbody>
</table>
You can also manage the version of several Jobs, Routes and/or metadata at the same time, as well as Jobs and their dependencies and/or child Jobs from the Project Settings. For more information, see Version management on page 450.

**Documenting a Job or a Route**

Talend Studio enables you to generate documentation that gives general information about your projects, Routes, Jobs or joblets. You can automate the generation of such documentation and edit any of the generated documents.

**Generating HTML documentation**

Talend Studio allows you to generate detailed documentation in HTML of the Job(s) or Routes you select in the Repository tree view of your Studio in the Integration perspective. This auto-documentation offers the following:

- The properties of the project where the selected Jobs or Routes have been created,
- The properties and settings of the selected Jobs or Routes along with preview pictures of each of the Jobs or Routes,
- The list of all the components used in each of the selected Jobs or Routes and component parameters.

To generate an HTML document for a Job or a Route, complete the following:

**Procedure**

1. In the Repository tree view, right-click a Job or Route entry or select several items to produce multiple documentations.
2. Select Generate Doc as HTML on the contextual menu.
3. Browse to the location where the generated documentation archive should be stored.
4. In the same field, type in a name for the archive gathering all generated documents.
5. Select the Use CSS file as a template to export check box to activate the CSS File field if you need to use a CSS file.
6. In the CSS File field, browse to, or enter the path to the CSS file to be used.
7. Click Finish to validate the generation operation.

Results
The archive file is generated in the defined path. It contains all required files along with the Html output file. You can open the HTML file in your favorite browser.

Updating the documentation on the spot
You can choose to manually update your documentation on the spot.

To update a single document, right-click the relevant Route, documentation entry and select Update documentation.

Comparing Jobs
Talend Studio provides a Compare Job option that enables you to compare Jobs on the same or different branches in order to list the differences in the items used in the two Jobs. Using this option, you can:
• compare different versions of the same Job,
• compare the same Job in different releases of the Studio, in order to see if any modifications were done on the Job in the previous/current release, for example,
• compare Jobs that have been designed using the same template, but different parameters, to check the differences among these Jobs.

Differences between the compared Jobs are displayed in the **Compare Result** view. The result detail are grouped under the three categories: **Jobsettings**, **Components** and **Connectors**.

The table below gives the description of the comparison results under each of the above categories.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobsettings</td>
<td>lists all differences related to the settings of the compared Job.</td>
</tr>
<tr>
<td>Components</td>
<td>lists the differences in the components and component parameter used in the two Jobs. A minus sign appended on top of a component listed in the <strong>Compare Result</strong> view indicates that this component is missing in the design of one of the two compared Jobs. A plus sign appended on top of a component listed in the view indicates that this component is added in one of the two compared Jobs. All differences in the component parameters will be listed in tables that display under the corresponding component.</td>
</tr>
<tr>
<td>Connectors</td>
<td>lists differences in all the links used to connect components in the two Jobs.</td>
</tr>
</tbody>
</table>

The procedure to compare two Jobs or two different versions of the same Job are the same.

To compare two different versions of the same Job, complete the following:

**Procedure**

1. In the **Repository** tree view, right-click the Job version you want to compare with another version of the same Job and then select **Compare Job** from the contextual menu.
The Compare Result view displays in the Studio workspace. The selected Job name and version show, by default, in the corresponding fields.

2. If the other version of the Job with which you want to compare the current version is on another branch, select the branch from the Another Branch list.

3. Click the three-dot button next to the Another job field to open the Select a Job/Joblet dialog box.

4. In the Name Filter field, type in the name of the Job or Joblet you want to use for this comparison. The dialog box returns you this Job or Joblet you are searching for.

5. Select the returned Job or Joblet from the list in the dialog box and click OK.

6. From the Current version and Another version lists select the Job versions you want to compare.
7. Click the button to launch the compare operation. The two indicated versions of the Job display in the design workspace.

The differences between the two versions are listed in the **Compare Result** view.

**Results**

In this example, differences between the two Job versions are related to components and links (connectors). The figure below shows the differences in the components used in the two versions.
For example, there is one difference in the output schemas used in the `tMap` and `tFileOutputXML` components: the length of the `Revenue` column is 15 in the second version of the Job while the length is 11 in the first version of the same Job. The minus sign appended on top of `tMysqlOutput` indicates that this component is missing in the design of one of the two compared Jobs. The plus sign appended on top of `tOracleOutput` indicates that this component is added in one of the two compared Jobs.

**Note:**

If you click any of the components listed in the Compare Result view, the component will be automatically selected, and thus identified, in the open Job in the design workspace.

The figure below shows the differences in the links used to link the components in the two versions of the same Job.
In this example, there is one difference related to the `reject` link used in the two versions: the target of this link in the first version is a `tMysqlOutput` component, while it is a `tOracleOutput` component in the second version.

**Note:**

You can export the Job compare results to an html file by clicking **Export to html**. Then browse to the directory you want to save the file in and enter a file name. You have the option of using a default CSS template or a customized one. The destination folder will contain the html file, a css file, an xml file and a pictures folder. For related topic, see **Exporting the results of impact analysis/data lineage to HTML.**

**Running Jobs**

You can execute a Job in several ways. This mainly depends on the purpose of your Job execution and on your user level.

This section describes:

- Running a Job or Route in normal mode on page 190
- Running a Job or Route in Java Debug mode on page 191
- Running a Job in Traces Debug mode on page 192
- Setting advanced execution settings on page 194
- Showing JVM resource usage during Job or Route execution on page 196
- Deploying a Job on SpagoBI server on page 197

**Running a Job or Route in normal mode**

**Note:**

Make sure you saved your **Job** or **Route** before running it in order for all properties to be taken into account.

To run your Job or Route in a normal mode, do the following:

1. Click the **Run** view to access it.
2. Click the **Basic Run** tab to access the normal execution mode.
3. In the **Context** area to the right of the view, select in the list the proper context for the Job or Route to be executed in. You can also check the variable values.

If you have not defined any particular execution context, the context parameter table is empty and the context is the default one. Related topic: Using contexts and variables on page 73.

1. Click **Run** to start the execution.

2. On the same view, the console displays the progress of the execution. The log includes any error message as well as start and end messages.

3. To define the lines of the execution progress to be displayed in the console, select the **Line limit** check box and type in a value in the field.

4. Select the **Wrap** check box to wrap the text to fit the console width. This check box is selected by default. When it is cleared, a horizontal scrollbar appears, allowing you to view the end of the lines.

Before running again a Job, you might want to remove the execution statistics and traces from the designing workspace. To do so, click the **Clear** button.

If for any reason, you want to stop the Job in progress, simply click the **Kill** button. You will need to click the **Run** button again, to start again the Job.

Talend Studio offers various informative features displayed during execution, such as statistics and traces, facilitating the Job monitoring and debugging work. For more information, see the following sections.

**Running a Job or Route in Java Debug mode**

**About this task**

To follow step by step the execution of a Job or Route to identify possible bugs, you can run it in Debug mode.

To access the Debug mode:

**Procedure**

1. Click the **Run** view to access it.
2. Click the **Debug Run** tab to access the debug execution modes.

**Results**

Before running your Job in Debug mode, add breakpoints to the major steps of your Job flow.

This will allow you to get the Job to automatically stop at each breakpoint. This way, components and their respective variables can be verified individually and debugged if required.

To add breakpoints to a component, right-click it on the design workspace, and select **Add breakpoint** on the contextual menu.

A pause icon displays next to the component where the break is added.

To switch to debug mode, click the **Java Debug** button on the **Debug Run** tab of the **Run** panel. Talend Studio’s main window gets reorganized for debugging.

You can then run the Job step by step and check each breakpoint component for the expected behavior and variable values.

**Running a Job in Traces Debug mode**

The traces feature allows you to monitor data processing when running a Job in the **Integration** perspective of Talend Studio.

It provides a row by row view of the component behavior and displays the dynamic result next to the **Row** link on the design workspace.

This feature allows you to monitor all the components of a Job, without switching to the debug mode, hence without requiring advanced Java knowledge.

The **Traces** function displays the content of processed rows in a table.

**Note:**

Exception is made for external components which cannot offer this feature if their design does not include it.

You can activate or deactivate **Traces** or decide what processed columns to display in the traces table that displays on the design workspace when launching the current Job.

To activate the **Traces** mode in a Job:
1. Click the **Run** view.

2. Click the **Debug Run** tab to access the debug and traces execution modes.

3. Click the down arrow of the **Java Debug** button and select the **Traces Debug** option. An icon displays under every flow of your Job to indicate that process monitoring is activated.

4. Click the **Traces Debug** to execute the Job in Traces mode.

To deactivate the **Traces** on one of the flows in your Job:

1. Right-click the **Traces** icon under the relevant flow.

2. Select **Disable Traces** from the list. A red minus sign replaces the green plus sign on the icon to indicate that the **Traces** mode has been deactivated for this flow.

To choose which columns of the processed data to display in the traces table, do the following:

1. Right-click the **Traces** icon for the relevant flow, then select **Setup Traces** from the list. The **[Setup Traces]** dialog box appears.

2. In the dialog box, clear the check boxes corresponding to the columns you do not want to display in the Traces table.

3. Click **OK** to close the dialog box.
Monitoring data processing starts when you execute the Job and stops at the end of the execution. To remove the displayed monitoring information, click the Clear button in the Debug Run tab.

**Setting advanced execution settings**

In the Advanced settings tab of the Run view, several advanced execution settings are available to make the execution of the Jobs or Route handier:

- **Statistics**, this feature displays processing performance rate. For more information, see Displaying Statistics on page 194.

- **Exec time**, this feature displays the execution time in the console at the end of the execution. For more information, see Displaying the execution time and other options on page 195.

- **Save Job before execution**, this feature allows to automatically save the Job or Route before its execution.

- **Clear before run**, this feature clears all the results of a previous execution before re-executing the Job or Route.

- **JVM Setting**, this feature allows you to define the parameters of your JVM according to your needs. For an example of how this can be used, see Displaying special characters in the console on page 195.

**Displaying Statistics**

The Statistics feature displays each component performance rate, under the flow links on the design workspace.

It shows the number of rows processed and the processing time in row per second, allowing you to spot straight away any bottleneck in the data processing flow.

For trigger links like OnComponentOK, OnComponentError, OnSubjobOK, OnSubjobError and If, the Statistics option displays the state of this trigger during the execution time of your Job: Ok or Error and True or False.

**Note:**

Exception is made for external components which cannot offer this feature if their design does not include it.
In the Run view, click the Advanced settings tab and select the Statistics check box to activate the Stats feature and clear the box to disable it.

The calculation only starts when the Job or Route execution is launched, and stops at the end of it.

Click the Clear button from the Basic or Debug Run views to remove the calculated stats displayed. Select the Clear before Run check box to reset the Stats feature before each execution.

**Note:**

The statistics thread slows down Job or Route execution as the Job or Route must send these stats data to the design workspace in order to be displayed.

You can also save your Job or Route before the execution starts. Select the relevant option check box.

**Displaying the execution time and other options**

To display the total execution time, select in the Advanced settings tab of the Run view the Exec time check box before running the Job or Route.

This way you can test your Job or Route before going to production.

You can also clear the design workspace before each Job or Route execution by selecting the check box Clear before Run.

You can also save your Job or Route before the execution starts. Select the relevant option check box.

**Displaying special characters in the console**

**About this task**

Talend Studio can display special characters in the console. To enable the display of Chinese, Japanese or Korean characters, for example, proceed as follows before executing the Job or Route:

**Procedure**

1. Select the Advanced settings tab.
2. In the JVM settings area of the tab view, select the **Use specific JVM arguments** check box to activate the **Argument** table.

3. Next to the **Argument** table, click the **New...** button to pop up the [Set the VM argument] dialog box.

4. In the dialog box, type in `-Dfile.encoding=UTF-8`.

5. Click **OK** to close the dialog box.

   This argument can be applied for all of your Job or Route executions in Talend Studio. For further information about how to apply this JVM argument for all of the Job executions, see Debug and Job execution preferences (Talend > Run/Debug) on page 483.

### Customizing log4j output level at runtime

**About this task**

When activated in components, the Apache logging utility log4j outputs component-related logging information at runtime. By default, all logging messages of or higher than the level defined in the log4j configuration will be output to the defined target.

You can change the logging output level for an execution of your Job or Route. To do so, take the following steps:

**Procedure**

1. In the **Run** view, click the **Advanced settings** tab.

2. Select the **log4jLevel** check box, and select the desired output level from the drop-down list.

   This check box is displayed only when log4j is activated in components.

   For more information on the logging output levels, see Apache documentation at http://logging.apache.org/log4j/1.2/apidocs/org/apache/log4j/Level.html.

3. Run your Job or Route. All the logging messages of and higher than the level you set are output to the defined target.

**Results**

For information on how to activate log4j in components and how to configure the logging behaviors globally, see Configuring Log4j on page 456.

For more information regarding the components with which you can use the log4j feature, see Talend Help Center (https://help.talend.com).

### Showing JVM resource usage during Job or Route execution

**About this task**

The Memory Run vertical tab of the **Run** view of your Talend Studio allows you to monitor real-time JVM resource usage during Job or Route execution, including memory consumption and host CPU usage, so that you can take appropriate actions when the resource usage is too high and results in low performance of your Talend Studio, such as increasing the memory allocated to the JVM, stopping unnecessary Jobs or Routes, and so on.

To monitor JVM resource usage at Job or Route execution, do the following:

**Procedure**

1. Open your Job or Route.
In the Run view, click the Memory Run tab.

2. Click Run to run the Job or Route.

You can click Run on the Memory Run tab to monitor the JVM resource usage by your Job or Route at any time even after you launch your Job or Route from the Basic Run tab.

The Studio console displays curve graphs showing the JVM heap usage and CPU usage respectively during the Job or Route execution. Warning messages are shown in red on the Job execution information area when the relevant thresholds are reached.

3. To view the information about resources used at a certain point of time during the Job or Route execution, move the mouse onto that point of time on the relevant graph. Depending on the graph on which you move your mouse pointer, you can see the information about allocated heap size, the 90% heap threshold, and the 70% heap threshold, or the CPU usage, at the point of time.

4. To run the Garbage Collector at a particular interval, select the With Garbage Collector pace set to check box and select an interval in seconds. The Garbage Collector automatically runs at the specified interval.

To run the Garbage Collector once immediately, click the Trigger GC button.

5. To export the log information into a text file, click the Export button and select a file to save the log.

6. To stop the Job, click the Kill button.

Deploying a Job on SpagoBI server

From Talend Studio interface, you can deploy your Jobs easily on a SpagoBI server in order to execute them from your SpagoBI administrator.

Creating a SpagoBI server entry

About this task

Beforehand, you need to set up your single or multiple SpagoBI server details in Talend Studio.

Procedure

1. On the menu bar, click Window > Preferences to open the [Preferences] dialog box.

2. Expand the Talend > Import/Export nodes in succession and select SpagoBI Server to display the relevant view.
3. Select the **Enable/Disable Deploy on SpagoBI** check box to activate the deployment operation.

4. Click **New** to open the [Create new SpagoBi server] dialog box and add a new server to the list.

5. Enter your SpagoBi server details, as described below:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine name</td>
<td>Internal engine name used in Talend Studio. This name is not used in the</td>
</tr>
<tr>
<td></td>
<td>generated code.</td>
</tr>
<tr>
<td>Short description</td>
<td>Free text to describe the server entry you are recording.</td>
</tr>
<tr>
<td>Host</td>
<td>IP address or host name of the machine running the SpagoBI server.</td>
</tr>
<tr>
<td>Port</td>
<td></td>
</tr>
<tr>
<td>Login</td>
<td>User name required to log on to the SpagoBI server.</td>
</tr>
<tr>
<td>Password</td>
<td>Password for SpagoBI server logon authentication.</td>
</tr>
</tbody>
</table>

6. Click **OK** to validate the details of the new server entry and close the dialog box.
The newly created entry is added to the table of available servers. You can add as many SpagoBI entries as you need.

7. Click **Apply** and then **OK** to close the [Preferences] dialog box.

**Editing or remove a SpagoBI server entry**

Select the relevant entry in the table, click the **Remove** button next to the table to first delete the outdated entry.

Then if required, simply create a new entry including the updated details.

**Deploying your Jobs on a SpagoBI server**

**About this task**

Follow the steps below to deploy your Job(s) onto a SpagoBI server.
Procedure

1. In the Repository tree view, expand Job Designs and right-click the Job to deploy.
2. In the drop-down list, select Deploy on SpagoBI.
3. As for any Job export, select a Name for the Job archive that will be created and fill it in the To archive file field.
4. Select the relevant SpagoBI server on the drop-down list.
5. The Label, Name and Description fields come from the Job main properties.
6. Select the relevant context in the list.
7. Click OK once you have completed the setting operation.

Results

The Jobs are now deployed onto the relevant SpagoBI server. Open your SpagoBI administrator to execute your Jobs.

Running a Route or Data Service Job in local Talend Runtime Test Container

Talend Studio enables you to set up a local Talend Runtime in the Studio to test Routes and Data Service Jobs easily within the OSGI Runtime environment.

To set up the test Runtime:

1. Open the [Preferences] dialog box.
2. In the tree view, click Talend > Run/Debug > ESB Runtime to display the corresponding view.
3. The ESB Studio Runtime check box is selected by default to use the local Talend Runtime. If this check box is disabled, the Route or Data Service Job will be run in the Studio instead of the local Runtime.

Note that this option only works for Routes and Data Service Jobs.

4. In the Connection Information area, click the Add Server... button to show the [Add ESB Runtime Server] wizard.

5. Choose one of the following to select a Runtime to be used:

- If you have prepared a Runtime container that you would like to use, select **Use an existing local Talend Runtime Container (ESB OSGi Container)**. Browse to or enter the path of Talend Runtime home and click Finish. This path is filled in the Location field of the ESB Runtime view. You can also enter the path of the Runtime container in the Location field.

- If you want to use a new Talend Runtime archive, select **Install the Runtime container from Talend Runtime (ZIP) or Talend ESB (ZIP)**. Browse to or enter the path of the Talend Runtime or Talend ESB zip file. You can choose to install the local Runtime into the default target folder, which is `<Studio_Home>/esb/container`, or a custom target folder of your choice. Click Finish to close the wizard. The Runtime server is extracted to the selected target folder. This target path is filled in the Location field of the ESB Runtime view.

An initialization script file `initlocal.sh` is created in the `<LocalRuntimeContainerPath>/scripts` folder to start all the ESB bundles, use JAAS authentication handlers for the security service, and start an ActiveMQ broker in the Runtime container. You can change the script if needed.

tesb:start-all
tesb:switch-sts-jaas
6. In the **ESB Runtime** view, click the **Initialize...** button to start the Runtime server and install the OSGi bundles.

Note that you can also start the Runtime server using the `trun` file from the `<LocalRuntimeContainerPath>`:

- `bin\trun.bat` (Windows)
- `bin\trun` (UNIX)

7. In the **ESB Runtime** view, if you select the **Filter system logs** check box, the Apache Karaf log information will not be shown when running Routes, or Data Service Jobs in the local Runtime server.

8. Click **OK** to close the **Preferences** dialog box.

Note that if you enabled or disabled the **ESB Studio Runtime** option in this view, the container setting needs to close all editors of ESB artifacts before saving your changes.

Once the Runtime server is added, you can run your Route or Data Service Job in the local Runtime for testing purposes:

1. Go to the **Run** view of Talend Studio design workspace.

2. Click the **Run** button in the **Basic Run** tab as usual, to deploy and execute the current Route or Data Service Job.

You can stop the Runtime server from the Runtime Console:

1. Click **Window > Show view** to show the **Console** view of the design workspace.

2. Click the **button in the **Console** view and select **ESB Runtime** from the list to show the ESB Runtime Console. You can run the Runtime commands in the console.

3. Click ** in the Console view to stop the Runtime server. To start the Runtime server again, click **.
Note that if the local Talend Runtime in the Studio is enabled, when running a Route or Data Service Job, the Runtime server will be started automatically if it is down.

Using parallelization to optimize Job performance

Parallelization in terms of Talend Jobs means to accomplish technical processes through parallel executions. When properly designed, a parallelization-enabled technical process can be completed within a shorter time frame.

Talend Studio allows you to implement different types of parallelization depending on ranging circumstances. These circumstances could be:

1. Parallel executions of multiple Subjobs. For further information, see Executing multiple Subjobs in parallel on page 203.

2. Parallel iterations for reading data. For further information, see Launching parallel iterations to read data on page 204.

Parallelization is an advanced feature and requires basic knowledge about a Talend Job such as how to design and execute a Job or a Subjob, how to use components and how to use the different types of connections that link components or Jobs. If you feel that you need to acquire this kind of knowledge, see What is a Job design? on page 25.

Executing multiple Subjobs in parallel

The Multi thread execution feature allows you to run multiple Subjobs that are active in the workspace in parallel.

As explained in the previous sections, a Job opened in the workspace can contain several Subjobs and you are able to arrange their execution order using the trigger links such as OnSubjobOK. However, when the Subjobs do not have any dependencies between them, you might want to launch them at the same time. For example, the following image presents four Subjobs within a Job and with no dependencies in between.

The tRunJob component is used in this example to call each Subjob they represent. For further information about tRunJob, see Talend Help Center (https://help.talend.com).

Then with the Job opened in the workspace, you need simply proceed as follows to run the Subjobs in parallel:
Procedure

1. Click the Job tab, then the Extra tab to display it.

2. Select the Multi thread execution check box to enable the parallel execution. This feature is optimal when the number of threads (in general a Subjob count one thread) do not exceed the number of processors of the machine you use for parallel executions. Otherwise, some of the Subjobs have to wait until any processor is freed up.

Launching parallel iterations to read data

About this task

You need to proceed as follows to set the parallel iterations:

Procedure

1. Simply select the Iterate link of your subjob to display the related Basic settings view of the Components tab.

2. Select the Enable parallel execution check box and set the number of executions to be carried out in parallel.

When executing your Job, the number of parallel iterations will be distributed onto the available processors.

3. Select the Statistics check box of the Run view to show the real time parallel executions on the design workspace.

Results

This feature is especially useful when you need to use the Iterate connection to pass context variables to a Subjob. In that situation, the variables will be read in parallel in the Subjob and thus the processes handled by the Subjob will be simultaneously run using those variables.
Mapping data flows

Map editor interfaces

The most common way to handle multiple input and output flows including transformations and data re-routing is to use dedicated mapping components.

Mapping components are advanced components which require more detailed explanation than other Talend Components. The Map Editor is an "all-in-one" tool allowing you to define all parameters needed to map, transform and route your data flows via a convenient graphical interface.

You can minimize and restore the Map Editor and all tables in the Map Editor using the window icons.

This figure presents the interface of tMap. Those of the other mapping components differ slightly in appearance. For example, in addition to the Schema editor and the Expression editor tabs on the lower part of this interface, tXMLMap has a third tab called Tree schema editor. For further information about tXMLMap, see tXMLMap operation on page 241.

The Map Editor is made of several panels:

- The Input panel is the top left panel on the editor. It offers a graphical representation of all (main and lookup) incoming data flows. The data are gathered in various columns of input tables. Note that the table name reflects the main or lookup row from the Job design on the design workspace.

- The Variable panel is the central panel in the Map Editor. It allows the centralization of redundant information through the mapping to variable and allows you to carry out transformations.
• The **Search panel** is above the **Variable panel**. It allows you to search in the editor for columns or expressions that contain the text you enter in the **Find** field.

• The **Output panel** is the top right panel on the editor. It allows mapping data and fields from Input tables and Variables to the appropriate Output rows.

• Both bottom panels are the Input and Output schemas description. The **Schema editor** tab offers a schema view of all columns of input and output tables in selection in their respective panel.

• **Expression editor** is the edition tool for all expression keys of Input/Output data, variable expressions or filtering conditions.

The name of input/output tables in the **Map Editor** reflects the name of the incoming and outgoing flows (row connections).

The following sections present separately different mapping components of which each is able to map flows of a specific nature.

**tMap operation**

**tMap** allows the following types of operations:

• data multiplexing and demultiplexing,
• data transformation on any type of fields,
• fields concatenation and interchange,
• field filtering using constraints,
• data rejecting.

As all these operations of transformation and/or routing are carried out by **tMap**, this component cannot be a start or end component in the Job design.

**tMap** uses incoming connections to pre-fill input schemas with data in the **Map Editor**. Therefore, you cannot create new input schemas directly in the **Map Editor**. Instead, you need to implement as many **Row** connections incoming to **tMap** component as required, in order to create as many input schemas as needed.
The same way, create as many output row connections as required. However, you can fill in the output with content directly in the **Map Editor** through a convenient graphical editor.

Note that there can be only one **Main** incoming rows. All other incoming rows are of **Lookup** type. Related topic: **Row connection** on page 64.

Lookup rows are incoming connections from secondary (or reference) flows of data. These reference data might depend directly or indirectly on the primary flow. This dependency relationship is translated with a graphical mapping and the creation of an expression key.

The **Map Editor** requires the connections to be implemented in your Job in order to be able to define the input and output flows in the **Map Editor**. You also need to create the actual mapping in your Job in order to display the **Map Editor** in the **Preview** area of the **Basic settings** view of the **tMap** component.

To open the **Map Editor** in a new window, double-click the **tMap** icon in the design workspace or click the three-dot button next to the **Map Editor** in the **Basic settings** view of the **tMap** component.

The following sections give the information necessary to use the **tMap** component in any of your Job designs.

**Setting the input flow in the Map Editor**

The order of the **Input** tables is essential. The top table reflects the **Main** flow connection, and for this reason, is given priority for reading and processing through the **tMap** component.

For this priority reason, you are not allowed to move up or down the **Main** flow table. This ensures that no Join can be lost.
Although you can use the up and down arrows to interchange **Lookup** tables order, be aware that the **Joins** between two lookup tables may then be lost.

Filling in Input tables with a schema

To fill in the input tables, you need to define either the schemas of the input components connected to the tMap component on your design workspace, or the input schemas within the Map Editor.

For more information about setting a component schema, see Defining component properties on page 49.

For more information about setting an input schema in the Map Editor, see Setting schemas in the Map Editor on page 229.

Main and Lookup table content

The order of the Input tables is essential.

The Main Row connection determines the Main flow table content. This input flow is reflected in the first table of the Map Editor’s Input panel.

The Lookup connections’ content fills in all other (secondary or subordinate) tables which displays below the Main flow table. If you have not define the schema of an input component yet, the input table displays as empty in the Input area.

The key is also retrieved from the schema defined in the Input component. This Key corresponds to the key defined in the input schema where relevant. It has to be distinguished from the hash key that is internally used in the Map Editor, which displays in a different color.

Variables

You can use global or context variables or reuse the variable defined in the Variables area. Press Ctrl+Space bar to access the list of variables. This list gathers together global, context and mapping variables.

The list of variables changes according to the context and grows along new variable creation. Only valid mappable variables in the context show on the list.

Docked at the Variable list, a metadata tip box display to provide information about the selected column.
Using Explicit Join

In fact, Joints let you select data from a table depending upon the data from another table. In the Map Editor context, the data of a Main table and of a Lookup table can be bound together on expression keys. In this case, the order of table does fully make sense.

Simply drop column names from one table to a subordinate one, to create a Join relationship between the two tables. This way, you can retrieve and process data from multiple inputs.

The join displays graphically as a purple link and creates automatically a key that will be used as a hash key to speed up the match search.

You can create direct joins between the main table and lookup tables. But you can also create indirect joins from the main table to a lookup table, via another lookup table. This requires a direct join between one of the Lookup table to the Main one.

Note: You cannot create a Join from a subordinate table towards a superior table in the Input area.

The Expression key field which is filled in with the dragged and dropped data is editable in the input schema, whereas the column name can only be changed from the Schema editor panel.

You can either insert the dragged data into a new entry or replace the existing entries or else concatenate all selected data into one cell.
For further information about possible types of drag and drops, see Mapping the Output setting on page 223.

**Note:** If you have a big number of input tables, you can use the minimize/maximize icon to reduce or restore the table size in the **Input** area. The Join binding two tables remains visible even though the table is minimized.

Creating a Join automatically assigns a hash key onto the joined field name. The key symbol displays in violet on the input table itself and is removed when the Join between the two tables is removed.

Related topics:
- Setting schemas in the Map Editor on page 229
- Using Inner Join on page 212
Along with the explicit Join you can select whether you want to filter down to a unique match or if you allow several matches to be taken into account. In this last case, you can choose to consider only the first or the last match or all of them.

To define the match model for an explicit Join:

1. Click the **tMap settings** button at the top of the table to which the Join links to display the table properties.
2. Click in the **Value** field corresponding to **Match Model** and then click the three-dot button that appears to open the [Options] dialog box.
3. In the [Options] dialog box, double-click the wanted match model, or select it and click **OK** to validate the setting and close the dialog box.

### Unique Match
This is the default selection when you implement an explicit Join. This means that only the last match from the Lookup flow will be taken into account and passed on to the output. The other matches will be then ignored.

### First Match
This selection implies that several matches can be expected in the lookup. The First Match selection means that in the lookup only the first encountered match will be taken into account and passed onto the main output flow. The other matches will then be ignored.

### All Matches
This selection implies that several matches can be expected in the lookup flow. In this case, all matches are taken into account and passed on to the main output flow.

### Using Inner Join
The **Inner join** is a particular type of Join that distinguishes itself by the way the rejection is performed.

This option avoids that null values are passed on to the main output flow. It allows also to pass on the rejected data to a specific table called **Inner Join Reject** table.
If the data searched cannot be retrieved through the explicit Join or the filter Join, in other words, the Inner Join cannot be established for any reason, then the requested data will be rejected to the Output table defined as **Inner Join Reject** table if any.

Simply drop column names from one table to a subordinate one, to create a **Join** relationship between the two tables. The Join is displayed graphically as a purple link and creates automatically a key that will be used as a hash key to speed up the match search.

To define the type of an explicit Join:

1. Click the **tMap settings** button at the top of the table to which the Join links to display the table properties.
2. Click in the **Value** field corresponding to **Join Model** and then click the three-dot button that appears to open the [Options] dialog box.
3. In the [Options] dialog box, double-click the wanted Join type, or select it and click **OK** to validate the setting and close the dialog box.

![Options dialog box](image)

**Note:** An **Inner Join** table should always be coupled to an **Inner Join Reject** table. For how to define an output table as an **Inner Join Reject** table, see **Lookup Inner Join rejection** on page 226.

You can also use the filter button to decrease the number of rows to be searched and improve the performance (in Java).

Related topics:

- **Lookup Inner Join rejection** on page 226
- **Filtering an input flow** on page 214

**Using the All Rows option**

By default, without a Join set up, in each input table of the input area of the **Map Editor**, the **All rows** match model option is selected. This **All rows** option means that all the rows are loaded from the **Lookup** flow and searched against the **Main** flow.

The output corresponds to the Cartesian product of both table (or more tables if need be).
Note: If you create an explicit or an inner Join between two tables, the All rows option is no longer available. You then have to select Unique match, First match or All matches. For more information, see Using Explicit Join on page 210 and Using Inner Join on page 212.

Filtering an input flow

Click the Filter button next to the tMap settings button to add a Filter field.

In the Filter field, type in the condition to be applied. This allows to reduce the number of rows parsed against the main flow, enhancing the performance on long and heterogeneous flows.

You can use the Auto-completion tool via the Ctrl+Space bar keystrokes in order to reuse schema columns in the condition statement.

Removing input entries from table

To remove input entries, click the red cross sign on the Schema Editor of the selected table. Press Ctrl or Shift and click fields for multiple selection to be removed.

Note: If you remove Input entries from the Map Editor schema, this removal also occurs in your component schema definition.

Mapping variables

The Var table (variable table) regroups all mapping variables which are used numerous times in various places.

You can also use the Expression field of the Var table to carry out any transformation you want to, using Java Code.

Variables help you save processing time and avoid you to retype many times the same data.

There are various possibilities to create variables:

- Type in freely your variables in Java. Enter the strings between quotes or concatenate functions using the relevant operator.
- Add new lines using the plus sign and remove lines using the red cross sign. And press Ctrl+Space to retrieve existing global and context variables.
• Drop one or more **Input** entries to the **Var** table.

Select an entry on the Input area or press Shift key to select multiple entries of one Input table.

Press **Ctrl** to select either non-appended entries in the same input table or entries from various tables. When selecting entries in the second table, notice that the first selection displays in grey. Hold the **Ctrl** key down to drag all entries together. A tooltip shows you how many entries are in selection.

Then various types of drag-and-drops are possible depending on the action you want to carry out.

<table>
<thead>
<tr>
<th><strong>To...</strong></th>
<th><strong>You need to...</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert all selected entries as separated variables.</td>
<td>Simply drag &amp; drop to the Var table. Arrows show you where the new Var entry can be inserted. Each Input is inserted in a separate cell.</td>
</tr>
<tr>
<td>Concatenate all selected input entries together with an existing Var entry.</td>
<td>Drag &amp; drop onto the Var entry which gets highlighted. All entries get concatenated into one cell. Add the required operators using Java operations signs. The dot concatenates string variables.</td>
</tr>
<tr>
<td>Overwrite a Var entry with selected concatenated Input entries.</td>
<td>Drag &amp; drop onto the relevant Var entry which gets highlighted then press <strong>Ctrl</strong> and release. All selected entries are concatenated and overwrite the highlighted Var.</td>
</tr>
<tr>
<td>Concatenate selected input entries with highlighted Var entries and create new Var lines if needed</td>
<td>Drag &amp; drop onto an existing Var then press <strong>Shift</strong> when browsing over the chosen Var entries. First entries get concatenated with the highlighted Var entries. And if necessary new lines get created to hold remaining entries.</td>
</tr>
</tbody>
</table>

**Accessing global or context variables**

Press **Ctrl+Space** to access the global and context variable list.

Appended to the variable list, a metadata list provides information about the selected column.

**Removing variables**

To remove a selected Var entry, click the red cross sign. This removes the whole line as well as the link.

Press **Ctrl** or **Shift** and click fields for multiple selection then click the red cross sign.

**Working with expressions**

All expressions (**Input**, **Var** or **Output**) and constraint statements can be viewed and edited directly in the expression fields, in the expression editor, and in the Expression Builder.
Accessing the expression editor

About this task

The expression editor provides visual comfort to write any function or transformation in a handy dedicated view.

You can write the expressions necessary for the data transformation directly in the **Expression editor** view located in the lower half of the expression editor.

To open the **Expression editor** view, complete the following:

**Procedure**

1. Double-click the **tMap** component in your Job design to open the **Map Editor**.
2. In the lower half of the editor, click the **Expression editor** tab to open the corresponding view.
   
   **Note:** To edit an expression, select it in the **Input** panel and then click the **Expression editor** tab and modify the expression as required.

3. Enter the Java code according to your needs. The corresponding expression in the output panel is synchronized.

**Results**

**Note:** Refer to the Java documentation for more information regarding functions and operations.

Writing code using the Expression Builder

Some Jobs require pieces of code to be written in order to provide components with parameters. In the **Component** view of some components, an **Expression Builder** interface can help you write such pieces of code (in Java), known as expressions.

Using the Expression Builder of **tMap**, you can edit the expression for an input column, an output column, or a variable, or change the expressions for multiple output columns at the same time.

Editing individual expressions

**About this task**

The following example shows how to use the **Expression Builder** to edit two individual expressions.
In this example, two input flows are connected to the **tMap** component.

- From the DB input, comes a list of names made of a first name and a last name separated by a space char.
- From the File input, comes a list of US states, in lower case.

In the **tMap**, use the expression builder to: First, replace the blank char separating the first and last names with an underscore char, and second, change the states from lower case to upper case.

**Procedure**

1. In the **tMap**, set the relevant inner join to set the reference mapping. For more information regarding **tMap**, see *tMap operation* on page 206 and *Map editor interfaces* on page 205.
2. From the main (row1) input, drop the **Names** column to the output area, and the **State** column from the lookup (row2) input towards the same output area.
3. Click in the first **Expression** field (row1.Name), and then click the [...] button that appears next to the expression.

The [Expression Builder] dialog box opens up.
4. In the **Category** area, select the relevant action you want to perform. In this example, select **StringHandling** and select the **EREPLACE** function.

5. In the **Expression** area, paste `row1.Name` in place of the text expression, in order to get:
   
   ```
   StringHandling.EREPLACE(row1.Name, ", ", ".")
   ```
   
   This expression will replace the separating space char with an underscore char in the char string given.

   Note that the **CHANGE** and **EREPLACE** functions in the **StringHandling** category are used to substitute all substrings that match the given regular expression in the given old string with the given replacement and returns a new string. Their three parameters are:

   - **oldStr**: the old string
   - **newStr**: the regular expression to match
   - **replacement**: the string to be substituted for every match

6. Now check that the output is correct, by typing in the relevant **Value** field of the **Test** area, a dummy value, e.g., `Chuck Norris` and clicking **Test!**. The correct change should be carried out, for example, `Chuck_Norris`.

7. Click **OK** to validate the changes, and then proceed with the same operation for the second column (State).

8. In the **tMap** output, select the **row2.State Expression** and click the `[...]` button to open the **Expression builder** again.
This time, the StringHandling function to be used is \texttt{UPCASE}. The complete expression says: \texttt{StringHandling.UPCASE(row2.State)}.

9. Once again, check that the expression syntax is correct using a dummy \texttt{Value} in the Test area, for example \texttt{indiana}. The Test! result should display \texttt{INDIANA} for this example. Then, click \texttt{OK} to validate the changes.

Both expressions are now displayed in the \texttt{tMap Expression} field.

\textbf{Results}

These changes will be carried out along the flow processing. The output of this example is as shown below.

\begin{verbatim}
Starting job NamesAndStates at 10:02 10/10/2007.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Column</th>
</tr>
</thead>
<tbody>
<tr>
<td>StringHandling.ERERPLACE(row1.name,&quot;&quot;,&quot;_&quot;)</td>
<td>Name</td>
</tr>
<tr>
<td>StringHandling.UPCASE(row2.State)</td>
<td>States</td>
</tr>
</tbody>
</table>

\begin{tabular}{|l|l|}
\hline
Name          & Column          \\
\hline
William_Crent & IOWA            \\
William_Hoover & NEW YORK       \\
Grover_Lincoln & NORTH DAKOTA   \\
Lyndon_Jefferson & OHIO          \\
Gerald_Hayes  & WASHINGTON     \\
Benjamin_Grant & MAINE          \\
George_Fierce  & CONNECTICUT    \\
Jimmy_Reagan   & ALASKA          \\
Martin_Hayes   & WASHINGTON     \\
Franklin_Jefferson & IOWA        \\
Andrew_Nixon   & NEW HAMPSHIRE  \\
\hline
\end{tabular}
\end{verbatim}
Setting expressions for multiple output columns simultaneously

About this task

tMap allows you to define the transformation behavior for multiple output columns at the same time. Using a simple transformation Job, the following example shows how to define expressions on multiple columns in a batch manner in tMap.

Here is the content of the input CSV file used in this example:

```
id;firstname;lastname;city;state
1; Andrew; Adams; Madison; Rhode Island
2; Andrew; Garfield; Saint Paul; Colorado
3; Woodrow; Eisenhower; Juneau; New Hampshire
4; Woodrow; Jackson; Denver; Maine
5; Lyndon; Buchanan; Pierre; Kentucky
6; Bill; Tyler; Helena; New York
7; George; Adams; Oklahoma City; Alaska
8; Ulysses; Garfield; Santa Fe; Massachusetts
9; Thomas; Coolidge; Charleston; Mississippi
10; John; Polk; Carson City; Louisiana
```

In this example, all the output columns of type String will be trimmed to remove preceding and training whitespace and the last names and state names will be transformed to upper case.

Procedure

1. In the Map Editor, complete the input-output mappings.
2. Select the columns of type String in the output table, namely firstname, lastname, city, and state in this example, and right-click the selection so that the **Apply Routine** button shows up.

3. Click the **Apply Routine** button to open the [Expression Builder] dialog box.

4. Select StringHandling in the **Categories** area, and then double-click the TRIM function in the **Functions** area to get StringHandling.TRIM({0}) in the **Expression** field.
5. Click OK to close the [Expression Builder] dialog box.

6. Select the lastname and state columns in the output table of the Map Editor, right-click the selection, and then click the Apply Routine button to open the [Expression Builder] dialog box.

7. Select StringHandling in the Categories area, and then double-click the UPPERCASE function in the Functions area to get StringHandling(${0}) in the Expression field.

8. Click OK to close the [Expression Builder] dialog box.

**Results**

Now the expressions on those output columns look like below:
The functions will be carried out along the flow processing. The output of this example is as shown below.

**Mapping the Output setting**

**Tip:**

There is no order among the output flows of **tMap**. To make the output flows to be executed one by one, you can output them to temporary files or memory, and then read and insert them into files or databases using different subjobs linked by **Trigger > OnSubjobOK** connections.

On the design workspace, the creation of a **Row** connection from the **tMap** component to the output components adds Output schema tables in the **Map Editor**.

You can also add an Output schema in your **Map Editor**, using the plus sign from the tool bar of the Output area.

You have as well the possibility to create a join between your output tables. The join on the tables enables you to process several flows separately and unite them in a single output.

**Note:** The join table retrieves the schema of the source table.

When you click the [+] button to add an output schema or to make a join between your output tables, a dialog box opens. You have then two options.
Select... | To...
---|---
New output | Add an independent table.
Create join table from | Create a join between output tables. In order to do so, select in the drop down list the table from which you want to create the join. In the Named field, type in the name of the table to be created.

Unlike the Input area, the order of output schema tables does not make such a difference, as there is no subordination relationship between outputs (of Join type).

Once all connections, hence output schema tables, are created, you can select and organize the output data via drag & drops.

You can drop one or several entries from the Input area straight to the relevant output table.

Press **Ctrl** or **Shift**, and click entries to carry out multiple selection.

Or you can drag expressions from the Var area and drop them to fill in the output schemas with the appropriate reusable data.

Note that if you make any change to the Input column in the Schema Editor, a dialog prompts you to decide to propagate the changes throughout all Input/Variable/Output table entries, where concerned.

<table>
<thead>
<tr>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drag &amp; Drop onto existing expressions.</td>
<td>Concatenates the selected expression with the existing expressions.</td>
</tr>
<tr>
<td>Drag &amp; Drop to insertion line.</td>
<td>Inserts one or several new entries at start or end of table or between two existing lines.</td>
</tr>
<tr>
<td>Drag &amp; Drop + Ctrl.</td>
<td>Replaces highlighted expression with selected expression.</td>
</tr>
<tr>
<td>Drag &amp; Drop + Shift.</td>
<td>Adds the selected fields to all highlighted expressions. Inserts new lines if needed.</td>
</tr>
<tr>
<td>Drag &amp; Drop + Ctrl + Shift.</td>
<td>Replaces all highlighted expressions with selected fields. Inserts new lines if needed.</td>
</tr>
</tbody>
</table>

You can add filters and rejections to customize your outputs.

**Creating complex expressions**

If you have complex expressions to create, or advanced changes to be carried out on the output flow, then the Expression Builder interface can help in this task.
Click the **Expression** field of your input or output table to display the [...] button. Then click this three-dot button to open the **Expression Builder**.

For more information regarding the Expression Builder, see *Writing code using the Expression Builder* on page 216.

**Filters**

Filters allow you to make a selection among the input fields, and send only the selected fields to various outputs.

Click the button at the top of the table to add a filter line.

You can enter freely your filter statements using Java operators and functions.

Drop expressions from the **Input** area or from the **Var** area to the Filter row entry of the relevant Output table.

An orange link is then created. Add the required Java operator to finalize your filter formula.

You can create various filters on different lines. The AND operator is the logical conjunction of all stated filters.

**Output rejection**

**About this task**

Reject options define the nature of an output table.

It groups data which do not satisfy one or more filters defined in the standard output tables. Note that as standard output tables, are meant all non-reject tables.

This way, data rejected from other output tables, are gathered in one or more dedicated tables, allowing you to spot any error or unpredicted case.

The Reject principle concatenates all non Reject tables filters and defines them as an ELSE statement.

To define an output table as the Else part of the regular tables:

**Procedure**

1. Click the tMap settings button at the top of the output table to display the table properties.
2. Click in the **Value** field corresponding to **Catch output reject** and then click the [...] button that appears to display the [Options] dialog box.
3. In the [Options] dialog box, double-click true, or select it and click OK to validate the setting and close the dialog box.

![Options dialog box]

**Results**

You can define several Reject tables, to offer multiple refined outputs. To differentiate various Reject outputs, add filter lines, by clicking on the plus arrow button.

Once a table is defined as Reject, the verification process will be first enforced on regular tables before taking in consideration possible constraints of the Reject tables.

Note that data are not exclusively processed to one output. Although a data satisfied one constraint, hence is routed to the corresponding output, this data still gets checked against the other constraints and can be routed to other outputs.

**Lookup Inner Join rejection**

**About this task**

The Inner Join is a Lookup Join. The Inner Join Reject table is a particular type of Rejection output. It gathers rejected data from the main row table after an Inner Join could not be established.

To define an Output flow as container for rejected Inner Join data, create a new output component on your Job that you connect to the Map Editor. Then in the Map Editor, follow the steps below:

**Procedure**

1. Click the tMap settings button at the top of the output table to display the table properties.
2. Click in the Value field corresponding to Catch lookup inner join reject and then click the [...] button that appears to display the [Options] dialog box.
3. In the [Options] dialog box, double-click true, or select it and click OK to validate the setting and close the dialog box.
Removing Output entries
To remove Output entries, click the cross sign on the Schema Editor of the selected table.

Handling errors

About this task
The Die on error option prevents error to be processed. To do so, it stops the Job execution as soon as an error is encountered. The tMap component provides this option to prevent processing erroneous data. The Die on error option is activated by default in tMap.

Deactivating the Die on error option will allow you to skip the rows on error and complete the process for error-free rows on one hand, and to retrieve the rows on error and manage them if needed.

To deactivate the Die on error option:

Procedure
1. Double-click the tMap component on the design workspace to open the Map Editor.
2. Click the Property Settings button at the top of the input area to display the [Property Settings] dialog box.
3. In [Property Settings] dialog box, clear the Die on error check box and click OK.
Results

A new table called **ErrorReject** appears in the output area of the **Map Editor**. This output table automatically comprises two columns: **errorMessage** and **errorStackTrace**, retrieving the message and stack trace of the error encountered during the Job execution. Errors can be unparsable dates, null pointer exceptions, conversion issues, etc.

You can also drag and drop columns from the input tables to this error reject output table. Those erroneous data can be retrieved with the corresponding error messages and thus be corrected afterward.

Once the error reject table is set, its corresponding flow can be sent to an output component.
To do so, on the design workspace, right-click the **tMap** component, select **Row > ErrorReject** in the menu, and click the corresponding output component, here **tLogRow**.

When you execute the Job, errors are retrieved by the **ErrorReject** flow.

```
Starting job Die_on_error at 17:30 01/09/2010

java.text.ParseException: Unparseable date: "08 01 1980"|java.lang.RuntimeException
java.text.ParseException: Unparseable date: "08 01 1980"
   at routines.TalendDate.parseDate(TalendDate.java:503)
at doc.die_on_error_0_1.Die_on_error.tFileInputDelimited_2Process(Die_on_error.java:1409)
at doc.die_on_error_0_1.Die_on_error.runJobInTOS(Die_on_error.java:2262)
at doc.die_on_error_0_1.Die_on_error.main(Die_on_error.java:2150)
Caused by: java.text.ParseException: Unparseable date: "08 01 1980"
   at java.text.DateFormat.parse(Unknown Source)
   at routines.TalendDate.parseDate(TalendDate.java:501)
```

```
3 more
```

The result contains the error message, its stack trace, and the two columns, **id** and **date**, dragged and dropped to the **ErrorReject** table, separated by a pipe "|".

**Setting schemas in the Map Editor**

In the **Map Editor**, you can define the type of a table schema as **Built-In** so that you can modify the data structure in the **Schema editor** panel, or **Repository** and retrieve the data structure from the Repository. By default, the schema type is set to **Built-In** for all tables.
Retrieving the schema structure from the Repository

About this task

To retrieve the schema structure of the selected table from the Repository:

Procedure

1. Click the **tMap Settings** button at the top of the table to display the table properties.
2. Click in the **Value** field of **Schema Type**, and then click the three-dot button that appears to open the [Options] dialog box.
3. In the [Options] dialog box, double-click **Repository**, or select it and click **OK**, to close the dialog box and display the **Schema Id** property beneath **Schema Type**.
   
   **Note:** If you close the Map Editor now without specifying a Repository schema item, the schema type changes back to **Built-In**.
4. Click in the **Value** field of **Schema Id**, and then click the [...] button that appears to display the [Repository Content] dialog box.
5. In the [Repository Content] dialog box, select your schema as you define a centrally stored schema for any component, and then click **OK**.

   The **Value** field of **Schema Id** is filled with the schema you just selected, and everything in the **Schema editor** panel for this table becomes read-only.
Warning:
Changing the schema type of the subordinate table across a Join from **Built-In** to **Repository** causes the Join to get lost.

Note: Changes to the schema of a table made in the **Map Editor** are automatically synchronized to the schema of the corresponding component connected with the **tMap** component.

Searching schema columns

About this task
The schema column filter of **tMap** allows you to quickly search an input or output schema column or multiple columns among hundreds of them in one go.

The following example shows how to find columns containing the string "customer" in the output table of the Map Editor.

Procedure
1. Open the Map Editor, and click the button at the top of the table to open the filter area.
2. In the filter area, type in your search string, `customer` in this example. As you start to type, the table displays the columns that match the characters.

**Using the Schema Editor**

The **Schema Editor** details all fields of the selected table. With the schema type of the table set to **Built-In**, you can modify the schema of the table.
Use the tool bar below the schema table, to add, move or remove columns from the schema.

You can also load a schema from the repository or export it into a file.

<table>
<thead>
<tr>
<th>Metadata</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column</td>
<td>Column name as defined on the Map Editor schemas and on the Input or Output component schemas.</td>
</tr>
<tr>
<td>Key</td>
<td>The Key shows if the expression key data should be used to retrieve data through the Join link. If unchecked, the Join relation is disabled.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of data: String, Integer, Date, etc.</td>
</tr>
<tr>
<td>Length</td>
<td>-1 shows that no length value has been defined in the schema.</td>
</tr>
<tr>
<td>Precision</td>
<td>Defines the number of digits to the right of the decimal point.</td>
</tr>
<tr>
<td>Nullable</td>
<td>Clear this check box if the field value should not be null.</td>
</tr>
<tr>
<td>Default</td>
<td>Shows any default value that may be defined for this field.</td>
</tr>
<tr>
<td>Comment</td>
<td>Free text field. Enter any useful comment.</td>
</tr>
</tbody>
</table>

**Note:** Input metadata and output metadata are independent from each other. You can, for instance, change the label of a column on the output side without the column label of the input schema being changed.

However, any change made to the metadata are immediately reflected in the corresponding schema on the tMap relevant (Input or Output) area, but also on the schema defined for the component itself on the design workspace.

A Red colored background shows that an invalid character has been entered. Most special characters are prohibited in order for the Job to be able to interpret and use the text entered in the code. Authorized characters include lower-case, upper-case, figures except as start character.

**Enabling automatic data type conversion**

**Before you begin**

When processing data flows using a tMap, if the input and output columns across a mapping are of different data types, compiling errors may occur at the Job execution time. The **Enable Auto-Conversion of types** option in the tMap helps avoid such errors.

To enable this feature in tMap in a Job:

**Procedure**

1. Click the button at the top of the Map Editor to open the [Property Settings] dialog box.
2. Select the **Enable Auto-Conversion of types** check box and then click OK.
What to do next

You can activate the automatic conversion option at the project level so that any tMap component added afterwards in the project will have this feature enabled.

Defining rules to override the default conversion behavior

If needed, you can also define conversion rules to override the default conversion behavior of tMap.

Procedure

1. On the toolbar of the Studio main window, click or click File > Edit Project Properties from the menu bar to open the [Project Settings] dialog box.
2. In the tree view of the dialog box, expand General and select Auto-Conversion of types to open the relevant view.
3. Select the **Enable Auto-Conversion of types** check box to activate the automatic type conversion feature for all tMap components added afterwards in the project.

4. If needed, click the `[+]` button to add a line, select the source and target data types, and define a Java function for data type conversion to create a conversion rule to override the default conversion behavior of tMap for data that matches the rule.

   You can press **Ctrl+Space** in the **Conversion Function** field to access a list of available Java functions.

   The rule shown in this example will match mappings with the input data type of String and output data type of Integer.

   You can created as many conversion rules as you want.

5. Click **Apply** to apply your changes and then **OK** to close the dialog box.

### Solving memory limitation issues in tMap use

When handling large data sources, including for example, numerous columns, large number of lines or of column types, your system might encounter memory shortage issues that prevent your Job, to complete properly, in particular when using a tMap component for your transformation.

A feature has been added (in Java only for the time being) to the tMap component, in order to reduce the memory in use for lookup loading. In fact, rather than storing the temporary data in the system memory and thus possibly reaching the memory limitation, the **Store temp data** option allows you to choose to store the temporary data onto a directory of your disk instead.

This feature comes as an option to be selected in the Lookup table of the input data in the **Map Editor**.

To enable the **Store temp data** option:

1. Double-click the tMap component in your Job to launch the **Map Editor**.
2. In input area, click the Lookup table describing the temporary data you want to be loaded onto the disk rather than in the memory.

3. Click the tMap settings button to display the table properties.

4. Click in the Value field corresponding to Store temp data, and then click the [...] button to display the Options dialog box.

5. In the [Options] dialog box, double-click true, or select it and click OK, to enable the option and close the dialog box.

For this option to be fully activated, you also need to specify the directory on the disk, where the data will be stored, and the buffer size, namely the number of rows of data each temporary file will contain. You can set the temporary storage directory and the buffer size either in the Map Editor or in the tMap component property settings.

To set the temporary storage directory and the buffer size in the Map Editor:

1. Click the Property Settings button at the top of the input area to display the [Property Settings] dialog box.

2. In [Property Settings] dialog box, fill the Temp data directory path field with the full path to the directory where the temporary data should be stored.

3. In the Max buffer size (nr of rows) field, specify the maximum number of rows each temporary file can contain. The default value is 2,000,000.

4. Click OK to validate the settings and close the [Property Settings] dialog box.
To set the temporary storage directory in the tMap component property settings without opening the Map Editor:

1. Click the tMap component to select it on the design workspace, and then select the Component tab to show the Basic settings view.

2. In the Store on disk area, fill the Temp data directory path field with the full path to the directory where the temporary data should be stored.

   Alternatively, you can use a context variable through the Ctrl+Space bar if you have set the variable in a Context group in the repository. For more information about contexts, see Using contexts and variables on page 73.

At the end of the subjob, the temporary files are cleared.

This way, you will limit the use of allocated memory per reference data to be written onto temporary files stored on the disk.

Note: As writing the main flow onto the disk requires the data to be sorted, note that the order of the output rows cannot be guaranteed.
On the **Advanced settings** view, you can also set a buffer size if needed. Simply fill out the field **Max buffer size (nb of rows)** in order for the data stored on the disk to be split into as many files as needed.

**Handling Lookups**

When implementing a join (including **Inner Join** and **Left Outer Join**) in a **tMap** between different data sources, there is always only one main flow and one or more lookup flows connected to the **tMap**. All the records of the lookup flow need to be loaded before processing each record of the main flow.

Three types of lookup loading models are provided suiting various types of business requirement and the performance needs: **Load once**, **Reload at each row**, and **Reload at each row (cache)**.

- **Load once**: it loads once (and only once) all the records from the lookup flow either in the memory or in a local file before processing each record of the main flow in case the **Store temp data** option is set to true. This is the default setting and the preferred option if you have a large set of records in the main flow to be processed using a join to the lookup flow.

- **Reload at each row**: it loads all the records of the lookup flow for each record of the main flow. Generally, this option increases the Job execution time due to the repeated loading of the lookup flow for each main flow record. However, this option is preferred in the following situations:
  - The lookup data flow is constantly updated and you want to load the latest lookup data for each record of the main flow to get the latest data after the join execution;
  - There are very few data from the main flow while a large amount of data from a database table in the lookup flow. In this case, it might cause an **OutOfMemory** exception if you use the **Load once** option. You can use dynamic variable settings such as where clause to update the lookup flow on the fly as it gets loaded, before the main flow join is processed. For an example, refer to **Reloading data at each row** on page 239.

- **Reload at each row (cache)**: it functions like the **Reload at each row** model, all the records of the lookup flow are loaded for each record of the main flow. However, this model can’t be used with the **Store temp data on disk** option. The lookup data are cached in memory, and when a new loading occurs, only the records that are not already exist in the cache will be loaded, in order to avoid loading the same records twice. This option optimizes the processing time and helps improve processing performance of the **tMap** component. Note that you can not use **Reload at each row (cache)** and **Store temp data** at the same time.

Note that when your lookup is a database table, the best practise is to open the connection to the database in the beginning of your Job design in order to optimize performance.

**Setting the loading mode of a lookup flow**

**About this task**

To set the loading mode of a lookup flow:

**Procedure**

1. Click the **tMap settings** button at the top right of the lookup table to display the table properties.
2. Click in the **Value** field corresponding to **Lookup Model**, and then click the [...] button to display the [Options] dialog box.
3. In the [Options] dialog box, double-click the wanted loading mode, or select it and then click OK, to validate the setting and close the dialog box.

**Results**

For use cases using these options, see the related documentation of the tMap component.

**Reloading data at each row**

**About this task**

The **Reload at each row** option is used to load all the records of a lookup flow for each record of the main flow.

When the main flow has much less rows than the lookup flow (for example, with a ratio of 1000 or more) and the lookup input is a database component, the advantage of this approach is that it helps deal with the fact that the amount of lookup data increases over time, since you can run queries against the data from the main flow in the database component to select only the lookup data that is relevant for each record in the main flow, such as in the following example which uses lookup data from a MySQL database.

The schemas of the main flow, the lookup flow and the output flow read as follows:
You can select from the MySQL database only the data that matches the values of the `id` column of the main flow. To do this, proceed as follows:

**Procedure**

1. Double-click `tSetGlobalVar` to open its Component view.

2. Click the `[+]` button to add one row and name the Key to `id` and the Value to `row1.id`.

3. Double-click `tMysqlInput` to open its Component view.
4. In the Query field, enter the query to select the data that matches the id column of the main flow. In this example, this query reads: `Select * from person where id="+(Integer)\n\nglobalMap.get("id")`

Results

Refer to the related documentation of the components used in this example for more information.

**tXMLMap operation**

>Note: Before starting this section, we recommend reading the previous tMap sections for the basic knowledge of a Talend mapping component.

tXMLMap is fine-tuned to leverage the Document data type for processing XML data, a case of transformation that often mixes hierarchical data (XML) and flat data together. This Document type carries a complete user-specific XML flow. In using tXMLMap, you are able to add as many input or output flows as required into a visual map editor to perform, on these flows, the operations as follows:

- data multiplexing and demultiplexing,
- data transformation on any type of fields, particularly on the Document type,
- data matching via different models, for example, the Unique match mode (related topic: Using Explicit Join on page 210),
- Automated XML tree construction on both of the input and the output sides,
- inner join and left outer join (related topic: Using Inner Join on page 212)
- lookup between data sources whatever they are flat or XML data using models like Load once (related topic: Handling Lookups on page 238),
- fields concatenation and interchange,
- field filtering using constraints,
- data rejecting.
Like tMap, a map editor is required to configure these operations. To open this map editor, you can double-click the tXMLMap icon in the design workspace, or alternatively, click the three-dot button next to the Map Editor in the Basic settings view of the tXMLMap component.

tXMLMap and tMap use the common approaches to accomplish most of these operations. Therefore, the following sections explain only the particular operations to which tXMLMap is dedicated for processing the hierarchical XML data.

The operations focusing on hierarchical data are:

- using the Document type to create the XML tree;
- managing the output XML data;
- editing the XML tree schema.

The following sections present more relevant details.

**Note:** Different from tMap, tXMLMap does not provide the Store temp data option for storing temporary data onto the directory of your disk. For further information about this option of tMap, see Solving memory limitation issues in tMap use on page 235.

**Using the document type to create the XML tree**

The Document data type fits perfectly the conception of defining XML structure as easily as possible. When you need the XML tree structure to map the input or output flow or both, use this type. Then you can import the XML tree structure from various XML sources and edit the tree directly in the mapping editor, thus saving the manual efforts.

**Setting up the Document type**

**About this task**

The Document data type is one of the data types provided by Talend. This Document type is set up when you edit the schema for the corresponding data in the Schema editor. For further information about the schema editor, see Using the Schema Editor on page 232.

The following figure presents an example in which the input flow, Customer, is set up as the Document type. To replicate it, in the Map editor, you can simply click the [+] button to add one row on the input side of the Schema editor, rename it and select Document from the drop-down list of the given data types.
In practice for most cases, `tXMLMap` retrieves the schema of its preceding or succeeding components, for example, from a `tFileInputXML` component or in the ESB use case, from a `tESBProviderRequest` component. This avoids many manual efforts to set up the `Document` type for the XML flow to be processed. However, to continue to modify the XML structure as the content of a Document row, you need still to use the given Map editor.

**Note:** Be aware that a `Document` flow carries a user-defined XML tree and is no more than one single field of a schema, which, same as the other schemas, may contain different data types between each field. For further information about how to set a schema, see [Basic Settings tab](#) on page 49.

Once the `Document` type is set up for a row of data, in the corresponding data flow table in the map editor, a basic XML tree structure is created automatically to reflect the details of this structure. This basic structure represents the minimum element required by a valid XML tree in using `tXMLMap`:

- The root element: it is the minimum element required by an XML tree to be processed and when needs be, the foundation to develop a sophisticated XML tree.
- The loop element: it determines the element over which the iteration takes place to read the hierarchical data of an XML tree. By default, the root element is set as loop element.

This figure gives an example with the input flow, `Customer`. Based on this generated XML root tagged as `root` by default, you can develop the XML tree structure of interest.

To do this, you need to:
Procedure

1. Import the custom XML tree structure from one of the following types of sources:
   - XML or XSD files (related topic: Importing the XML tree structure from XML and XSD files on page 245)
     
     **Note:** When you import an XSD file, you will create the XML structure this XSD file describes.
   - file XML connections created and stored in the Repository of your Studio (related topic: Importing the XML tree structure from the Repository on page 247).
     
     **Note:** If needs be, you can develop the XML tree of interest manually using the options provided on the contextual menu.

2. Reset the loop element for the XML tree you are creating, if needs be. You can set as many loops as you need to. At this step, you may have to consider the following situations:
   - If you have to create several XML trees, you need to define the loop element for each of them.
   - If you import the XML tree from the Repository, the loop element will have been set depending on the set of the source structure. But you can still reset the loop element.
     
     For further details, see Setting or resetting a loop element for an imported XML structure on page 248

3. Optional: If needed, you can continue to modify the imported XML tree using the options provided in the contextual menu. The following table presents the operations you can perform through the available options.

<table>
<thead>
<tr>
<th>Options</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Sub-element and Create Attribute</td>
<td>Add elements or attributes to develop an XML tree. Related topic: Adding a sub-element or an attribute to an XML tree structure on page 248</td>
</tr>
<tr>
<td>Set a namespace</td>
<td>Add and manage given namespaces on the imported XML tree. Related topic: Managing a namespace on page 250</td>
</tr>
<tr>
<td>Delete</td>
<td>Delete an element or an attribute. Related topic: Deleting an element or an attribute from the XML tree structure on page 249</td>
</tr>
<tr>
<td>Rename</td>
<td>Rename an element or an attribute.</td>
</tr>
<tr>
<td>As loop element</td>
<td>Set or reset an element as loop element. Multiple loop elements and optional loop element are supported.</td>
</tr>
</tbody>
</table>
### Data services

<table>
<thead>
<tr>
<th>Options</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>As optional loop</td>
<td>This option is not available unless to the loop element you have defined. When the corresponding element exists in the source file, an optional loop element works the same way as a normal loop element; otherwise, it resets automatically its parent element as loop element or in absence of parent element in the source file, it takes the element of the higher level until the root element. But in the real-world practice, with such differences between the XML tree and the source file structure, we recommend adapting the XML tree to the source file for better performance.</td>
</tr>
<tr>
<td>As group element</td>
<td>On the XML tree of the output side, set an element as group element. Related topic: <a href="#">Grouping the output data</a> on page 252</td>
</tr>
<tr>
<td>As aggregate element</td>
<td>On the XML tree of the output side, set an element as aggregate element. Related topic: <a href="#">Aggregating the output data</a> on page 253</td>
</tr>
<tr>
<td>Add Choice</td>
<td>Set the Choice element. Then all of its child elements developed underneath will be contained in this declaration. This Choice element originates from one of the XSD concepts. It enables tXMLMap to perform the function of the XSD Choice element to read or write a Document flow. When tXMLMap processes a choice element, the elements contained in its declaration will not be outputted unless their mapping expressions are appropriately defined. <strong>Note:</strong> The tXMLMap component declares automatically any Choice element set in the XSD file it imports.</td>
</tr>
<tr>
<td>Set as Substitution</td>
<td>Set the Substitution element to specify the element substitutable for a given head element defined in the corresponding XSD. The Substitution element enables tXMLMap to perform the function of the XSD Substitution element to read or write a Document flow. When tXMLMap processes a substitution element, the elements contained in its declaration will not be outputted unless their mapping expressions are appropriately defined. <strong>Note:</strong> The tXMLMap component declares automatically any Substitution element set in the XSD file it imports.</td>
</tr>
</tbody>
</table>

The following sections present more details about the process of creating the XML tree.

**Importing the XML tree structure from XML and XSD files**

**Before you begin**

To import the XML tree structure from an XML file, proceed as follows:
**Procedure**

1. In the input flow table of interest, right-click the column name to open the contextual menu. In this example, it is Customer.

![Contextual menu](image)

2. From this menu, select **Import From File**.

3. In the pop-up dialog box, browse to the XML file you need to use to provide the XML tree structure of interest and double-click the file.

**What to do next**

To import the XML tree structure from an XSD file, proceed as follows:

1. In the input flow table of interest, right-click the column name to open the contextual menu. In this example, it is Customer.

![Contextual menu](image)

2. From this menu, select **Import From File**.

3. In the pop-up dialog box, browse to the XSD file you need to use to provide the XML tree structure of interest and double-click the file.

4. In the dialog box that appears, select an element from the **Root** list as the root of your XML tree, and click **OK**. Then the XML tree described by the XSD file imported is established.

![Dialog box](image)

**Note:**

The root of the imported XML tree is adaptable:

- When importing either an input or an output XML tree structure from an XSD file, you can choose an element as the root of your XML tree.

- Once an XML structure is imported, the root tag is renamed automatically with the name of the XML source. To change this root name manually, you need use the tree schema editor. For further information about this editor, see *Editing the XML tree schema* on page 260.
Then, you need to define the loop element in this XML tree structure. For further information about how to define a loop element, see Setting or resetting a loop element for an imported XML structure on page 248.

Importing the XML tree structure from the Repository

About this task

To do this, proceed as follows:

Procedure

1. In any input flow table, right click the column name to open the contextual menu. In this example, it is Customer.

![Screenshot of a table with columns and menu options]

2. From this menu, select Import From Repository.

3. In the pop-up repository content list, select the XML connection or the MDM connection of interest to import the corresponding XML tree structure.

![Screenshot of a window displaying repository content]

This figure presents an example of this Repository-stored XML connection.

Note:

To import an XML tree structure from the Repository, the corresponding XML connection should have been created. For further information about how to create a file XML connection in the Repository, see Centralizing XML file metadata on page 293.

4. Click OK to validate this selection.

Results

The XML tree structure is created and a loop is defined automatically as this loop was already defined during the creation of the current Repository-stored XML connection.
**Setting or resetting a loop element for an imported XML structure**

**About this task**

You need to set at least one loop element for each XML tree if it does not have any. If it does, you may have to reset the existing loop element when needs be.

Whatever you need to set or reset a loop element, proceed as follows:

**Procedure**

1. In the created XML tree structure, right-click the element you need to define as loop. For example, you need to define the **Customer** element as loop in the following figure.

   ![XML Tree Structure](image)

   2. From the pop-up contextual menu, select **As loop element** to define the selected element as loop. Once done, this selected element is marked with the text: **loop**.

   ![Customer (loop)](image)

**Results**

Note:

If you close the **Map Editor** without having set the required loop element for a given XML tree, its root element will be set automatically as loop element.

**Adding a sub-element or an attribute to an XML tree structure**

**About this task**

In the XML tree structure view, you are able to manually add a sub-element or an attribute to the root or to any of the existing elements when needs be.

To do either of these operations, proceed as follows:

**Procedure**

1. In the XML tree you need to edit, right-click the element to which you need to add a sub-element or an attribute underneath and select **Create Sub-Element** or **Create Attribute** according to your purpose.
2. In the pop-up [Create New Element] wizard, type in the name you need to use for the added sub-element or attribute.

3. Click OK to validate this creation. The new sub-element or attribute displays in the XML tree structure you are editing.

Deleting an element or an attribute from the XML tree structure

About this task

From an established XML tree, you may need to delete an element or an attribute. To do this, proceed as follows:

Procedure

1. In the XML tree you need to edit, right-click the element or the attribute you need to delete.
2. In the pop-up contextual menu, select **Delete**.
   Then the selected element or attribute is deleted, including all of the sub-elements or the attributes attached to it underneath.

**Managing a namespace**

When necessary, you are able to set and edit namespace for each of the element in the a created XML tree of the input or the output data flow.

**Defining a namespace**

**About this task**

To do this, proceed as follows:

**Procedure**

1. In the XML tree of the input or the output data flow you need to edit, right click the element for which you need to declare a namespace. For example, in a Customer XML tree of the output flow, you need to set a namespace for the root.

2. In the pop-up contextual menu, select **Set a namespace**. Then the [Namespace dialog] wizard displays.

3. In this wizard, type in the URI you need to use.
4. If you need to set a prefix for this namespace you are editing, select the **Prefix** check box in this wizard and type in the prefix you need. In this example, we select it and type in `xhtml`.

![Namespace dialog](image)

5. Click **OK** to validate this declaration.

### Modifying the default value of a namespace

**About this task**

To do this, proceed as follows:

**Procedure**

1. In the XML tree that the namespace you need to edit belongs to, right-click this namespace to open the contextual menu.

![Contextual menu](image)

2. In this menu, select **Change Namespace** to open the corresponding wizard.
3. Type in the new default value you need in this wizard.

4. Click OK to validate this modification.

Deleting a namespace

About this task

To do this, proceed as follows:

Procedure

1. In the XML tree that the namespace you need to edit belongs to, right-click this namespace to open the contextual menu.

2. In this menu, click Delete to validate this deletion

Grouping the output data

The tXMLMap component uses a group element to group the output data according to a given grouping condition. This allows you to wrap elements matching the same condition with this group element.

To set a group element, two restrictions must be respected:

1. the root node cannot be set as group element;
2. the group element must be the parent of the loop element.

Note:
The option of setting group element is not visible until you have set the loop element; this option is also invisible if an element is not allowed to be set as group element.

Once the group element is set, all of its sub-elements except the loop one are used as conditions to group the output data.

You have to carefully design the XML tree view for the optimized usage of a given group element. For further information about how to use a group element, see Talend Help Center (https://help.talend.com).

Note:
tXMLMap provides group element and aggregate element to classify data in the XML tree structure. When handling a row of XML data flow, the behavioral difference between them is:

- The group element processes the data always within one single flow.
- The aggregate element splits this flow into separate and complete XML flows.

Setting a group element

About this task

To set a group element, proceed as follows:
Procedure

1. In the XML tree view on the output side of the Map editor, right-click the element you need to set as group element.

2. From the opened contextual menu, select **As group element**.
Then this element of selection becomes the group element. The following figure presents an example of an XML tree with the group element.

Revoking a defined group element

About this task

To revoke a defined group element, proceed as follows:

Procedure

1. In the XML tree view on the output side of the Map editor, right-click the element you have defined as **group element**.

2. From the opened contextual menu, select **Remove group element**.
Then the defined group element is revoked.

Aggregating the output data

About this task

With tXMLMap, you can define as many aggregate elements as required in the output XML tree to class the XML data accordingly. Then this component outputs these classes, each as one complete XML flow.

Procedure

1. To define an element as aggregate element, simply right-click this element of interest in the XML tree view on the output side of the Map editor and from the contextual menu, select **As aggregate element**.
Then this element becomes the aggregate element. Texts in red are added to it, reading **aggregate**. The following figure presents an example.
2. To revoke the definition of the aggregate element, simply right-click the defined aggregate element and from the contextual menu, select Remove aggregate element.

Results

Note:

To define an element as aggregate element, ensure that this element has no child element and the All in one feature is being disabled. The As aggregate element option is not available in the contextual menu until both of the conditions are respected. For further information about the All in one feature, see Outputing elements into one document on page 254.

For an example about how to use the aggregate element with tXMLMap, see Talend Help Center (https://help.talend.com).

Note:

tXMLMap provides group element and aggregate element to classify data in the XML tree structure. When handling one row of data (one complete XML flow), the behavioral difference between them is:

- The group element processes the data always within one single flow.
- The aggregate element splits this flow into separate and complete XML flows.

Defining the output mode

To define the output mode of the document-type data, you are defining whether to put all of the XML elements into one single XML flow and when empty element exist, whether to output them. By doing this, you do not change the structure of the XML tree you have created.

Outputing elements into one document

About this task

Unless you are using the aggregate element which always classifies the output elements and splits an output XML flow, you are able to determine whether an XML flow is output as one single flow or as separate flows, using the All in one feature in the tXMLMap editor.

To do this, on the output side of the Map editor, proceed as follows:
Procedure

1. Click the pincer icon to open the map setting panel. The following figure presents an example.

   ![](image1)

2. Click the **All in one** field and from the drop-down list, select **true** or **false** to decide whether the output XML flow should be one single flow.
   - If you select **true**, the XML data is output all in one single flow. In this example, the single flow reads as follows:

   ```xml
   Starting job iXMLMap at 10:16 09/11/2011.

   [statistics] connecting to socket on port 3643
   [statistics] connected
   <?xml version="1.0" encoding="UTF-8"?>
   <customers><customer id="1" xmlns="urn:be:unica:custom:1.0">Griffith Pevings and Sekalatin</customer><CustomerAddress>talend@apress91</CustomerAddress><idState>7</idState><CustomLabel>Connecticut</CustomLabel><LabelState><custom id="56">Glenn Oaks Office Supplies</CustomLabel></LabelState><CustomLabel><customer id="2" xmlns="urn:be:unica:custom:1.0">Bill’s Dive Shop</CustomLabel><CustomerAddress>511 Maple Ave. Apt. 1B</CustomerAddress><idState>35</idState><CustomLabel>Ohio</CustomLabel><LabelState><custom id="61">DBN Bank</CustomLabel></LabelState><CustomLabel><customer id="63">Pivot Point College</CustomLabel><CustomerAddress>1547 Knolvood Rd.</CustomLabel><idState>9</idState><CustomLabel>Florida</CustomLabel><LabelState><customer id="1" xmlns="urn:be:unica:custom:1.0"></customer></customers>
   [statistics] disconnected
   Job iXMLMap ended at 10:16 09/11/2011. [exit code=0]
   ```

   The structure of this flow reads:
• If you select false, the XML data is output in separate flows, each loop being one flow, neither grouped nor aggregated. In this example, these flows read as follows:
Each flow contains one complete XML structure. To take the first flow as example, its structure reads:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<customers>
  <customer id="1">
    <CustomerName>Griffith Paving and Sealcoating</CustomerName>
    <CustomerAddress>Telendoplex91</CustomerAddress>
    <idState>7</idState>
    <LabelState>Connecticut</LabelState>
  </customer>
</customers>
```

About this task

It may be necessary to create and output empty elements during the process of transforming data into XML flow, such as, when `tXMLMap` works along with `tWriteXMLField` that creates empty elements or when there is no input column associated with certain XML node in the output XML data flow.

By contrast, in some scenarios, you do not need to output the empty element while you have to keep them in the output XML tree for some reasons.
**tXMLMap** allows you to set the boolean for the creation of empty element. To do this, on the output side of the **Map editor**, perform the following operations:

**Procedure**

1. Click the pincer icon to open the map setting panel.

2. In the panel, click the **Create empty element** field and from the drop-down list, select **true** or **false** to decide whether to output the empty element.
   - If you select **true**, the empty element is created in the output XML flow and output, for example, `<customer><LabelState/></customer>`.
   - If you select **false**, the empty element is not output.

**Defining the sequence of multiple input loops**

**About this task**

If a loop element, or the flat data flow, receives mappings from more than one loop element of the input flow, you need to define the sequence of the input loops. The first loop element of this sequence will be the primary loop, so the transformation process related to this sequence will first loop over this element such that the data outputted will be sorted with regard to its element values.
For example, in this figure, the types element is the primary loop and the outputted data will be sorted by the values of this element.

```xml
<Data services>
  <types>
    <type>DELL123</type>
    <manufacture_id>manu_1</manufacture_id>
  </types>
  <types>
    <type>DELL123</type>
    <manufacture_id>manu_2</manufacture_id>
  </types>
  <types>
    <type>DELL456</type>
    <manufacture_id>manu_1</manufacture_id>
  </types>
  <types>
    <type>DELL456</type>
    <manufacture_id>manu_2</manufacture_id>
  </types>
  <types>
    <type>HP123</type>
    <manufacture_id>manu_1</manufacture_id>
  </types>
  <types>
    <type>HP123</type>
    <manufacture_id>manu_2</manufacture_id>
  </types>
  <types>
    <type>HP455</type>
    <manufacture_id>manu_1</manufacture_id>
  </types>
  <types>
    <type>HP455</type>
    <manufacture_id>manu_2</manufacture_id>
  </types>
</Data services>
```

In this case in which one output loop element receives several input loop elements, a [...] button appears next to this receiving loop element or for the flat data, appears on the head of the table representing the flat data flow. To define the loop sequence, do the following:
Procedure

1. Click this [...] button to open the sequence arrangement window as presented by the figure used earlier in this section.
2. Use the up or down flash button to arrange this sequence.

Editing the XML tree schema

In addition to the Schema editor and the Expression editor views that tMap is also equipped with, a Tree schema editor view is provided in the map editor of tXMLMap for you to edit the XML tree schema of an input or output data flow.

To access this schema editor, click the Tree schema editor tab on the lower part of the map editor.

The left half of this view is used to edit the tree schema of the input flow and the right half to edit the tree schema of the output flow.

The following table presents further information about this schema editor.

<table>
<thead>
<tr>
<th>Metadata</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XPath</td>
<td>Use it to display the absolute paths pointing to each element or attribute in a XML tree and edit the name of the corresponding element or attribute.</td>
</tr>
<tr>
<td>Key</td>
<td>Select the corresponding check box if the expression key data should be used to retrieve data through the Join link. If unchecked, the Join relation is disabled.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of data: String, Integer, Document, etc.</td>
</tr>
<tr>
<td>Nullable</td>
<td>Select this check box if the field value could be null.</td>
</tr>
<tr>
<td>Pattern</td>
<td>Define the pattern for the Date data type.</td>
</tr>
</tbody>
</table>

Note:

Input metadata and output metadata are independent from each other. You can, for instance, change the label of a column on the output side without the column label of the input schema being changed.

However, any change made to the metadata are immediately reflected in the corresponding schema on the tXMLMap relevant (Input or Output) area, but also on the schema defined for the component itself on the design workspace.
Centralizing metadata for Data Integration

Objectives

The Metadata folder in the Repository tree view stores reusable information on files, databases, and/or systems that you need to create your Jobs.

Various corresponding wizards help you store these pieces of information that can be used later to set the connection parameters of the relevant input or output components and the data description called "schemas" in a centralized manner in Talend Studio.

The procedures of different wizards slightly differ depending on the type of connection chosen.

Click Metadata in the Repository tree view to expand the folder tree. Each of the connection nodes will gather the various connections and schemas you have set up.

Centralizing database metadata

If you often need to connect to database tables of any kind, then you may want to centralize the connection information details in the Metadata folder in the Repository tree view.

This setup procedure is made of two separate but closely related major tasks:

1. Set up a database connection,
2. Retrieve the table schemas.

The sections below describe how to complete the tasks in detail.
**Prerequisites:** Talend Studio requires specific third-party Java libraries or database drivers (.jar files) to be installed in order to connect to sources or targets. Due to license restrictions, Talend may not be able to ship certain required libraries or drivers; in that situation, the connection wizard to be presented in the following sections displays related information to help you identify and install the libraries or drivers in question. For more information, see the Talend Installation and Upgrade Guide.

**Setting up a database connection**

To create a database connection from scratch, expand Metadata in the Repository tree view, right-click Db Connections and select Create connection from the contextual menu to open the database connection setup wizard.

To centralize database connection parameters you have defined in a Job, click the icon in the Basic settings view of the relevant database component with its Property Type set to Built-in to open the database connection setup wizard.

To modify an existing database connection, right-click the connection item from the Repository tree view, and select Edit connection to open the connection setup wizard.

Then define the general properties and parameters of the connection in the wizard.

**Defining general properties**

**Procedure**

1. In the connection setup wizard, give your connection a name in the Name field. This name will appear as the database connection name under the Metadata node of the Repository tree view.
2. Fill in the optional **Purpose** and **Description** fields as required. The information you fill in the **Description** field will appear as a tooltip when you move your mouse pointer over the connection.

3. If needed, set the connection version and status in the **Version** and **Status** fields respectively. You can also manage the version and status of a repository item in the [Project Settings] dialog box. For more information, see Version management on page 450 and Status management on page 451 respectively.

4. If needed, click the **Select** button next to the **Path** field to select a folder under the **Db connections** node to hold your newly created database connection. Note that you cannot select a folder if you are editing an existing database connection, but you can drag and drop a connection to a new folder whenever you want.

5. Click **Next** when completed. The second step requires you to fill in or edit database connection data.

---

**Defining connection parameters**

**Procedure**

1. Select the type of the database to which you want to connect and fill in the connection details. The fields you need to fill vary depending on the database type you select.
Note:

When you are creating the database connection of some databases like AS/400, HSQDB, Informix, Microsoft SQL, MySQL, Oracle, SAP HANA, Sybase, or Teradata, you can specify additional connection properties through the **Additional parameters** field in the **Database Settings** area.

In Talend Studio 6.0 and onwards, due to limitations of Java 8, ODBC is no longer supported for Access database connections, and the only supported database driver type is JDBC.

Also due to Java 8 limitations, you cannot create Generic ODBC or Microsoft SQL Server (ODBC) connections in Talend Studio 6.0 and onwards unless you import such connections created in an earlier version of Talend Studio - in that case, you can create Generic ODBC and Microsoft SQL Server (ODBC) connections but they work only with Java 7.
For an MS SQL Server (JDBC) connection, when **Microsoft** is selected from the **Db Version** list, you need to download the Microsoft JDBC driver for SQL Server on **Microsoft Download Center**, unpack the downloaded zip file, choose a jar in the unzipped folder based on your JRE version, rename the jar to **mssql-jdbc.jar** and install it manually. For more information about choosing the jar, see the System Requirements information on **Microsoft Download Center**.

You can set up a connection to Oracle using the Wallet by selecting **Oracle Custom** from the **DB Type** drop-down list, then selecting the **Use SSL Encryption** check box and specifying the related properties, including the path to your TrustStore and KeyStore files and the password for each of them, and whether to disable the use of CBC (CipherBlock Chaining).

If you need to connect to Hive, we recommend using one of the **Talend** solutions with Big Data.

**Warning:**

If you are creating an MSSQL connection, in order to be able to retrieve all table schemas in the database, be sure to:

- enter **dbo** in the **Schema** field if you are connecting to MSSQL 2000,
- remove **dbo** from the **Schema** field if you are connecting to MSSQL 2005/2008.

2. Click **Check** to check your connection.

If the connection fails, a message box is displayed to indicate this failure and from that message box. From that message box, click the **Details** button to read further information.

If a missing library or driver (**.jar** file) has provoked this failure, you can read that from the **Details** panel and then install the specified library or driver.

The Studio provides multiple approaches to automate the installation. For further information, see the chapter describing how to install external modules of the **Talend Installation and Upgrade Guide**.

3. If needed, fill in the database properties information. That is all for the first operation on database connection setup. Click **Finish** to close the connection setup wizard.

The newly created database connection will be saved under the **Db Connections** node in the **Repository** tree view, and several folders for SQL queries and different types of schemas, such as **Calculation View schemas** (only for SAP HANA), **Synonym schemas** (for Oracle, IBM DB2 and MSSQL), **Table schemas**, and **View schemas** will be created under the database connection node.

Now you can drag and drop the database connection onto the design workspace as a database component to reuse the defined database connection details in your Job.

### Retrieving table schemas

To retrieve table schemas from the database connection you have just set up, right-click the connection item from the **Repository** tree view, and select **Retrieve schema** from the contextual menu.
Centralizing metadata for Data Integration

Note:

An error message will appear if there are no tables to retrieve from the selected database or if you do not have the correct rights to access this database.

A new wizard opens up where you can specify the filter for searching different database objects such as table, view, synonym (for Oracle, IBM DB2 and MSSQL) and calculation view (only for SAP HANA).
Filtering database objects

In the Select Filter Conditions area, you can filter the database objects using either of the two options: Set the Name Filter or Use the Sql Filter to filter tables based on objects names or using SQL queries respectively.

To filter database tables based on their names, do the following:

1. In the Select Filter Conditions area, select the Use the Name Filter option.
2. In the Select Types area, select the check box(es) of the database object(s) you want to filter or display.

   Note:
   Available options can vary according to the selected database.
3. In the Set the Name Filter area, click Edit... to open the [Edit Filter Name] dialog box.
4. Enter the filter you want to use in the dialog box. For example, if you want to recuperate the database objects which names start with "A", enter the filter "A%", or if you want to recuperate all database objects which names end with "type", enter "%type" as your filter.
5. Click OK to close the dialog box.
6. Click Next to open a new view on the wizard that lists the filtered database objects.

To filter database objects using an SQL query, do the following:

1. In the Select Filter Conditions area, select the Use Sql Filter option.
2. In the Set the Sql Filter field, enter the SQL query you want to use to filter database objects.
3. Click Next to open a new view that lists the filtered database objects.
Selecting tables and defining table schemas

About this task

Once you have the filtered list of the database objects, do the following to load the schemas of the desired objects onto your Repository:

Procedure

1. Select one or more database objects on the list and click Next to open a new view on the wizard where you can see the schemas of the selected object.

Note:
Centralizing metadata for Data Integration

If no schema is visible on the list, click the **Check connection** button below the list to verify the database connection status.

2. Modify the schemas if needed.

   Make sure the data type in the **Type** column is correctly defined.

   For more information regarding Java data types, including date pattern, see Java API Specification.

   Below are the commonly used **Talend** data types:

   - **Object**: a generic **Talend** data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.
   - **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.
   - **Document**: a data type that allows processing an entire XML document without regard to its content.

   **Warning:**

   If your source database table contains any default value that is a function or an expression rather than a string, be sure to remove the single quotation marks, if any, enclosing the
default value in the end schema to avoid unexpected results when creating database tables using this schema.

For more information, see Talend Help Center (https://help.talend.com).

By default, the schema displayed on the **Schema** panel is based on the first table selected in the list of schemas loaded (left panel). You can change the name of the schema and according to your needs. You can also customize the schema structure in the schema panel.

The tool bar allows you to add, remove or move columns in your schema. In addition, you can load an XML schema from a file or export the current schema as XML.

To retrieve a schema based on one of the loaded table schemas, select the DB table schema name in the drop-down list and click **Retrieve schema**. Note that the retrieved schema then overwrites any current schema and does not retain any custom edits.

When done, click **Finish** to complete the database schema creation. All the retrieved schemas will be saved in the corresponding schema folders under the relevant database connection node.

Now you can drag and drop any table schema of the database connection from the **Repository** tree view onto the design workspace as a new database component or onto an existing component to reuse the metadata. For more information, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

**Centralizing JDBC metadata**

To centralize DB table based metadata into a JDBC connection under the **Metadata** node of the **Repository** tree view, the procedure is made of two separate but closely related tasks:

1. Set up a JDBC connection,
2. Retrieve the table schemas.

The sections below describe how to complete the tasks in detail.

**Setting up a JDBC connection**

**Procedure**

1. To create a JDBC connection from scratch, expand **Metadata** in the **Repository** tree view, right-click **Db Connections** and select **Create connection** from the contextual menu to open the database connection setup wizard.

   To centralize database connection parameters you have defined in a Job into a JDBC connection, click the icon in the **Basic settings** view of the relevant database component with its **Property Type** set to **Built-In** to open the database connection setup wizard.

   To modify an existing JDBC connection, right-click the connection item from the **Repository** tree view, and select **Edit connection** to open the connection setup wizard.

2. Fill in the schema generic information, such as the connection **Name** and **Description**, and then click **Next** to proceed to define the connection details.

   For further information, see the section on defining general properties in Setting up a database connection on page 262.

3. Select **JDBC** from the **DB Type** list.
4. Fill in the connection details as follows:

- Fill in the **JDBC URL** used to access the database server.

- In the **Drivers** table, specify the driver jars needed. To do this, click the [+] button under the table to add as many rows as needed, each row for a driver JAR, then select the cell and click the [...] button at the right side of the cell to open the Module wizard from which you can select the driver JAR of your interest.

- In the **Driver Class** field, specify the main class of the driver allowing to communicate with the database.

- Fill in your database user authentication data in **User Id** and **Password** fields.

- In the **Mapping file** list, select the mapping that allows the database Type to match the Java type of data on the schema according to the type of database you are connecting to.

<i>Note:</i>
The mapping files are XML files that you can manage via **Window > Preferences > Talend > Specific Settings > Metadata of TalendType**. For more information, see **Accessing mapping files** on page 448.

5. Click **Test connection** to check your connection.

6. Click **Finish** to close the connection setup wizard.

The newly created JDBC connection is now available in the **Repository** tree view and it displays several folders including **Queries** (for the SQL queries you save) and **Table schemas** that will gather all schemas linked to this DB connection upon schema retrieval.

**Retrieving table schemas**

**Procedure**

1. To retrieve table schemas from the database connection you have just set up, right-click the connection item from the **Repository** tree view and select **Retrieve schema** from the contextual menu.

A new wizard opens up where you can filter and show different objects (tables, views and synonyms) in your database connection, select tables of interest, and define table schemas.

2. Define a filter to filter databases objects according to your need. For details, see **Filtering database objects** on page 267.

   Click **Next** to open a view that lists your filtered database objects. The list offers all the databases with all their tables present on the database connection that meet your filter conditions.
If no database is visible on the list, click **Check connection** to verify the database connection.

3. Select one or more tables on the list to load them onto your repository file system. Your repository schemas will be based on these tables.

4. Click **Next**. On the next window, four setting panels help you define the schemas to create. Modify the schemas if needed.

   Make sure the data type in the **Type** column is correctly defined.

   For more information regarding Java data types, including date pattern, see Java API Specification.

Below are the commonly used **Talend** data types:

- **Object**: a generic **Talend** data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

⚠️ **Warning:**

   If your source database table contains any default value that is a function or an expression rather than a string, be sure to remove the single quotation marks, if any, enclosing the default value in the end schema to avoid unexpected results when creating database tables using this schema.

   For more information, see Talend Help Center (https://help.talend.com).

By default, the schema displayed on the Schema panel is based on the first table selected in the list of schemas loaded (left panel). You can change the name of the schema and according to your needs, you can also customize the schema structure in the schema panel.

The tool bar allows you to add, remove or move columns in your schema. In addition, you can load an XML schema from a file or export the current schema as XML.

To retrieve a schema based on one of the loaded table schemas, select the database table schema name in the drop-down list and click **Retrieve schema**. Note that the retrieved schema then overwrites any current schema and does not retain any custom edits.

When done, click **Finish** to complete the database schema creation. All the retrieved schemas are displayed in the **Table schemas** sub-folder under the relevant database connection node.

Now you can drag and drop any table schema of the database connection from the **Repository** tree view onto the design workspace as a new database component or onto an existing component to reuse the metadata. For more information, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

---

**Centralizing SAS metadata**

If you often need to connect to a remote SAS system, you can centralize the connection information in the **Repository**.

To centralize the metadata information of a SAS connection in the **Repository**, you need to complete two major tasks:
1. Set up a SAS connection,
2. Retrieve the database schemas.

**Prerequisites:**

- Talend Studio requires specific third-party Java libraries or database drivers (.jar files) to be installed in order to connect to sources or targets. Due to license restrictions, Talend may not be able to ship certain required libraries or drivers; in that situation, the connection wizard to be presented in the following sections displays related information to help you identify and install the libraries or drivers in question. For more information, see the Talend Installation and Upgrade Guide.
- Before carrying on the procedure below to configure your SAS connection, make sure that you retrieve your metadata from the SAS server and export it in XML format.

**Setting up a SAS connection**

**Procedure**

1. In the Repository tree view of Talend Studio, right-click **DB Connections** under the Metadata node and select **Create connection** from the contextual menu to open the **[Database Connection]** wizard.
2. Fill in the general properties of the connection, such as **Name** and **Description** and click **Next** to open a new view on the wizard to define the connection details.
   
   For further information, see the section on defining general properties in Setting up a database connection on page 262.
3. In the **DB Type** field of the **[Database Connection]** wizard, select **SAS** and fill in the fields that follow with SAS connection information.
4. If needed, click the Check tab to verify if your connection is successful.

5. If needed, define the properties of the database in the corresponding fields in the Database Properties area.

6. Click Finish to validate your changes and close the wizard.

   The newly set connection to the defined database displays under the DB Connections folder in the Repository tree view. This connection has several sub-folders among which Table schemas will group all schemas relative to this connection after schema retrieval.

Retrieving SAS table schemas
Procedure

1. Right-click the SAS connection you created and then select Retrieve Schema from the contextual menu.

A new wizard opens up where you can filter and show different objects (tables, views) in your database connection, select tables of interest, and define table schemas.

2. Filter databases objects according to your need, select one or more tables of interest, and modify the table schemas if needed. For details, see Retrieving table schemas on page 265.

Make sure the data type in the Type column is correctly defined.

For more information regarding Java data types, including date pattern, see Java API Specification. Below are the commonly used Talend data types:

- Object: a generic Talend data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a tFileInputRaw component by specifying that it has a data type of Object.

- List: a space-separated list of primitive type elements in an XML Schema definition, defined using the xsd:list element.

- Document: a data type that allows processing an entire XML document without regarding to its content.

When done, you can drag and drop any table schema of the SAS connection from the Repository tree view onto the design workspace as a new component or onto an existing component to reuse the metadata. For more information, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

Centralizing File Delimited metadata

If you often need to read data from and/or write data to delimited files, you may want to centralize their metadata in the Repository for easy reuse. File Delimited metadata can be used to define the properties of tFileInputDelimited, tFileOutputDelimited, and t*OutputBulk components.

Note:
The file schema creation is very similar for all types of file connections: Delimited, Positional, Regex, XML, or Ldif.

Unlike the database connection wizard, the [New Delimited File] wizard gathers both file connection and schema definitions in a four-step procedure.

To create a File Delimited connection from scratch, expand Metadata in the Repository tree view, right-click File Delimited and select Create file delimited from the contextual menu to open the file metadata setup wizard.

To centralize a file connection and its schema you have defined in a Job, click the icon in the Basic settings view of the relevant component with its Property Type set to Built-in to open the file metadata setup wizard.

Then define the general properties and file schema in the wizard.

Now you can drag and drop the file connection or any schema of it from the Repository tree view onto the design workspace as a new component or onto an existing component to reuse the metadata. For further information about how to use the centralized metadata in a Job, see Using centralized metadata in a Job on page 415and Setting a repository schema in a Job on page 51.

To modify an existing file connection, right-click it from the Repository tree view, and select Edit file delimited to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the Repository tree view and select Retrieve Schema from the contextual menu.

To edit an existing file schema, right-click the schema from the Repository tree view and select Edit Schema from the contextual menu.

**Defining the general properties**

**Procedure**

1. In the file metadata setup wizard, fill in the Name field, which is mandatory, and the Purpose and Description fields if you choose to do so. The information you provide in the Description field will appear as a tooltip when you move your mouse pointer over the file connection.
2. If needed, set the version and status in the **Version** and **Status** fields respectively. You can also manage the version and status of a repository item in the [Project Settings] dialog box. For more information, see [Version management](#) on page 450 and [Status management](#) on page 451 respectively.

3. If needed, click the **Select** button next to the **Path** field to select a folder under the **File delimited** node to hold your newly created file connection. Note that you cannot select a folder if you are editing an existing connection, but you can drag and drop it to a new folder whenever you want.

4. Click **Next** when completed with the general properties.

**Defining the file path and format**

**Procedure**

1. Click the **Browse...** button to search for the file on the local host or a LAN host.
2. Select the OS **Format** the file was created in. This information is used to prefill subsequent step fields. If the list doesn't include the appropriate format, ignore it.

3. The **File viewer** gives an instant picture of the file loaded. Check the file consistency, the presence of header and more generally the file structure.

4. Click **Next** to proceed to the next step.

**Defining the file parsing parameters**

**About this task**

On this view, you can refine the various settings of your file so that the file schema can be properly retrieved.
Procedure

1. Set the Encoding type, and the Field and Row separators in the **File Settings** area.

2. Depending on your file type (csv or delimited), set the Escape and Enclosure characters to be used.
3. If the file preview shows a header message, exclude the header from the parsing. Set the number of header rows to be skipped. Also, if you know that the file contains footer information, set the number of footer lines to be ignored.

![Rows To Skip](image)

4. The **Limit of Rows** allows you to restrict the extend of the file being parsed. If needed, select the **Limit** check box and set or select the desired number of rows.

5. In the **File Preview** panel, view the new settings impact.

6. Check the **Set heading row as column names** box to transform the first parsed row as labels for schema columns. Note that the number of header rows to be skipped is then incremented by 1.

![Preview](image)

7. Click **Refresh** on the preview panel for the settings to take effect and view the result on the viewer.

8. Click **Next** to proceed to the final step to check and customize the generated file schema.

**Checking and customizing the file schema**

**About this task**

The last step shows the Delimited File schema generated. You can customize the schema using the toolbar underneath the table.
Make sure the data type in the **Type** column is correctly defined.

For more information regarding Java data types, including date pattern, see [Java API Specification](#).

Below are the commonly used **Talend** data types:

- **Object**: a generic **Talend** data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of `Object`.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

### Procedure

1. If the Delimited file which the schema is based on has been changed, use the **Guess** button to generate again the schema. Note that if you customized the schema, the **Guess** feature does not retain these changes.

2. Click **Finish**. The new schema is displayed under the relevant **File Delimited** connection node in the **Repository** tree view.
Centralizing File Positional metadata

If you often need to read data from and/or write data to certain positional files, you may want to centralize their metadata in the **Repository** for easy reuse. File Positional metadata can be used to define the properties of `tFileInputPositional`, `tFileOutputPositional`, and `tFileInputMSPositional` components.

The **[New Positional File]** wizard gathers both file connection and schema definitions in a four-step procedure.

To create a File Positional connection from scratch, expand **Metadata** in the **Repository** tree view, right-click **File positional** and select **Create file positional** from the contextual menu to open the file metadata setup wizard.

To centralize a file connection and its schema you have defined in a Job, click the ![icon](image) icon in the **Basic settings** view of the relevant component with its **Property Type** set to **Built-in** to open the file metadata setup wizard.

Then define the general properties and file schema in the wizard.

The new schema is displayed under the relevant **File positional** connection node in the **Repository** tree view. You can drop the defined metadata from the **Repository** onto the design workspace as a new component or onto an existing component to reuse the metadata. For further information about how to use the centralized metadata in a Job, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

To modify an existing file connection, right-click it from the **Repository** tree view, and select **Edit file positional** to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the **Repository** tree view and select **Retrieve Schema** from the contextual menu.

To edit an existing file schema, right-click the schema from the **Repository** tree view and select **Edit Schema** from the contextual menu.

**Defining the general properties of the File Positional connection**

**Procedure**

1. In the file metadata setup wizard, fill in the **Name** field, which is mandatory, and the **Purpose** and **Description** fields if you choose to do so. The information you provide in the **Description** field will appear as a tooltip when you move your mouse pointer over the file connection.
2. If needed, set the version and status in the **Version** and **Status** fields respectively. You can also manage the version and status of a **Repository** item in the [Project Settings] dialog box. For more information, see **Version management** on page 450 and **Status management** on page 451 respectively.

3. If needed, click the **Select** button next to the **Path** field to select a folder under the **File positional** node to hold your newly created file connection. Note that you cannot select a folder if you are editing an existing connection, but you can drag and drop it to a new folder whenever you want.

4. Click **Next** when completed with the general properties.

**Defining the file path, format and marker positions**

**Procedure**

1. Click the **Browse...** button to search for the file on the local host or a LAN host.

2. Select the **Encoding** type and the **OS Format** the file was created in. This information is used to prefill subsequent step fields. If the list doesn’t include the appropriate format, ignore the OS format.
The file is loaded and the File Viewer area shows a file preview and allows you to place your position markers.

3. Click the file preview and set the markers against the ruler to define the file column properties. The orange arrow helps you refine the position.
The Field Separator and Marker Position fields are automatically filled with a series of figures separated by commas.

The figures in the Field Separator are the number of characters between the separators, which represent the lengths of the columns of the loaded file. The asterisk symbol means all remaining characters on the row, starting from the preceding marker position. You can change the figures to specify the column lengths precisely.

The Marker Position field shows the exact position of each marker on the ruler, in units of characters. You can change the figures to specify the positions precisely.

To move a marker, press its arrow and drag it to the new position. To remove a marker, press its arrow and drag it towards the ruler until a ✗ icon appears.

4. Click Next to continue.

Defining the parsing parameters of your positional file

About this task

On this view, you define the file parsing parameters so that the file schema can be properly retrieved.

At this stage, the preview shows the file columns upon the markers' positions.
Procedure

1. Set the Field and Row separators in the File Settings area.
   - If needed, change the figures in the Field Separator field to specify the column lengths precisely.
   - If the row separator of your file is not the standard EOL (end of line), select Custom String from the Row Separator list and specify the character string in the Corresponding Character field.

2. If your file has any header rows to be excluded from the data content, select the Header check box in the Rows To Skip area and define the number of rows to be ignored in the corresponding field. Also, if you know that the file contains footer information, select the Footer check box and set the number of rows to be ignored.

3. The Limit of Rows area allows you to restrict the extend of the file being parsed. If needed, select the Limit check box and set or select the desired number of rows.

4. If the file contains column labels, select the Set heading row as column names check box to transform the first parsed row to labels for schema columns. Note that the number of header rows to be skipped is then incremented by 1.

5. Click Refresh Preview on the Preview panel for the settings to take effect and view the result on the viewer.

6. Click Next to proceed to the next view to check and customize the generated file schema.
Checking and customizing the schema of your positional file

About this task

Step 4 shows the end schema generated. Note that any character which could be misinterpreted by the program is replaced by neutral characters. Underscores replace asterisks, for example.

Procedure

1. Rename the schema (by default, `metadata` and edit the schema columns as needed.
   Make sure the data type in the **Type** column is correctly defined.

   For more information regarding Java data types, including date pattern, see Java API Specification.

   Below are the commonly used **Talend** data types:

   - **Object**: a generic **Talend** data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a **tFileInputRaw** component by specifying that it has a data type of Object.

   - **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.
• Document: a data type that allows processing an entire XML document without regarding to its content.

2. To generate the Positional File schema again, click the Guess button. Note that, however, any edits to the schema might be lost after “guessing” the file-based schema.

3. When done, click Finish to close the wizard.

Centralizing File Regex metadata

Regex file schemas are used for files made of regular expressions, such as log files. If you often need to connect to a regex file, you may want to centralize its connection and schema information in the Repository for easy reuse.

The [New RegEx File] wizard gathers both file connection and schema definitions in a four-step procedure.

Note:

This procedure requires some advanced knowledge on regular expression syntax.

To create a File Regex connection from scratch, expand the Metadata node in the Repository tree view, right-click File Regex and select Create file regex from the contextual menu to open the file metadata setup wizard.

To centralize a file connection and its schema you have defined in a Job, click the icon in the Basic settings view of the relevant component with its Property Type set to Built-in to open the file metadata setup wizard.

Then define the general properties and file schema in the wizard.

The new schema is displayed under the relevant File regex node in the Repository tree view. You can drop the defined metadata from the Repository onto the design workspace as a new component or onto an existing component to reuse the metadata. For further information about how to use the centralized metadata in a Job, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

To modify an existing file connection, right-click it from the Repository tree view, and select Edit file regex to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the Repository tree view and select Retrieve Schema from the contextual menu.

To edit an existing file schema, right-click the schema from the Repository tree view and select Edit Schema from the contextual menu.

Defining the general properties of the File Regex connection

Procedure

1. In the file metadata setup wizard, fill in the Name field, which is mandatory, and the Purpose and Description fields if you choose to do so. The information you provide in the Description field will appear as a tooltip when you move your mouse pointer over the file connection.
2. If needed, set the version and status in the **Version** and **Status** fields respectively. You can also manage the version and status of a repository item in the [Project Settings] dialog box. For more information, see Version management on page 450 and Status management on page 451 respectively.

3. If needed, click the **Select** button next to the **Path** field to select a folder under the **File regex** node to hold your newly created file connection. Note that you cannot select a folder if you are editing an existing connection, but you can drag and drop it to a new folder whenever you want.

4. Click **Next** when completed with the general properties.

**Defining the path and format of your Regex file**

**Procedure**

1. Click the **Browse...** button to search for the file on the local host or a LAN host.

2. Select the **Encoding** type and the **OS Format** the file was created in. This information is used to prefill subsequent step fields. If the list doesn't include the appropriate format, ignore the OS format.
The file viewer gives an instant picture of the loaded file.

3. Click **Next** to define the schema structure.

**Defining the parsing parameters of your Regex file**

**About this task**

On this view, you define the file parsing parameters so that the file schema can be properly retrieved.

**Procedure**

1. Set the Field and Row separators in the **File Settings** area.
   - If needed, change the figures in the **Field Separator** field to specify the column lengths precisely.
   - If the row separator of your file is not the standard EOL, select **Custom String** from the **Row Separator** list and specify the character string in the **Corresponding Character** field.

2. In the **Regular Expression settings** panel, enter the regular expression to be used to delimit the file.
Centralizing metadata for Data Integration

Warning:
Make sure to include the Regex code in single or double quotes accordingly.

3. If your file has any header rows to be excluded from the data content, select the **Header** check box in the **Rows To Skip** area and define the number of rows to be ignored in the corresponding field. Also, if you know that the file contains footer information, select the **Footer** check box and set the number of rows to be ignored.

4. The **Limit of Rows** allows you to restrict the extend of the file being parsed. If needed, select the **Limit** check box and set or select the desired number of rows.

5. If the file contains column labels, select the **Set heading row as column names** check box to transform the first parsed row to labels for schema columns. Note that the number of header rows to be skipped is then incremented by 1.

6. Then click **Refresh preview** to take the changes into account. The button changes to **Stop** until the preview is refreshed.

7. Click **Next** to proceed to the next view where you can check and customize the generated Regex File schema.

Checking and customizing the schema of your Regex file

Procedure

1. Rename the schema (by default, `metadata`) and edit the schema columns as needed.

   Make sure the data type in the **Type** column is correctly defined.

   For more information regarding Java data types, including date pattern, see [Java API Specification](#).

   Below are the commonly used **Talend** data types:

   - Object: a generic **Talend** data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a **tFileInputRaw** component by specifying that it has a data type of Object.
• List: a space-separated list of primitive type elements in an XML Schema definition, defined using the xsd:list element.

• Document: a data type that allows processing an entire XML document without regarding to its content.

2. To retrieve or update the Regex File schema, click **Guess**. Note however that any edits to the schema might be lost after guessing the file based schema.

3. When done, click **Finish** to close the wizard.

### Centralizing XML file metadata

If you often need to connect to an XML file, you may want to use the [New Xml File] wizard to centralize your connection to the file and the schema retrieved from it in your Repository for easy reuse.

Depending on the option you select, the wizard helps you create either an input or an output file connection. In a Job, the tFileInputXML and tExtractXMLField components use the input connection created to read XML files, whereas tAdvancedFileOutputXML uses the output schema created to either write an XML file, or to update an existing XML file.

For further information about reading an XML file, see Setting up XML metadata for an input file on page 293.

For further information about writing an XML file, see Setting up XML metadata for an output file on page 303.

To create an XML file connection from scratch, expand the Metadata node in the Repository tree view, right-click **File XML** and select **Create file XML** from the contextual menu to open the file metadata setup wizard.

To centralize a file connection and its schema you have defined in a Job, click the icon in the **Basic settings** view of the relevant component with its Property Type set to **Built-in** to open the file metadata setup wizard.

Then define the general properties and file schema in the wizard.

### Setting up XML metadata for an input file

This section describes how to define a file connection and upload an XML schema for an input file. To define and upload an output file, see Setting up XML metadata for an output file on page 303.

Now you can drag and drop the file connection or any schema of it from the Repository tree view onto the design workspace as a new tFileInputXML or tExtractXMLField component or onto an existing component to reuse the metadata. For further information about how to use the centralized metadata in a Job, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

To modify an existing file connection, right-click it from the Repository tree view, and select **Edit file xml** to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the Repository tree view and select Retrieve Schema from the contextual menu.
To edit an existing file schema, right-click the schema from the Repository tree view and select Edit Schema from the contextual menu.

**Defining the general properties of the File XML connection**

**About this task**

In this step, the general metadata properties such as the Name, Purpose and Description are set.

**Procedure**

1. In the file metadata setup wizard, fill in the Name field, which is mandatory, and the Purpose and Description fields if you choose to do so. The information you provide in the Description field will appear as a tooltip when you move your mouse pointer over the file connection.

   - **Note:**
     
     When you enter the general properties of the metadata to be created, you need to define the type of connection as either input or output. It is therefore advisable to enter information that will help you distinguish between your input and output schemas.

2. If needed, set the version and status in the Version and Status fields respectively. You can also manage the version and status of a Repository item in the [Project Settings] dialog box. For more information, see Version management on page 450 and Status management on page 451 respectively.
3. If needed, click the Select button next to the Path field to select a folder under the File XML node to hold your newly created file connection. Note that you cannot select a folder if you are editing an existing connection, but you can drag and drop it to a new folder whenever you want.

4. Click Next to select the type of metadata.

**Setting the type of metadata (input)**

**About this task**

In this step, the type of metadata is set as either input or output. For this procedure, the metadata of interest is input.

**Procedure**

1. In the dialog box, select Input XML.

2. Click Next to upload the input file.

**Uploading an XML file**

**About this task**

This procedure describes how to upload an XML file to obtain the XML tree structure. To upload an XML Schema Definition (XSD) file, see Uploading an XSD file on page 297.

The example input XML file used to demonstrate this step contains some contact information, and the structure is like the following:

```xml
<contactInfo>
  <contact>
    <id>1</id>
    <firstName>Michael</firstName>
    <lastName>Jackson</lastName>
    <company>Talend</company>
    <city>Paris</city>
    <phone>2323</phone>
  </contact>
  <contact>
    <id>2</id>
  </contact>
</contactInfo>
```
To upload an XML file, do the following:

**Procedure**

1. Click **Browse...** and browse your directory to the XML file to be uploaded. Alternatively, enter the access path to the file. The **Schema Viewer** area displays a preview of the XML structure. You can expand and visualize every level of the file's XML tree structure.

2. Enter the **Encoding** type in the corresponding field if the system does not detect it automatically.

3. In the **Limit** field, enter the number of columns on which the XPath query is to be executed, or 0 if you want to run it against all of the columns.

4. Click **Next** to define the schema parameters.
Uploading an XSD file

About this task

This procedure describes how to upload an XSD file to obtain the XML tree structure. To upload an XML file, see Uploading an XML file on page 295.

An XSD file is used to define the schema of XML files. The structure and element data types of the example XML file above can be described using the following XSD, which is used as the example XSD input in this section.

```xml
<x:schema xmlns:x="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified">
  <x:element name="contactInfo">
    <x:complexType>
      <x:sequence>
        <x:element maxOccurs="unbounded" ref="contact"/>
      </x:sequence>
    </x:complexType>
  </x:element>
  <x:element name="contact">
    <x:complexType>
      <x:sequence>
        <x:element ref="id"/>
        <x:element ref="firstName"/>
        <x:element ref="lastName"/>
        <x:element ref="company"/>
        <x:element ref="city"/>
        <x:element ref="phone"/>
      </x:sequence>
    </x:complexType>
  </x:element>
  <x:element name="id" type="xs:integer"/>
  <x:element name="firstName" type="xs:NCName"/>
  <x:element name="lastName" type="xs:NCName"/>
  <x:element name="company" type="xs:NCName"/>
  <x:element name="city" type="xs:NCName"/>
  <x:element name="phone" type="xs:integer"/>
</x:schema>
```

For more information on XML Schema, see http://www.w3.org/XML/Schema.

**Note:**

When loading an XSD file,

- the data will be saved in the Repository, and therefore the metadata will not be affected by the deletion or displacement of the file.
- you can choose an element as the root of your XML tree.

To load an XSD file, do the following:

**Procedure**

1. Click **Browse...** and browse your directory to the XSD file to be uploaded. Alternatively, enter the access path to the file.
2. In the dialog box the appears, select an element from the **Root** list as the root of your XML tree, and click **OK**.
The **Schema Viewer** area displays a preview of the XML structure. You can expand and visualize every level of the file’s XML tree structure.

3. Enter the **Encoding** type in the corresponding field if the system does not detect it automatically.
4. In the **Limit** field, enter the number of columns on which the XPath query is to be executed, or 0 if you want to run it against all of the columns.
5. Click **Next** to define the schema parameters.

**Defining the schema**

**About this task**

In this step the schema parameters are set.
Centralizing metadata for Data Integration

The schema definition window is composed of four views:

<table>
<thead>
<tr>
<th>View</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Schema</td>
<td>Tree view of the XML file.</td>
</tr>
<tr>
<td>Target Schema</td>
<td>Extraction and iteration information.</td>
</tr>
<tr>
<td>Preview</td>
<td>Preview of the target schema, together with the input data of the selected columns displayed in the defined order.</td>
</tr>
</tbody>
</table>

**Note:**
The preview functionality is not available if you loaded an XSD file.
First define an XPath loop and the maximum number of times the loop can run. To do so:

**Procedure**

1. Populate the **XPath loop expression** field with the absolute XPath expression for the node to be iterated upon. There are two ways to do this, either:
   - enter the absolute XPath expression for the node to be iterated upon (Enter the full expression or press Ctrl+Space to use the autocompletion list),
   - drop a node from the tree view under **Source schema** onto the **Absolute XPath expression** field.
   An orange arrow links the node to the corresponding expression.

   ![XPath Loop Expression](image)

   **Note:**
   The **XPath loop expression** field is mandatory.

2. In the **Loop limit** field, specify the maximum number of times the selected node can be iterated, or -1 if you want to run it against all of the rows.

3. Define the fields to be extracted dragging the node(s) of interest from the **Source Schema** tree into the **Relative or absolute XPath expression** fields.

   **Note:**
   You can select several nodes to drop on the table by pressing Ctrl or Shift and clicking the nodes of interest. The arrow linking an individual node selected on the **Source Schema** to the **Fields to extract** table are blue in colour. The other ones are gray.
4. If needed, you can add as many columns to be extracted as necessary, delete columns or change the column order using the toolbar:

- Add or delete a column using the + and - buttons.
- Change the order of the columns using the ↑ and ↓ buttons.

5. In the Column name fields, enter labels for the columns to be displayed in the schema Preview area.

6. Click Refresh Preview to display a preview of the target schema. The fields are consequently displayed in the schema according to the defined order.

   **Note:**
   
   The preview functionality is not available if you loaded an XSD file.

7. Click Next to check and edit the end schema.
Finalizing the end schema

About this task

The schema generated displays the columns selected from the XML file and allows you to further define the schema.

Procedure

1. If needed, rename the metadata in the Name field (metadata, by default), add a Comment, and make further modifications, for example:
   - Redefine the columns by editing the relevant fields.
   - Add or delete a column using the + and - buttons.
   - Change the order of the columns using the ▲ and ▼ buttons.

Make sure the data type in the Type column is correctly defined.
For more information regarding Java data types, including date pattern, see Java API Specification.

Below are the commonly used Talend data types:

- **Object**: a generic Talend data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

2. If the XML file which the schema is based on has been changed, click the Guess button to generate the schema again. Note that if you have customized the schema, the Guess feature does not retain these changes.

3. Click Finish. The new file connection, along with its schema, appears under the File XML node in the Repository tree view.

## Setting up XML metadata for an output file

This section describes how to define a file connection and upload an XML schema for an output file. To define and upload an XML schema for an input file, see Setting up XML metadata for an input file on page 293.

Now you can drag and drop the file connection or any schema of it from the Repository tree view onto the design workspace as a new `tAdvancedFileOutputXML` component or onto an existing component to reuse the metadata.

To modify an existing file connection, right-click it from the Repository tree view, and select **Edit file xml** to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the Repository tree view and select **Retrieve Schema** from the contextual menu.

To edit an existing file schema, right-click the schema from the Repository tree view and select **Edit Schema** from the contextual menu.

## Defining the general properties of the File XML connection for an output file

### About this task

In this step, the general metadata properties such as the Name, Purpose and Description are set.

### Procedure

1. In the file metadata setup wizard, fill in the Name field, which is mandatory, and the Purpose and Description fields if you choose to do so. The information you provide in the Description field will appear as a tooltip when you move your mouse pointer over the file connection.

   **Note:**

   When you enter the general properties of the metadata to be created, you need to define the type of connection as either input or output. It is therefore advisable to enter information that will help you distinguish between your input and output schemas.
2. If needed, set the version and status in the **Version** and **Status** fields respectively. You can also manage the version and status of a repository item in the [Project Settings] dialog box. For more information, see Version management on page 450 and Status management on page 451 respectively.

3. If needed, click the **Select** button next to the **Path** field to select a folder under the **File XML** node to hold your newly created file connection. Note that you cannot select a folder if you are editing an existing connection, but you can drag and drop it to a new folder whenever you want.

4. Click **Next** to select the type of metadata.

**Setting the type of metadata (output)**

**About this task**

In this step, the type of metadata is set as either input or output. For this procedure, the metadata of interest is output.

**Procedure**

1. From the dialog box, select **Output XML**.
2. Click Next to define the output file, either from an XML or XSD file or from scratch.

**Defining the output file structure using an existing XML file**

**About this task**

In this step, you will choose whether to create your file manually or from an existing XML or XSD file. If you choose the Create manually option you will have to configure your schema, source and target columns yourself at step 4 in the wizard. The file will be created in a Job using a an XML output component such as `tAdvancedFileOutputXML`.

In this procedure, we will create the output file structure by loading an existing XML. To create the output XML structure from an XSD file, see Defining the output file structure using an XSD file on page 307.

To create the output XML structure from an XML file, do the following:

**Procedure**

1. Select the Create from a file option.
2. Click the Browse... button next to the XML or XSD File field, browse to the access path to the XML file the structure of which is to be applied to the output file, and double-click the file.

The File Viewer area displays a preview of the XML structure, and the File Content area displays a maximum of the first 50 rows of the file.
3. Enter the **Encoding** type in the corresponding field if the system does not detect it automatically.

4. In the **Limit** field, enter the number of columns on which the XPath query is to be executed, or enter 0 if you want it to be run against all of the columns.

5. In the **Output File** field, in the **Output File Path** zone, browse to or enter the path to the output file. If the file does not exist as yet, it will be created during the execution of a Job using a **tAdvancedFileOutputXML** component. If the file already exists, it will be overwritten.

6. Click **Next** to define the schema.
Defining the output file structure using an XSD file

About this task

This procedure describes how to define the output XML file structure from an XSD file. To define the XML structure from an XML file, see Defining the output file structure using an existing XML file on page 305.

Note:

When loading an XSD file,

- the data will be saved in the Repository, and therefore the metadata will not be affected by the deletion or displacement of the file.
- you can choose an element as the root of your XML tree.

To create the output XML structure from an XSD file, do the following:

Procedure

1. Select the Create from a file option.
2. Click the Browse... button next to the XML or XSD File field, browse to the access path to the XSD file the structure of which is to be applied to the output file, and double-click the file.
3. In the dialog box the appears, select an element from the Root list as the root of your XML tree, and click OK.

   The File Viewer area displays a preview of the XML structure, and the File Content area displays a maximum of the first 50 rows of the file.
4. Enter the **Encoding** type in the corresponding field if the system does not detect it automatically.

5. In the **Limit** field, enter the number of columns on which the XPath query is to be executed, or enter 0 if you want it to be run against all of the columns.

6. In the **Output File** field, in the **Output File Path** zone, browse to or enter the path to the output file. If the file does not exist as yet, it will be created during the execution of a Job using a **tAdvancedFileOutputXML** component. If the file already exists, it will be overwritten.

7. Click **Next** to define the schema.

**Defining the schema of your output file**

**About this task**

Upon completion of the previous operations, the columns in the **Linker Source** area are automatically mapped to the corresponding ones in the **Linker Target** area, as indicated by blue arrow links.
In this step, you need to define the output schema. The following table describes how:

<table>
<thead>
<tr>
<th>To...</th>
<th>Perform the following...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a schema from scratch or edit the source schema columns to pass to the output schema</td>
<td>In the <strong>Linker Source</strong> area, click the <strong>Schema Management</strong> button to open the schema editor.</td>
</tr>
</tbody>
</table>
| Define a loop element | In the **Linker Target** area, right-click the element of interest and select **Set As Loop Element** from the contextual menu.  
**Note:**  
It is a mandatory operation to define an element to run a loop on. |
| Define a group element | In the **Linker Target** area, right-click the element of interest and select **Set As Group Element** from the contextual menu.  
**Note:**  
You can set a parent element of the loop element as a group element on the condition that the parent element is not the root of the XML tree. |
<table>
<thead>
<tr>
<th>To...</th>
<th>Perform the following...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a child element for an element</td>
<td>In the <strong>Linker Target</strong> area,</td>
</tr>
<tr>
<td></td>
<td>• Right-click the element of interest and select <strong>Add Sub-element</strong> from the contextual menu, enter a name for the sub-element in the dialog box that appears, and click <strong>OK</strong>,</td>
</tr>
<tr>
<td></td>
<td>• Select the element of interest, click the [+] button at the bottom, select <strong>Create as sub-element</strong> in the dialog box that appears, and click <strong>OK</strong>. Then, enter a name for the sub-element in the next dialog box and click <strong>OK</strong>.</td>
</tr>
<tr>
<td>Create an attribute for an element</td>
<td>In the <strong>Linker Target</strong> area,</td>
</tr>
<tr>
<td></td>
<td>• Right-click the element of interest and select <strong>Add Attribute</strong> from the contextual menu, enter a name for the attribute in the dialog box that appears, and click <strong>OK</strong>,</td>
</tr>
<tr>
<td></td>
<td>• Select the element of interest, click the [+] button at the bottom, select <strong>Create as attribute</strong> in the dialog box that appears, and click <strong>OK</strong>. Then, enter a name for the attribute in the next dialog box and click <strong>OK</strong>.</td>
</tr>
<tr>
<td>Create a name space for an element</td>
<td>In the <strong>Linker Target</strong> area,</td>
</tr>
<tr>
<td></td>
<td>• Right-click the element of interest and select <strong>Add Name Space</strong> from the contextual menu, enter a name for the name space in the dialog box that appears, and click <strong>OK</strong>,</td>
</tr>
<tr>
<td></td>
<td>• Select the element of interest, click the [+] button at the bottom, select <strong>Create as name space</strong> in the dialog box that appears, and click <strong>OK</strong>. Then, enter a name for the name space in the next dialog box and click <strong>OK</strong>.</td>
</tr>
<tr>
<td>Delete one or more elements/attributes/name spaces</td>
<td>In the <strong>Linker Target</strong> area,</td>
</tr>
<tr>
<td></td>
<td>• Right-click the element(s)/attribute(s)/name space(s) of interest and select <strong>Delete</strong> from the contextual menu</td>
</tr>
<tr>
<td></td>
<td>• Select the element(s)/attribute(s)/name space(s) of interest and click the [x] button at the bottom</td>
</tr>
<tr>
<td></td>
<td>• Select the element(s)/attribute(s)/name space(s) of interest and press the <strong>Delete</strong> key.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong></td>
</tr>
<tr>
<td></td>
<td>Deleting an element will also delete its children, if any.</td>
</tr>
<tr>
<td>Adjust the order of one or more elements</td>
<td>In the <strong>Linker Target</strong> area, select the element(s) of interest and click the [↑] and [↓] buttons.</td>
</tr>
<tr>
<td>Set a static value for an element/attribute/name space</td>
<td>In the <strong>Linker Target</strong> area, right-click the element/attribute/name space of interest and select <strong>Set A Fix Value</strong> from the contextual menu.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong></td>
</tr>
<tr>
<td></td>
<td>• The value you set will replace any value retrieved for the corresponding column from the incoming data flow in your Job.</td>
</tr>
<tr>
<td></td>
<td>• You can set a static value for a child element of the loop element only, on the condition that the element does not have its own children and does not have a source-target mapping on it.</td>
</tr>
</tbody>
</table>
To...

<table>
<thead>
<tr>
<th>Perform the following...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Create a source-target mapping</strong></td>
</tr>
<tr>
<td>Select the column of interest in the Linker Source area, drop it onto the node of interest in the Linker Target area, and select Create as sub-element of target node, Create as attribute of target node, or Add linker to target node according to your need in the dialog box that appears, and click OK. If you choose an option that is not permitted for the target node, you will see a warning message and your operation will fail.</td>
</tr>
<tr>
<td><strong>Remove a source-target mapping</strong></td>
</tr>
<tr>
<td>In the Linker Target area, right-click the node of interest and select Disconnect Linker from the contextual menu.</td>
</tr>
<tr>
<td><strong>Create an XML tree from another XML or XSD file</strong></td>
</tr>
<tr>
<td>Right-click any schema item in the Linker Target area and select Import XML Tree from the contextual menu to load another XML or XSD file. Then, you need to create source-target mappings manually and define the output schema all again.</td>
</tr>
</tbody>
</table>

**Note:**

You can select and drop several fields at a time, using the Ctrl + Shift technique to make multiple selections, therefore making mapping faster. You can also make multiple selections for right-click operations.

**Procedure**

1. In the Linker Target area, right-click the element you want to run a loop on and select Set As Loop Element from the contextual menu.

2. Define other output file properties as needed, and then click Next to view and customize the end schema.
Finalizing the end schema of your output file

About this task

Step 5 of the wizard displays the end schema generated and allows you to further define the schema.

Procedure

1. If needed, rename the metadata in the Name field (metadata, by default), add a Comment, and make further modifications, for example:
   - Redefine the columns by editing the relevant fields.
   - Add or delete a column using the [+] and [x] buttons.
   - Change the order of the columns using the ↑ and ↓ buttons.

2. If the XML file which the schema is based on has been changed, click the Guess button to generate the schema again. Note that if you have customized the schema, the Guess feature does not retain these changes.

3. Click Finish. The new file connection, along with its schema, is displayed under the relevant File XML metadata node in the Repository tree view.
Centralizing File Excel metadata

If you often need to read data from and/or write data to a certain Excel spreadsheet file, you may want to centralize the connection to the file, along with its data structure, in the Repository for easy reuse. This will save you much effort because you will not have to define the metadata details manually in the relevant components each time you use the file.

You can centralize an Excel file connection either from an existing Excel file, or from Excel file property settings defined in a Job.

To centralize a File Excel connection and its schema from an Excel file, expand Metadata in the Repository tree view, right-click File Excel and select Create file Excel from the contextual menu to open the file metadata setup wizard.

To centralize a file connection and its schema you have already defined in a Job, click the icon in the Basic settings view of the relevant component, with its Property Type set to Built-in, to open the file metadata setup wizard.

Then complete these tasks step by step following the wizard:

- Define the general information that will identify the file connection. See Defining the general properties of the File Excel connection on page 313.
- Load the file of interest. See Loading the file on page 314.
- Parse the file to retrieve the file schema. See Parsing the file on page 316.
- Finalize the file schema. See Finalizing the end schema of your Excel file on page 317.

Now you can drag and drop the file connection or the schema of it from the Repository tree view onto the design workspace as a new component or onto an existing component to reuse the metadata. For further information about how to use the centralized metadata in a Job, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

To modify an existing file connection, right-click it from the Repository tree view, and select Edit file Excel to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the Repository tree view and select Retrieve Schema from the contextual menu.

To edit an existing file schema, right-click the schema from the Repository tree view and select Edit Schema from the contextual menu.

Defining the general properties of the File Excel connection

Procedure

1. In the file metadata setup wizard, fill in the Name field, which is mandatory, and the Purpose and Description fields if needed. The information you provide in the Description field will appear as a tooltip when you move your mouse pointer over the file connection.
2. If needed, set the version and status in the Version and Status fields respectively. You can also manage the version and status of a repository item in the Project Settings dialog box. For more information, see Version management on page 450 and Status management on page 451 respectively.

3. If needed, click the Select button next to the Path field to select a folder under the File Excel node to hold your newly created file connection.

4. Click Next to proceed with file settings.

**Loading the file**

**Procedure**

1. Click the Browse... button to browse to the file and fill out the File field.
   
   Skip this step if you are saving an Excel file connection defined in a component because the file path is already filled in the File field.
2. If the uploaded file is an Excel 2007 file, make sure that the Read excel2007 file format(xlsx) check box is selected.

3. By default, user mode is selected. If the uploaded xlsx file is extremely large, select Less memory consumed for large excel(Event mode) from the Generation mode list to prevent out-of-memory errors.

4. In the File viewer and sheets setting area, view the file content and the select the sheet or sheets of interest.
   - From the Please select sheet drop-down list, select the sheet you want to view. The preview table displays the content of the selected sheet.
     - By default the file preview table displays the first sheet of the file.
   - From the Set sheets parameters list, select the check box next to the sheet or sheets you want to upload.
If you select more than one sheet, the result schema will be the combination of the structures of all the selected sheets.

5. Click **Next** to continue.

**Parsing the file**

**About this task**

In this step of the wizard, you can define the various settings of your file so that the file schema can be properly retrieved.

**Procedure**

1. Specify the encoding, advanced separator for numbers, and the rows that should be skipped as they are header or footer, according to your Excel file.

![Excel file settings](image)

2. If needed, fill the **First column** and **Last column** fields with integers to set precisely the columns to be read in the file. For example, if you want to skip the first column as it may not contain proper data to be processed, fill the **First column** field with 2 to set the second column of the file as the first column of the schema.

To retrieve the schema of an Excel file you do not need to parse all the rows of the file, especially when you have uploaded a large file. To limit the number of rows to parse, select the **Limit** check box in the **Limit Of Rows** area and set or select the desired number of rows.

![Limit Of Rows](image)

3. If your Excel file has a header row, select the **Set heading row as column names** check box to take into account the heading names. Click **Refresh** to view the result of all the previous changes in the preview table.

![Excel file preview](image)
4. Then click **Next** to continue.

**Finalizing the end schema of your Excel file**

**About this task**

The last step of the wizard shows the end schema generated and allows you to customize the schema according to your needs.

Note that any character which could be misinterpreted by the program is replaced by neutral characters. For example, asterisks are replaced with underscores.
Procedure

1. If needed, rename the schema (by default, `metadata`) and leave a comment.

   Customize the schema if needed: add, remove or move schema columns, export the schema to an XML file, or replace the schema by importing an schema definition XML file using the tool bar.

   Make sure the data type in the `Type` column is correctly defined.

   For more information regarding Java data types, including date pattern, see Java API Specification.

   Below are the commonly used Talend data types:

   - Object: a generic Talend data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.

   - List: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

   - Document: a data type that allows processing an entire XML document without regarding to its content.

2. If the Excel file which the schema is based on has been changed, click the Guess button to generate the schema again. Note that if you have customized the schema, the Guess feature does not retain these changes.
3. Click Finish. The new schema is displayed under the relevant File Excel connection node in the Repository tree view.

**Centralizing File LDIF metadata**

**About this task**

LDIF files are directory files described by attributes. If you often need to read certain LDIF files, you may want to centralize the connections to these LDIF-type files and their attribute descriptions in the Repository for easy reuse. This way you will not have to define the metadata details manually in the relevant components each time you use the files.

You can centralize an LDIF file connection either from an existing LDIF file, or from the LDIF file property settings defined in a Job.

To centralize an LDIF connection and its schema from an LDIF file, expand Metadata in the Repository tree view, right-click File ldif and select Create file ldif from the contextual menu to open the file metadata setup wizard.

To centralize a file connection and its schema you have already defined in a Job, click the icon in the Basic settings view of the relevant component, with its Property Type set to Built-in, to open the file metadata setup wizard.

Then complete these steps following the wizard:

⚠️ **Warning:**

Make sure that you have installed the required third-party module as described in the Talend Installation and Upgrade Guide.

**Procedure**

1. Fill in the general information in the relevant fields to identify the LDIF file metadata, including Name, Purpose and Description.

   The Name field is required, and the information you provide in the Description field will appear as a tooltip when you move your mouse pointer over the file connection.
2. If needed, set the version and status in the **Version** and **Status** fields respectively. You can also manage the version and status of a repository item in the [Project Settings] dialog box. For more information, see **Version management** on page 450 and **Status management** on page 451 respectively.

3. If needed, click the **Select** button next to the **Path** field to select a folder under the **File ldif** node to hold your newly created file connection. Click **Next** to proceed with file settings.

4. Click the **Browse...** button to browse to the file and fill out the **File** field. Skip this step if you are saving an LDIF file connection defined in a component because the file path is already filled in the **File** field.
5. Check the first 50 rows of the file in the **File Viewer** area and click **Next** to continue.

6. From the list of attributes of the loaded file, select the attributes you want to include the file schema, and click **Refresh Preview** to preview the selected attributes. Then click **Next** to proceed with schema finalization.
7. If needed, customize the generated schema:
   - Rename the schema (by default, metadata) and leave a comment.
   - Add, remove or move schema columns, export the schema to an XML file, or replace the schema by importing an schema definition XML file using the tool bar.
Centralizing metadata for Data Integration

Make sure the data type in the **Type** column is correctly defined.

For more information regarding Java data types, including date pattern, see [Java API Specification](#).

Below are the commonly used *Talend* data types:

- **Object**: a generic *Talend* data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

8. If the LDIF file on which the schema is based has been changed, click the **Guess** button to generate the schema again. Note that if you have customized the schema, the **Guess** feature does not retain these changes.

9. Click **Finish**. The new schema is displayed under the relevant Ldif file connection node in the **Repository** tree view.
Results

Now you can drag and drop the file connection or the schema of it from the Repository tree view onto the design workspace as a new component or onto an existing component to reuse the metadata. For further information about how to use the centralized metadata in a Job, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

To modify an existing file connection, right-click it from the Repository tree view, and select Edit file ldif to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the Repository tree view and select Retrieve Schema from the contextual menu.

To edit an existing file schema, right-click the schema from the Repository tree view and select Edit Schema from the contextual menu.

Centralizing JSON file metadata

If you often need to use a JSON file, you may want to use the [New Json File] wizard to centralize the file connection, XPath query statements, and data structure in the Repository for easy reuse.

Depending on the option you select, the wizard helps you create either an input or an output file connections. In a Job, the tFileInputJSON and tExtractJSONFields components use the input schema created to read JSON files/fields, whereas tWriteJSONField uses the output schema created to write a JSON field, which can be saved in a file by tFileOutputJSON or extracted by tExtractJSONFields.

For information about setting up input JSON file metadata, see Setting up JSON metadata for an input file on page 324.

For information about setting up output JSON metadata, see Setting up JSON metadata for an output file on page 332.

In the Repository view, expand the Metadata node, right click File JSON, and select Create JSON Schema from the contextual menu to open the [New Json File] wizard.

Setting up JSON metadata for an input file

This section describes how to define a file connection and upload a JSON schema for an input file. To define an output JSON file connection and schema, see Setting up JSON metadata for an output file on page 332.

Now you can drag and drop the file connection or the schema of it from the Repository tree view onto the design workspace as a new tFileInputJSON or tExtractJSONFields component or onto an existing component to reuse the metadata. For further information about how to use the centralized metadata in a Job, see Using centralized metadata in a Job on page 415 and Setting a repository schema in a Job on page 51.

To modify an existing file connection, right-click it from the Repository tree view, and select Edit JSON to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the Repository tree view and select Retrieve Schema from the contextual menu.

To edit an existing file schema, right-click the schema from the Repository tree view and select Edit Schema from the contextual menu.
Defining the general properties of the File JSON connection

Procedure

1. In the wizard, fill in the general information in the relevant fields to identify the JSON file metadata, including Name, Purpose and Description.
   The Name field is required, and the information you provide in the Description field will appear as a tooltip when you move your mouse pointer over the file connection.
   
   ![New Json File](image)

   **Note:**
   In this step, it is advisable to enter information that will help you distinguish between your input and output connections, which will be defined in the next step.

2. If needed, set the version and status in the Version and Status fields respectively.
   You can also manage the version and status of a repository item in the [Project Settings] dialog box. For more information, see Version management on page 450 and Status management on page 451 respectively.

3. If needed, click the Select button next to the Path field to select a folder under the File Json node to hold your newly created file connection.

4. Click Next to select the type of metadata.
Setting the type of metadata and loading the input file

Procedure

1. In the dialog box, select Input Json and click Next to proceed to the next step of the wizard to load the input file.

2. From the Read By list box, select the type of query to read the source JSON file.
   - JsonPath: read the JSON data based on a JsonPath query.
     This is the default and recommended query type to read JSON data in order to gain performance and to avoid problems that you may encounter when reading JSON data based on an XPath query.
   - Xpath: read the JSON data based on an XPath query.

3. Click Browse... and browse your directory to the JSON file to be uploaded. Alternatively, enter the full path to the file or the URL that links to the JSON file.

   In this example, the input JSON file has the following content:

```json
{"movieCollection": [
    {
        "type": "Action Movie",
        "name": "Brave Heart",
        "details": {
            "release": "1995",
            "rating": "5",
            "starring": "Mel Gibson"
        }
    },
    {
        "type": "Action Movie",
        "name": "Edge of Darkness",
        "details": {
            "release": "2010",
            "rating": "5",
            "starring": "Mel Gibson"
        }
    }
]}
```
The **Schema Viewer** area displays a preview of the JSON structure. You can expand and visualize every level of the file's JSON tree structure.

4. Enter the **Encoding** type in the corresponding field if the system does not detect it automatically.

5. In the **Limit** field, enter the number of levels in the JSON hierarchical depth to which you want to limit the JsonPath or XPath query, 0 for no limits.

   Setting this parameter to a value less than 5 can help prevent the wizard from hanging in case of a large JSON file.

6. Click **Next** to define the schema parameters.

**Defining the schema of your JSON file**

**About this task**

In this step you will set the schema parameters.
The schema definition window is composed of four views:

<table>
<thead>
<tr>
<th>View</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Schema</td>
<td>Tree view of the JSON file.</td>
</tr>
<tr>
<td>Target Schema</td>
<td>Extraction and iteration information.</td>
</tr>
</tbody>
</table>
## Centralizing metadata for Data Integration

<table>
<thead>
<tr>
<th>View</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preview</td>
<td>Preview of the target schema, together with the input data of the selected columns displayed in the defined order.</td>
</tr>
<tr>
<td>File Viewer</td>
<td>Preview of the JSON file's data.</td>
</tr>
</tbody>
</table>

### Procedure

1. Populate the **Path loop expression** field with the absolute JsonPath or XPath expression, depending on the type of query you have selected, for the node to be iterated upon. There are two ways to do this, either:
   - enter the absolute JsonPath or XPath expression for the node to be iterated upon (enter the full expression or press **Ctrl+Space** to use the autocompletion list),
   - drag the loop element node from the tree view under **Source schema** into the **Absolute path expression** field of the **Path loop expression** table.

   An orange arrow links the node to the corresponding expression.

   ![Diagram](image)

   **Note:**
   The **Path loop expression** definition is mandatory.

2. In the **Loop limit** field, specify the maximum number of times the selected node can be iterated.
3. Define the fields to be extracted by dragging the nodes from the **Source Schema** tree into the **Relative or absolute path expression** fields of the **Fields to extract** table.
Centralizing metadata for Data Integration

Note:
You can select several nodes to drop onto the table by pressing Ctrl or Shift and clicking the nodes of interest.

4. If needed, you can add as many columns to be extracted as necessary, delete columns or change the column order using the toolbar:
   - Add or delete a column using the [+] and [x] buttons.
   - Change the order of the columns using the ↑ and ↓ buttons.

5. If you want your file schema to have different column names than those retrieved from the input file, enter new names in the corresponding Column name fields.

6. Click Refresh Preview to preview the target schema. The fields are consequently displayed in the schema according to the defined order.

7. Click Next to finalize the schema.

Finalizing the schema of your JSON file

About this task
The last step of the wizard shows the end schema generated and allows you to customize the schema according to your needs.
Procedure

1. If needed, rename the schema (by default, `metadata`) and leave a comment.

Customize the schema if needed: add, remove or move schema columns, export the schema to an XML file, or replace the schema by importing an schema definition XML file using the tool bar.

Make sure the data type in the **Type** column is correctly defined.

For more information regarding Java data types, including date pattern, see [Java API Specification](https://docs.oracle.com/javase/8/docs/api/). Below are the commonly used **Talend** data types:

- **Object**: a generic **Talend** data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.
2. If the JSON file which the schema is based on has been changed, click the **Guess** button to generate the schema again. Note that if you have customized the schema, the **Guess** feature does not retain these changes.

3. Click **Finish**. The new file connection, along with its schema, is displayed under the relevant **File Json** metadata node in the **Repository** tree view.

**Setting up JSON metadata for an output file**

This section describes how to define JSON metadata for an output file. To define JSON metadata for an input file, see **Setting up JSON metadata for an input file** on page 324.

Now you can drag and drop the file connection or the schema of it from the **Repository** tree view onto the design workspace as a new **tWriteJSONField** component or onto an existing component to reuse the metadata. For further information about how to use the centralized metadata in a Job, see **Using centralized metadata in a Job** on page 415 and **Setting a repository schema in a Job** on page 51.

To modify an existing file connection, right-click it from the **Repository** tree view, and select **Edit JSON** to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the **Repository** tree view and select **Retrieve Schema** from the contextual menu.

To edit an existing file schema, right-click the schema from the **Repository** tree view and select **Edit Schema** from the contextual menu.

**Defining general properties of the File JSON connection for an output file**

**Procedure**

1. In the wizard, fill in the general information in the relevant fields to identify the JSON file metadata, including **Name**, **Purpose** and **Description**.

   The **Name** field is required, and the information you provide in the **Description** field will appear as a tooltip when you move your mouse pointer over the file connection.

   **Note:**

   In this step, it is advisable to enter information that will help you distinguish between your input and output connections, which will be defined in the next step.
2. If needed, set the version and status in the **Version** and **Status** fields respectively.

   You can also manage the version and status of a repository item in the [Project Settings] dialog box. For more information, see [Version management](#) on page 450 and [Status management](#) on page 451 respectively.

3. If needed, click the **Select** button next to the **Path** field to select a folder under the **File Json** node to hold your newly created file connection.

4. Click **Next** to set the type of metadata.

   **Setting the type of metadata and loading the template JSON file**

   **About this task**

   In this step, the type of schema is set as either input or output. For this procedure, the schema of interest is output.

   **Procedure**

   1. From the dialog box, select **Output JSON** click **Next** to proceed to the next step of the wizard.
2. Choose whether to create the output metadata manually or from an existing JSON file as a template.

If you choose the **Create manually** option you will have to configure the schema and link the source and target columns yourself. The output JSON file/field is created via a Job using a JSON output component such as `tWriteJSONField`.

In this example, we will create the output metadata by loading an existing JSON file. Therefore, select the **Create from a file** option.

3. Click the **Browse...** button next to the **JSON File** field, browse to the access path to the JSON file the structure of which is to be applied to the output JSON file/field, and double-click the file. Alternatively, enter the full path to the file or the URL which links to the template JSON file.

The **File Viewer** area displays a preview of the JSON structure, and the **File Content** area displays a maximum of the first 50 rows of the file.
4. Enter the **Encoding** type in the corresponding field if the system does not detect it automatically.

5. In the **Limit** field, enter the number of levels in the JSON hierarchical depth to which you want to limit the JsonPath or XPath query, 0 for no limits.
   Setting this parameter to a value less than 5 can help prevent the wizard from hanging in case of a large JSON file.

6. Optionally, specify an output file path.

7. Click **Next** to define the schema.

**Defining the JSON schema of your output file**

**About this task**

Upon completion of the previous operations, the columns in the **Linker Source** area are automatically mapped to the corresponding ones in the **Linker Target** area, as indicated by blue arrow links.
In this step, you need to define the output schema. The following table describes how:

<table>
<thead>
<tr>
<th>To...</th>
<th>Perform the following...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define a loop element</td>
<td>In the <strong>Linker Target</strong> area, right-click the element of interest and select <strong>Set As Loop Element</strong> from the contextual menu.</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>It is a mandatory operation to define an element to run a loop on.</td>
</tr>
<tr>
<td>Define a group element</td>
<td>In the <strong>Linker Target</strong> area, right-click the element of interest and select <strong>Set As Group Element</strong> from the contextual menu.</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>You can set a parent element of the loop element as a group element on the condition that the parent element is not the root of the JSON tree.</td>
</tr>
<tr>
<td>To...</td>
<td>Perform the following...</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------</td>
</tr>
</tbody>
</table>
| Create a child element for an element | In the **Linker Target** area,  
  - Right-click the element of interest and select **Add Sub-element** from the contextual menu, enter a name for the sub-element in the dialog box that appears, and click **OK**.  
  - Select the element of interest, click the [*] button at the bottom, select **Create as sub-element** in the dialog box that appears, and click **OK**. Then, enter a name for the sub-element in the next dialog box and click **OK**. |
| Create an attribute for an element | In the **Linker Target** area,  
  - Right-click the element of interest and select **Add Attribute** from the contextual menu, enter a name for the attribute in the dialog box that appears, and click **OK**.  
  - Select the element of interest, click the [*] button at the bottom, select **Create as attribute** in the dialog box that appears, and click **OK**. Then, enter a name for the attribute in the next dialog box and click **OK**. |
| Create a name space for an element | In the **Linker Target** area,  
  - Right-click the element of interest and select **Add Name Space** from the contextual menu, enter a name for the name space in the dialog box that appears, and click **OK**.  
  - Select the element of interest, click the [*] button at the bottom, select **Create as name space** in the dialog box that appears, and click **OK**. Then, enter a name for the name space in the next dialog box and click **OK**. |
| Delete one or more elements/attributes/name spaces | In the **Linker Target** area,  
  - Right-click the element(s)/attribute(s)/name space(s) of interest and select **Delete** from the contextual menu.  
  - Select the element(s)/attribute(s)/name space(s) of interest and click the **[x]** button at the bottom.  
  - Select the element(s)/attribute(s)/name space(s) of interest and press the **Delete** key.  
  - **Note:** Deleting an element will also delete its children, if any. |
| Adjust the order of one or more elements | In the **Linker Target** area, select the element(s) of interest and click the ↑ and ↓ buttons. |
| Set a static value for an element/attribute/name space | In the **Linker Target** area, right-click the element/attribute/name space of interest and select **Set A Fix Value** from the contextual menu.  
  - **Note:**  
    - The value you set will replace any value retrieved for the corresponding column from the incoming data flow in your Job.  
    - You can set a static value for a child element of the loop element only, on the condition that the element does not have its own children and does not have a source-target mapping on it. |
To... | Perform the following...
---|---
Create a source-target mapping | Select the column of interest in the **Linker Source** area, drop it onto the node of interest in the **Linker Target** area, and select **Create as sub-element of target node**, **Create as attribute of target node**, or **Add linker to target node** according to your need in the dialog box that appears, and click **OK**. If you choose an option that is not permitted for the target node, you will see a warning message and your operation will fail.
Remove a source-target mapping | In the **Linker Target** area, right-click the node of interest and select **Disconnect Linker** from the contextual menu.
Create a JSON tree from another JSON file | Right-click any schema item in the **Linker Target** area and select **Import JSON Tree** from the contextual menu to load another JSON file. Then, you need to create source-target mappings manually and define the output schema all again.

### Note:

You can select and drop several fields at a time, using the **Ctrl + Shift** technique to make multiple selections, therefore making mapping faster. You can also make multiple selections for right-click operations.

### Procedure

1. In the **Linker Target** area, right-click the element you want to set as the loop element and select **Set As Loop Element** from the contextual menu.
   In this example, define a loop to run on the **details** element.

2. Customize the mappings if needed.

3. Click **Next** to finalize the schema.
Finalizing the end schema JSON of your output file

About this task
The last step of the wizard shows the end schema generated and allows you to customize the schema according to your needs.

Procedure
1. If needed, rename the schema (by default, metadata) and leave a comment.
   Customize the schema if needed: add, remove or move schema columns, export the schema to an XML file, or replace the schema by importing an schema definition XML file using the tool bar.
   Make sure the data type in the Type column is correctly defined.

   For more information regarding Java data types, including date pattern, see Java API Specification.

   Below are the commonly used Talend data types:

   - Object: a generic Talend data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a tFileInputRaw component by specifying that it has a data type of Object.

   - List: a space-separated list of primitive type elements in an XML Schema definition, defined using the xsd:list element.
• Document: a data type that allows processing an entire XML document without regarding to its content.

2. If the JSON file which the schema is based on has been changed, click the **Guess** button to generate the schema again. Note that if you have customized the schema, the **Guess** feature does not retain these changes.

3. Click **Finish**. The new file connection, along with its schema, is displayed under the relevant **File Json** metadata node in the **Repository** tree view.

**Centralizing LDAP connection metadata**

If you often need to access an LDAP directory, you want to centralize your LDAP server connection in the **Repository** tree view for easy reuse.

You can create an LDAP connection either from an accessible LDAP directory, or by saving the LDAP settings defined in a Job.

To create an LDAP connection from an accessible LDAP directory, expand the **Metadata** node in the **Repository** tree view, right-click the **LDAP** tree node, and select **Create LDAP schema** from the contextual menu to open the **[Create new LDAP schema]** wizard.

To centralize an LDAP connection and its schema you have already defined in a Job, click the **icon** in the **Basic settings** view of the relevant component, with its **Property Type** set to **Built-In**, to open the **[Create new LDAP schema]** wizard.

Unlike the DB connection wizard, the LDAP wizard gathers both LDAP server connection and schema definition in a five-step procedure.

Now you can drag and drop the file connection or any schema of it from the **Repository** tree view onto the design workspace as a new component or onto an existing component to reuse the metadata.

To modify an existing file connection, right-click it from the **Repository** tree view, and select **Edit LDAP schema** to open the file metadata setup wizard.

To add a new schema to an existing file connection, right-click the connection from the **Repository** tree view and select **Retrieve Schema** from the contextual menu.

To edit an existing file schema, right-click the schema from the **Repository** tree view and select **Edit Schema** from the contextual menu.

**Defining the general properties of the LDAP connection**

**Procedure**

1. Fill in the general information in the relevant fields to identify the LDAP connection to be created, including **Name**, **Purpose** and **Description**.

   The **Name** field is required, and the information you provide in the **Description** field will appear as a tooltip when you move your mouse pointer over the LDAP connection.

2. If needed, set the version and status in the **Version** and **Status** fields respectively. You can also manage the version and status of a **Repository** item in the **[Project Settings]** dialog box. For more information, see **Version management** on page 450 and **Status management** on page 451 respectively.
3. If needed, click the Select button next to the Path field to select a folder under the LDAP node to hold your newly created LDAP connection.

4. Click Next to define your LDAP server connection details.

**Defining the server connection**

**Procedure**

1. Fill the connection details.

   **File - Step 2 of 5**

   **Add a Metadata File to repository**

   **Define the path of the file and the format settings**

   ![Network Parameter Table]

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host</td>
<td>LDAP Server host name or IP address</td>
</tr>
<tr>
<td>Port</td>
<td>Listening port to the LDAP directory</td>
</tr>
<tr>
<td>Encryption method</td>
<td>LDAP: no encryption is used</td>
</tr>
<tr>
<td></td>
<td>LDAPS: secured LDAP</td>
</tr>
<tr>
<td></td>
<td>TLS: certificate is used</td>
</tr>
</tbody>
</table>

   2. Then check your connection using Check Network Parameter to verify the connection and activate the Next button.

   3. Click Next to continue.

**Configuring LDAP access parameters**

**Procedure**

1. In this view, set the authentication and data access mode.
### Create new LDAP schema

**Field - Step 2 of 5**

Add a Metadata File on repository
Define the setting of the parse job

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Authentication method</strong></td>
<td></td>
</tr>
</tbody>
</table>
Simple authentication: requires Authentication Parameters field to be filled in  
Anonymous authentication: does not require authentication parameters |
| **Authentication Parameters** |  
Bind DN or User: login as expected by the LDAP authentication method  
Bind password: expected password  
Save password: remembers the login details. |
| **Get Base DN from Root DSE / Base DN** |  
Path to user’s authorized tree leaf  
Fetch Base DNs button retrieves the DN automatically from Root. |
| **Alias Dereferencing** |  
Never allows to improve search performance if you are sure that no aliases is to be dereferenced. By default, Always is to be used.  
Always: Always dereference aliases  
Never: Never dereferences aliases.  
Searching: Dereferences aliases only after name resolution.  
Finding: Dereferences aliases only during name resolution |
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral Handling</td>
<td>redirection of user request:</td>
</tr>
<tr>
<td></td>
<td><strong>Ignore</strong>: does not handle request redirections</td>
</tr>
<tr>
<td></td>
<td><strong>Follow</strong>: does handle request redirections</td>
</tr>
<tr>
<td>Limit</td>
<td>limited number of records to be read</td>
</tr>
</tbody>
</table>

2. Click **Check authentication** to verify your access rights.

3. Click **Fetch Base DNs** to retrieve the DN and click the **Next** button to continue.

4. If any third-party libraries required for setting up an LDAP connection are found missing, an external module installation wizard appears. Install the required libraries as guided by the wizard. For more information on installing third-party modules, see the **Talend Installation and Upgrade Guide**.

### Defining the schema of your LDAP directory

**Procedure**

1. Select the attributes to be included in the schema structure. Add a filter if you want selected data only.
2. Click **Refresh Preview** to display the selected column and a sample of the data.
3. Click **Next** to continue.

**Finalizing the end schema of your LDAP directory**

**About this task**
The last step shows the LDAP schema generated and allows you to further customize the end schema.

![Create new LDAP schema](image)

**Procedure**
1. If needed, rename the metadata in the **Name** field (metadata, by default), add a **Comment**, and make further modifications, for example:
   - Redefine the columns by editing the relevant fields.
   - Add or delete a column using the + and - buttons.
   - Change the order of the columns using the ↑ and ↓ buttons.

Make sure the data type in the **Type** column is correctly defined.
For more information regarding Java data types, including date pattern, see Java API Specification.

Below are the commonly used Talend data types:

- **Object**: a generic Talend data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a tFileInputRaw component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the xsd:list element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

2. If the LDAP directory which the schema is based on has changed, use the Guess button to generate again the schema. Note that if you customized the schema, your changes will not be retained after the Guess operation.

3. Click Finish. The new schema is displayed under the relevant LDAP connection node in the Repository tree view.

---

**Centralizing Azure Storage metadata**

*About this task*

You can use the Azure Storage metadata wizard provided by Talend Studio to set up quickly a connection to Azure Storage and retrieve the schema of your interested container(s), queue(s), and table(s).

*Procedure*

1. In the Repository tree view, expand the Metadata node, right-click the Azure Storage tree node, and select Create Azure Storage from the contextual menu to open the [Azure Storage] wizard.
2. In the **Azure Storage Connection Settings** dialog box, specify (or update if needed) the values for the properties listed in the following table.

![Azure Storage Connection Settings dialog box](image)

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter the name for the connection to be created.</td>
</tr>
<tr>
<td>Account Name</td>
<td>Enter the name of the storage account you need to access. A storage account name can be found in the Manage Access Keys dashboard of the Microsoft Azure Storage system to be used.</td>
</tr>
<tr>
<td>Account Key</td>
<td>Enter the key associated with the storage account you need to access. Two keys are available for each account and by default, either of them can be used for this access.</td>
</tr>
<tr>
<td>Protocol</td>
<td>Select the protocol for this connection to be created.</td>
</tr>
<tr>
<td>Use Azure Shared Access Signature</td>
<td>Select this check box to use a shared access signature to access the storage resources without need for the account key. In the Azure Shared Access Signature field displayed, enter your shared access signature between double quotation marks. For more information, see <a href="link">Using Shared Access Signatures (SAS)</a>.</td>
</tr>
</tbody>
</table>

3. Click **Test connection** to verify the configuration.

A connection successful dialog box will prompt up if the connection information provided is correct. Then click **OK** to close the dialog box. The **Next** button will be available to use.

4. Click **Next** and in the [Add a new container schema in current connection] dialog box displayed, select your interested container(s) whose schema you want to retrieve.
5. Click **Next** and in the **[Add a new queue schema in current connection]** dialog box displayed, select your interested queue(s) whose schema you want to retrieve.

6. Click **Next** and in the **[Add a new table schema in current connection]** dialog box displayed, select your interested table(s) whose schema you want to retrieve.
7. Click Finish to complete the procedure.

The newly created Azure Storage connection is displayed under the Azure Storage node in the Repository tree view, along with the schema of your interested container(s), queue(s), and table(s).
You can now add a Azure Storage component onto the design workspace by dragging and dropping the Azure Storage connection created or any container/queue/table retrieved from the Repository view to reuse the connection and/or schema information. For more information about dropping component metadata in the design workspace, see Using centralized metadata in a Job on page 415. For more information about the usage of the Azure Storage components, see the related documentation for the Azure Storage components.

To modify the Azure Storage connection metadata created, right-click the connection node in the Repository tree view and select Edit Azure Storage from the contextual menu to open the metadata setup wizard.

To edit the schema of an interested container/queue/table, right-click the container/queue/table node in the Repository tree view and select Edit Schema from the contextual menu to open the update schema wizard.

**Centralizing Google Drive metadata**

Talend Studio enables you to centralize the details of your Google Drive connection under the Metadata folder in the Repository tree view. You can then use the established connection to connect to your Google Drive when using the Google Drive components.

**Procedure**

1. In the Repository tree view, expand the Metadata node, right-click the Google Drive tree node, and select New GoogleDrive Connection from the contextual menu to open the [New Google Drive Connection] wizard.

2. Specify the values for the properties listed in the following table according to the OAuth method you are using.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The name for the Google Drive connection to be created.</td>
</tr>
<tr>
<td>Application Name</td>
<td>The application name required by Google Drive to get access to its APIs.</td>
</tr>
<tr>
<td>OAuth Method</td>
<td>Select an OAuth method used to access Google Drive from the drop-down list.</td>
</tr>
<tr>
<td></td>
<td>• Access Token (deprecated): uses an access token to access Google Drive.</td>
</tr>
<tr>
<td></td>
<td>• Installed Application (Id &amp; Secret): uses the client ID and client secret created through Google API Console to access Google Drive. For more information about this method, see Google Identity Platform &gt; Installed applications.</td>
</tr>
<tr>
<td></td>
<td>• Installed Application (JSON): uses the client secret JSON file that is created through Google API Console and contains the client ID, client secret, and other OAuth 2.0 parameters to access Google Drive.</td>
</tr>
<tr>
<td></td>
<td>• Service Account: uses a service account JSON file created through Google API Console to access Google Drive.</td>
</tr>
</tbody>
</table>
### Property Description

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Drive</td>
<td>Google Drive. For more information about this method, see Google Identity Platform &gt; Service accounts.</td>
</tr>
<tr>
<td></td>
<td>For more detailed information about how to access Google Drive using each method, see the description of OAuth methods for accessing Google Drive in Talend Components Reference Guide or on Talend Help Center (<a href="https://help.talend.com">https://help.talend.com</a>).</td>
</tr>
<tr>
<td>Access Token</td>
<td>The access token generated through Google Developers OAuth 2.0 Playground.</td>
</tr>
<tr>
<td></td>
<td>This property is available only when Access Token is selected from the OAuth Method drop-down list.</td>
</tr>
<tr>
<td>Client ID and Client Secret</td>
<td>The client ID and client secret. These two properties are available only when Installed Application (Id &amp; Secret) is selected from the OAuth Method drop-down list.</td>
</tr>
<tr>
<td>Client Secret JSON</td>
<td>The path to the client secret JSON file. This property is available only when Installed Application (JSON) is selected from the OAuth Method drop-down list.</td>
</tr>
<tr>
<td>Service Account JSON</td>
<td>The path to the service account JSON file. This property is available only when Service Account is selected from the OAuth Method drop-down list.</td>
</tr>
<tr>
<td>DataStore Path</td>
<td>The path to the credential file that stores the refresh token. This property is available only when Installed Application (Id &amp; Secret) or Installed Application (JSON) is selected from the OAuth Method drop-down list.</td>
</tr>
<tr>
<td>Use Proxy</td>
<td>Select this check box when you are working behind a proxy. With this check box selected, you need to specify the value for the following parameters:</td>
</tr>
<tr>
<td></td>
<td>• Host: The IP address of the HTTP proxy server.</td>
</tr>
<tr>
<td></td>
<td>• Port: The port number of the HTTP proxy server.</td>
</tr>
<tr>
<td>Use SSL</td>
<td>Select this check box if an SSL connection is used to access Google Drive. With this check box selected, you need to specify the value for the following parameters:</td>
</tr>
<tr>
<td></td>
<td>• Algorithm: The name of the SSL cryptography algorithm.</td>
</tr>
<tr>
<td></td>
<td>• Keystore File: The path to the certificate TrustStore file that contains the list of certificates the client trusts.</td>
</tr>
<tr>
<td>Property</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
</tr>
<tr>
<td>• Password</td>
<td>The password used to check the integrity of the TrustStore data.</td>
</tr>
</tbody>
</table>

3. Click **Test connection** to verify the configuration.

If you are using the OAuth method **Access Token (deprecated), Installed Application (Id & Secret)**, or **Installed Application (JSON)**, a window will pop up in your web browser, asking you to choose your account and allow the access to your Google Drive. After the authentication in web browser, a connection successful dialog box will prompt up in Talend Studio.

4. Click **OK** to close the connection successful dialog box and then click **Finish**.

The newly created Google Drive connection is displayed under the **Google Drive** node in the **Repository** tree view.

You can now add a Google Drive component onto the design workspace by dragging and dropping the new Google Drive connection node to reuse the connection information. For more information about dropping component metadata in the design workspace, see Using centralized metadata in a **Job** on page 415. For more information about the usage of the Google Drive components, see the related documentation for the Google Drive components.

To modify the Google Drive connection metadata created, right-click the connection node in the **Repository** tree view and select **Edit Google Drive Connection** from the contextual menu to open the metadata setup wizard.

**Centralizing Marketo metadata**

**About this task**

You can use the Marketo metadata wizard provided by Talend Studio to set up quickly a connection to Marketo and retrieve the schema of your interested custom objects using REST API.

**Procedure**

1. In the **Repository** tree view, expand the **Metadata** node, right-click the **Marketo** tree node, and select **Create Marketo** from the contextual menu to open the **Marketo** wizard.
2. In the Marketo REST Connection Settings dialog box, specify (or update if needed) the values for the properties listed in the following table.
### Centralizing metadata for Data Integration

#### Marketo REST Connection Settings

Complete these fields in order to connect to your Marketo account.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection name</td>
<td>Enter the name for the connection to be created.</td>
</tr>
<tr>
<td>Endpoint address</td>
<td>Enter the API Endpoint URL of the Marketo Web Service. The API Endpoint URL can be found on the Marketo Admin &gt; Web Services panel.</td>
</tr>
<tr>
<td>Client access ID</td>
<td>Enter the client Id for the access to the Marketo Web Service.</td>
</tr>
<tr>
<td>Secret key</td>
<td>Enter the client secret for the access to the Marketo Web Service.</td>
</tr>
<tr>
<td>Timeout</td>
<td>Enter the timeout value (in milliseconds) for the connection to the Marketo Web Service before terminating the attempt.</td>
</tr>
<tr>
<td>Max reconnection attempts</td>
<td>Enter the maximum number of reconnect attempts to the Marketo Web Service before giving up.</td>
</tr>
<tr>
<td>Attempt interval time</td>
<td>Enter the time period (in milliseconds) between subsequent reconnection attempts.</td>
</tr>
</tbody>
</table>

3. Click **Test connection** to verify the configuration.

   A connection successful dialog box will prompt up if the connection information provided is correct. Then click **OK** to close the dialog box. The **Next** button will be available to use.

4. Click **Next** to go to the next step to select your interested custom objects.
5. Select the custom objects whose schema you want to retrieve, and then click Finish.

The newly created Marketo connection is displayed under the Marketo node in the Repository tree view, along with the schema of your interested custom objects.

You can now add a Marketo component onto the design workspace by dragging and dropping the Marketo connection created or any custom object retrieved from the Repository view to reuse.
Centralizing metadata for Data Integration

the connection and/or schema information. For more information about dropping component metadata in the design workspace, see Using centralized metadata in a Job on page 415. For more information about the usage of the Marketo components, see the related documentation for the Marketo components.

To modify the Marketo connection metadata created, right-click the connection node in the Repository tree view and select Edit Marketo from the contextual menu to open the metadata setup wizard.

To edit the schema of an interested custom object, right-click the custom object node in the Repository tree view and select Edit Schema from the contextual menu to open the update schema wizard.

**Centralizing Salesforce metadata**

You can use the Salesforce metadata wizard provided by Talend Studio to set up quickly a connection to a Salesforce system so that you can reuse your Salesforce metadata across Jobs.

**About this task**

You can use the Salesforce metadata wizard provided by Talend Studio to set up quickly a connection to a Salesforce system so that you can reuse your Salesforce metadata across Jobs.

**Procedure**

1. In the Repository tree view, expand the Metadata node, right-click the Salesforce tree node, and select Create Salesforce from the contextual menu to open the [Salesforce] wizard.

2. Enter a name for your connection in the Name field, select Basic or OAuth from the Connection type list, and provide the connection details according to the connection type you selected.
With the **Basic** option selected, you need to specify the following details:

- **User Id**: the ID of the user in Salesforce.
- **Password**: the password associated with the user ID.
- **Security Key**: the security token.

With the **OAuth** option selected, you need to specify the following details:

- **Client Id** and **Client Secret**: the OAuth consumer key and consumer secret, which are available in the **OAuth Settings** area of the Connected App that you have created at Salesforce.com.
- **Callback Host** and **Callback Port**: the OAuth authentication callback URL. This URL (both host and port) is defined during the creation of a Connected App and will be shown in the **OAuth Settings** area of the Connected App.
- **Token File**: the path to the token file that stores the refresh token used to get the access token without authorization.

3. If needed, click **Advanced**... to open the [Salesforce Advanced Connection Settings] dialog box, do the following and then click **OK**:

- enter the Salesforce Webservice URL required to connect to the Salesforce system.
- select the **Bulk Connection** check box if you need to use bulk data processing function.
- select the **Use or save the connection session** check box and in the **Session directory** field displayed, specify the path to the connection session file to be saved or used.
This session file can be shared by different Jobs to retrieve a connection session as long as the correct user ID is provided by the component. This way, you do not need to connect to the server to retrieve the session.

When an expired session is detected, if the correct connection information (the user ID, password, and security key) is provided, the component will connect to the server to retrieve the new session information and update the connection session file.

This check box is available only when Basic is selected from the Connection type drop-down list.

- select the Need compression check box to activate SOAP message compression, which can result in increased performance levels.
- select the Trace HTTP message check box to output the HTTP interactions on the console. This option is available if the Bulk Connection check box is selected.
- select the Use HTTP Chunked check box to use the HTTP chunked data transfer mechanism. This option is not available if the Bulk Connection check box is selected.
- enter the ID of the real user in the Client Id field to differentiate between those who use the same account and password to access the Salesforce website.
- fill the Timeout field with the Salesforce connection timeout value, in milliseconds.

4. Click Test connection to verify the connection settings, and when the connection check success message appears, click OK for confirmation. Then click Next to go to the next step to select the modules you want to retrieve the schema of.

5. Select the check boxes for the modules of interest and click Finish to retrieve the schemas of the selected modules.

You can type in filter text to narrow down your selection.
The newly created Salesforce connection is displayed under the Salesforce node in the Repository tree view, along with the schemas of the selected modules.
Results

You can now drag and drop the Salesforce connection or any schema of it from the **Repository** onto the design workspace, and from the dialog box that opens choose a Salesforce component to use in your Job. You can also drop the Salesforce connection or a schema of it onto an existing component to reuse the connection or metadata details in the component. For more information about dropping component metadata in the design workspace, see *Using centralized metadata in a Job* on page 415.

To modify the Salesforce metadata entry, right-click it from the **Repository** tree view, and select **Edit Salesforce** to open the file metadata setup wizard.

To edit an existing Salesforce schema, right-click the schema from the **Repository** tree view and select **Edit Schema** from the contextual menu.

Centralizing Snowflake metadata

About this task

You can use the Snowflake metadata wizard provided by Talend Studio to set up quickly a connection to Snowflake and retrieve the schema of your interested tables.

ℹ️ **Note:** The Snowflake metadata wizard doesn't support handling Snowflake views for now.

Procedure

1. In the **Repository** tree view, expand the **Metadata** node, right-click the **Snowflake** tree node, and select **Create Snowflake** from the contextual menu to open the [Snowflake] wizard.

2. In the **Snowflake Connection Settings** dialog box, specify the values for the properties listed in the following table.
### Snowflake Connection Settings

Complete these fields in order to connect to your Snowflake account.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter the name for the connection to be created.</td>
</tr>
<tr>
<td>Account</td>
<td>Enter the account name that has been assigned to you by Snowflake.</td>
</tr>
<tr>
<td>User Id</td>
<td>Enter your login name that has been defined in Snowflake using the LOGIN_NAME parameter of Snowflake. For details, ask the administrator of your Snowflake system.</td>
</tr>
<tr>
<td>Password</td>
<td>Enter the password associated with the user ID.</td>
</tr>
<tr>
<td>Warehouse</td>
<td>Enter the name of the Snowflake warehouse to be used. This name is case-sensitive and is normally upper case in Snowflake.</td>
</tr>
<tr>
<td>Schema</td>
<td>Enter the name of the database schema to be used. This name is case-sensitive and is normally upper case in Snowflake.</td>
</tr>
<tr>
<td>Database</td>
<td>Enter the name of the Snowflake database to be used. This name is case-sensitive and is normally upper case in Snowflake.</td>
</tr>
</tbody>
</table>

3. Click **Advanced...** and in the [Snowflake Advanced Connection Settings] dialog box displayed, specify or update the values for the advanced properties listed in the following table and click **OK** to close the dialog box.
Centralizing metadata for Data Integration

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Login Timeout</td>
<td>Specify how long to wait for a response when connecting to Snowflake before returning an error.</td>
</tr>
<tr>
<td>Tracing</td>
<td>Select the log level for the Snowflake JDBC driver. If enabled, a standard Java log is generated.</td>
</tr>
<tr>
<td>Role</td>
<td>Enter the default access control role to use to initiate the Snowflake session. This role must already exist and has been granted to the user ID you are using to connect to Snowflake. If this field is left empty, the PUBLIC role is automatically granted. For further information about the Snowflake access control model, see Snowflake documentation at Understanding the Access Control Model.</td>
</tr>
</tbody>
</table>

4. Click **Test connection** to verify the configuration.
   A connection successful dialog box will prompt up if the connection information provided is correct. Then click **OK** to close the dialog box. The **Next** button will be available to use.

5. Click **Next** to go to the next step to select your interested tables.
6. Select the tables whose schema you want to retrieve, and then click **Finish**. The newly created Snowflake connection is displayed under the **Snowflake** node in the **Repository** tree view, along with the schema of your interested tables.
You can now add a Snowflake component onto the design workspace by dragging and dropping the Snowflake connection created or any table retrieved from the Repository view to reuse the connection and/or schema information. For more information about dropping component metadata in the design workspace, see Using centralized metadata in a Job on page 415. For more information about the usage of the Snowflake components, see the related documentation for the Snowflake components.

To modify the Snowflake connection metadata created, right-click the connection node in the Repository tree view and select Edit Snowflake from the contextual menu to open the metadata setup wizard.

To edit the schema of an interested table, right-click the table node in the Repository tree view and select Edit Schema from the contextual menu to open the update schema wizard.

### Setting up a generic schema

Talend Studio allows you to create a generic schema to use in your Jobs if none of the specific metadata wizards matches your need or if you do not have any source file to take the schema from.

You can create a generic schema:

- from scratch. For details, see Setting up a generic schema from scratch on page 363,
- from a schema definition XML file. For details, see Setting up a generic schema from an XML file on page 366, and
- from the schema defined in a component. For details, see Saving a component schema as a generic schema on page 368.

To use a generic schema on a component, use either of the following methods:

- Select Repository from the Schema drop-down list in the component Basic settings view.
  
  Click the [...] button to open the [Repository Content] dialog box, select the generic schema under the Generic schemas node and click OK.
- Select the metadata node of the generic schema from the Repository tree view and drop it onto the component.

### Setting up a generic schema from scratch

**About this task**

To create a generic schema from scratch, proceed as follows:

**Procedure**

1. Right-click Generic schemas under the Metadata node in the Repository tree view, and select Create generic schema.
2. In the schema creation wizard that appears, fill in the generic schema properties such as schema Name and Description. The Status field is a customized field. For more information about how to define the field, see Status settings on page 457. Click Next to continue.

3. Give a name to the schema or use the default one (metadata) and add a comment if needed. Customize the schema structure in the Schema panel according to your needs. The tool bar allows you to add, remove or move columns in your schema.
Make sure the data type in the **Type** column is correctly defined.

For more information regarding Java data types, including date pattern, see [Java API Specification](#).

Below are the commonly used **Talend** data types:

- **Object**: a generic **Talend** data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

4. Click **Finish** to complete the generic schema creation. The created schema is displayed under the relevant **Generic schemas** node.
Setting up a generic schema from an XML file

About this task

⚠️ Warning:

The source XML file from which you can create a generic schema must be an export of schema from the Studio or an XML with the same XML tree structure, not any other kind of XML.

To create a generic schema from a source XML file, proceed as follows:

Procedure

1. Right-click Generic schemas in the Repository tree view, and select Create generic schema from xml.

2. In the dialog box that appears, choose the source XML file from which the schema is taken and click Open.

3. In the schema creation wizard that appears, define the schema Name or use the default one (metadata) and give a Comment if any.

   The schema structure from the source file is displayed in the Schema panel. You can customize the columns in the schema as needed.

   The tool bar allows you to add, remove or move columns in your schema.
Make sure the data type in the **Type** column is correctly defined.

For more information regarding Java data types, including date pattern, see [Java API Specification](#).

Below are the commonly used **Talend** data types:

- **Object**: a generic Talend data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.
- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.
- **Document**: a data type that allows processing an entire XML document without regarding to its content.

4. Click **Finish** to complete the generic schema creation. The created schema is displayed under the relevant **Generic schemas** node.
Saving a component schema as a generic schema

About this task

You can create a generic schema by saving the schema defined in a component. To do so, follow the steps below:

Procedure

1. Open the Basic settings view of the component that has the schema you want to create a generic schema from, and click the [...] button next to Edit schema to open the [Schema] dialog box.

![Schema dialog box](image)

2. Click the floppy disc icon to open the [Select folder] dialog box.

![Select folder dialog box](image)

3. Select a folder if needed, and click OK to close the dialog box and open the [Save as generic schema] creation wizard.
4. Fill in the Name field (required) and the other fields if needed, and click Finish to save the schema. Then close the [Schema] dialog box opened from the component Basic settings view. The schema is saved in the selected folder under the Generic schemas node in the Repository tree view.

Centralizing MDM metadata

Talend Studio enables you to centralize the details of one or more MDM connections under the Metadata folder in the Repository tree view. You can then use any of these established connections to connect to the MDM server.

Note:

You can also set up an MDM connection the same way by clicking the icon in the Basic settings view of the tMDMInput and tMDMOutput components. For more information, see Talend Help Center (https://help.talend.com).

According to the option you select, the wizard helps you create an input XML, an output XML or a receive XML schema. Later, in a Talend Job, the tMDMInput component uses the defined input schema to read master data stored in XML documents, tMDMOutput uses the defined output schema to either write master data in an XML document on the MDM server, or to update existing XML documents and finally the tMDMReceive component uses the defined XML schema to receive an MDM record in XML from MDM triggers and processes.
Setting up the connection

About this task
To establish an MDM connection, complete the following:

Procedure
1. In the Repository tree view, expand Metadata and right-click Talend MDM.
2. Select Create MDM Connection from the contextual menu.
   The connection wizard is displayed.

3. Fill in the connection properties such as Name, Purpose and Description. The Status field is a customized field that can be defined. For more information, see Status settings on page 457.
4. Click Next to proceed to the next step.
5. From the **Version** list, select the version of the MDM server to which you want to connect.

   **Note:**

   The default value in the **Server URL** field varies depending on what you selected in the **Version** list.

6. Fill in the connection details including the authentication information to the MDM server and then click **Check** to check the connection you have created.

   A dialog box pops up to show that your connection is successful. Click **OK** to close it.

   If needed, you can click **Export as context** to export this **Talend MDM** connection details to a new context group in the Repository or reuse variables of an existing context group to set up your metadata connection. For more information, see Exporting metadata as context and reusing context parameters to set up a connection on page 405.

7. Click **Next** to proceed to the next step.
8. From the **Data-Model** list, select the data model against which the master data is validated.
9. From the **Data-Container** list, select the data container that holds the master data you want to access.
10. Click **Finish** to validate your changes and close the dialog box.

The newly created connection is listed under **Talend MDM** under the **Metadata** folder in the **Repository** tree view.

**Results**

You need now to retrieve the XML schema of the business entities linked to this MDM connection.

**Defining MDM schema**

**Defining Input MDM schema**

This section describes how to define and download an input MDM XML schema. To define and download an output MDM XML schema, see **Defining output MDM schema** on page 378.

To set the values to be fetched from one or more entities linked to a specific MDM connection, complete the following:

1. In the **Repository** tree view, expand **Metadata** and right-click the MDM connection for which you want to retrieve the entity values.

2. Select **Retrieve Entity** from the contextual menu.
3. Select the **Input MDM** option in order to download an input XML schema and then click **Next** to proceed to the following step.
4. From the **Entities** field, select the business entity (XML schema) from which you want to retrieve values.

The name is displayed automatically in the **Name** field.

**Note:**

You are free to enter any text in this field, although you would likely put the name of the entity from which you are retrieving the schema.

5. Click **Next** to proceed to the next step.
Centralizing metadata for Data Integration

Note:
The schema of the entity you selected is automatically displayed in the Source Schema panel.

Here, you can set the parameters to be taken into account for the XML schema definition.

The schema dialog box is divided into four different panels as the following:

<table>
<thead>
<tr>
<th>Panel</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Schema</td>
<td>Tree view of the uploaded entity.</td>
</tr>
<tr>
<td>Target schema</td>
<td>Extraction and iteration information.</td>
</tr>
<tr>
<td>Preview</td>
<td>Target schema preview.</td>
</tr>
<tr>
<td>File viewer</td>
<td>Raw data viewer.</td>
</tr>
</tbody>
</table>

6. In the Xpath loop expression area, enter the absolute XPath expression leading to the XML structure node on which to apply the iteration. Or, drop the node from the source schema to the target schema Xpath field. This link is orange in color.

Note:
The Xpath loop expression field is compulsory.
7. If required, define a **Loop limit** to restrict the iteration to a number of nodes.

In the capture above, we use **Features** as the element to loop on because it is repeated within the **Product** entity as follows:

```xml
<Product>
  <Id>1</Id>
  <Name>Cup</Name>
  <Description/>
  <Features>
    <Feature>Color red</Feature>
    <Feature>Size maxi</Feature>
  </Features>
  ...
</Product>

<Product>
  <Id>2</Id>
  <Name>Cup</Name>
  <Description/>
  <Features>
    <Feature>Color blue</Feature>
    <Feature>Thermos</Feature>
  </Features>
  ...
</Product>
```

By doing so, the **tMDMInput** component that uses this MDM connection will create a new row for every item with different feature.

8. To define the fields to extract, drop the relevant node from the source schema to the **Relative or absolute XPath expression** field.
9. If required, enter a name to each of the retrieved columns in the Column name field.

   Note:
   You can prioritize the order of the fields to extract by selecting the field and using the up and down arrows. The link of the selected field is blue, and all other links are grey.

10. Click Finish to validate your modifications and close the dialog box.

   The newly created schema is listed under the corresponding MDM connection in the Repository tree view.

   To modify the created schema, complete the following:

   1. In the Repository tree view, expand Metadata and Talend MDM and then browse to the schema you want to modify.

   2. Right-click the schema name and select Edit Entity from the contextual menu.

      A dialog box is displayed.
3. Modify the schema as needed.

You can change the name of the schema according to your needs, you can also customize the schema structure in the schema panel. The tool bar allows you to add, remove or move columns in your schema.

Make sure the data type in the **Type** column is correctly defined.

For more information regarding Java data types, including date pattern, see [Java API Specification](#).

Below are the commonly used **Talend** data types:

- **Object**: a generic Talend data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a `tFileInputRaw` component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the `xsd:list` element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

4. Click **Finish** to close the dialog box.

The MDM input connection (**tMDMInput**) is now ready to be dropped in any of your Jobs.

**Defining output MDM schema**

This section describes how to define and download an output MDM XML schema. To define and download an input MDM XML schema, see [Setting up the connection](#) on page 370.

To set the values to be written in one or more entities linked to a specific MDM connection, complete the following:
1. In the **Repository** tree view, expand **Metadata** and right-click the MDM connection for which you want to write the entity values.

2. Select **Retrieve Entity** from the contextual menu.

   A dialog box pops up.

3. Select the **Output MDM** option in order to define an output XML schema and then click **Next** to proceed to the following step.

4. From the **Entities** field, select the business entity (XML schema) in which you want to write values. The name is displayed automatically in the **Name** field.
Note:
You are free to enter any text in this field, although you would likely put the name of the entity from which you are retrieving the schema.

5. Click **Next** to proceed to the next step.

![Diagram of MDM Entity with Linker Source and Target panels showing a list of fields such as Picture, Id, Name, Description, Features, Sizes, Color, Availability, Price, Family, and OnlineStore, with related columns and node status.

Note:
Identical schema of the entity you selected is automatically created in the **Linker Target** panel, and columns are automatically mapped from the source to the target panels. The wizard automatically defines the item Id as the looping element. You can always select to loop on another element.

Here, you can set the parameters to be taken into account for the XML schema definition.

6. Click **Schema Management** to display a dialog box.

7. Do necessary modifications to define the XML schema you want to write in the selected entity.
Your Linker Source schema must correspond to the Linker Target schema, that is to say define the elements in which you want to write values.

8. Click OK to close the dialog box.

The defined schema is displayed under Schema list.

9. In the Linker Target panel, right-click the element you want to define as a loop element and select Set as loop element. This will restrict the iteration to one or more nodes.
By doing so, the tMDMOutput component that uses this MDM connection will create a new row for every item with different feature.

**Note:**

You can prioritize the order of the fields to write by selecting the field and using the up and down arrows.

10. Click **Finish** to validate your modifications and close the dialog box.

The newly created schema is listed under the corresponding MDM connection in the **Repository** tree view.

To modify the created schema, complete the following:

1. In the **Repository** tree view, expand **Metadata** and **Talend MDM** and then browse to the schema you want to modify.

2. Right-click the schema name and select **Edit Entity** from the contextual menu.

A dialog box is displayed.

3. Modify the schema as needed.
You can change the name of the schema according to your needs, you can also customize the schema structure in the schema panel. The tool bar allows you to add, remove or move columns in your schema.

4. Click Finish to close the dialog box.

The MDM output connection (tMDMOutput) is now ready to be dropped in any of your Jobs.

Defining Receive MDM schema

This section describes how to define a receive MDM XML schema based on the MDM connection.

To set the XML schema you want to receive in accordance with a specific MDM connection, complete the following:

1. In the Repository tree view, expand Metadata and right-click the MDM connection for which you want to retrieve the entity values.

2. Select Retrieve Entity from the contextual menu.

A dialog box displays.

3. Select the Receive MDM option in order to define a receive XML schema and then click Next to proceed to the following step.
4. From the **Entities** field, select the business entity (XML schema) according to which you want to receive the XML schema.

   The name displays automatically in the **Name** field.

   **Note:**

   You can enter any text in this field, although you would likely put the name of the entity according to which you want to receive the XML schema.

5. Click **Next** to proceed to the next step.
Centralizing metadata for Data Integration

Note:
The schema of the entity you selected display in the Source Schema panel. Here, you can set the parameters to be taken into account for the XML schema definition. The schema dialog box is divided into four different panels as the following:

<table>
<thead>
<tr>
<th>Panel</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Schema</td>
<td>Tree view of the uploaded entity.</td>
</tr>
<tr>
<td>Target schema</td>
<td>Extraction and iteration information.</td>
</tr>
<tr>
<td>Preview</td>
<td>Target schema preview.</td>
</tr>
<tr>
<td>File viewer</td>
<td>Raw data viewer.</td>
</tr>
</tbody>
</table>

6. In the Xpath loop expression area, enter the absolute XPath expression leading to the XML structure node on which to apply the iteration. Or, drop the node from the source schema to the target schema Xpath field. This link is orange in color.

Note:
The Xpath loop expression field is compulsory.

7. If required, define a Loop limit to restrict the iteration to one or more nodes.
In the above capture, we use Features as the element to loop on because it is repeated within the Product entity as the following:

```
<Product>
  <Id>1</Id>
  <Name>Cup</Name>
  <Description/>
  <Features>
    <Feature>Color red</Feature>
    <Feature>Size maxi</Feature>
  </Features>
  ...
</Product>
<Product>
  <Id>2</Id>
  <Name>Cup</Name>
  <Description/>
  <Features>
    <Feature>Color blue</Feature>
    <Feature>Thermos</Feature>
  </Features>
  ...
</Product>
```

By doing so, the tMDMReceive component that uses this MDM connection will create a new row for every item with different feature.

8. To define the fields to receive, drop the relevant node from the source schema to the Relative or absolute XPath expression field.
Note:
Use the plus sign to add rows to the table and select as many fields to extract as necessary. Press the Ctrl or the Shift keys for multiple selection of grouped or separate nodes and drop them to the table.

9. If required, enter a name to each of the received columns in the Column name field.

Note:
You can prioritize the order of the fields you want to receive by selecting the field and using the up and down arrows. The link of the selected field is blue, and all other links are grey.

10. Click Finish to validate your modifications and close the dialog box.

The newly created schema is listed under the corresponding MDM connection in the Repository tree view.

To modify the created schema, complete the following:

1. In the Repository tree view, expand Metadata and Talend MDM and then browse to the schema you want to modify.

2. Right-click the schema name and select Edit Entity from the contextual menu.

A dialog box displays.
3. Modify the schema as needed.

You can change the name of the schema according to your needs, you can also customize the schema structure in the schema panel. The tool bar allows you to add, remove or move columns in your schema.

Make sure the data type in the **Type** column is correctly defined.

For more information regarding Java data types, including date pattern, see Java API Specification. Below are the commonly used **Talend** data types:

- **Object**: a generic **Talend** data type that allows processing data without regard to its content, for example, a data file not otherwise supported can be processed with a **tFileInputRaw** component by specifying that it has a data type of Object.

- **List**: a space-separated list of primitive type elements in an XML Schema definition, defined using the xsd:list element.

- **Document**: a data type that allows processing an entire XML document without regarding to its content.

4. Click **Finish** to close the dialog box.

The MDM receive connection (**tMDMReceive**) is now ready to be dropped in any of your Jobs.
Centralizing Web Service metadata

If you often need to visit a Web Service from your Talend Studio you can save your Web Service connections in the Repository.

The [Web Service] schema wizard enables you to create either a simple schema (Simple WSDL) or an advanced schema (Advanced WebService), according to your needs.

Note:

In step 1, you must enter the schema metadata before choosing whether to create a simple or an advanced schema in step 2. It is therefore important to enter metadata information which will help you to differentiate between your different schema types in the future.

To create a simple schema, see Setting up a simple schema on page 389.
To create an advanced schema, see Setting up an advanced schema on page 394.

Setting up a simple schema

This section describes how to define a simple Web Service schema (Simple WSDL). For information about how to define an Advanced Web Service schema, see Setting up an advanced schema on page 394.

Defining general properties of the simple Web Service schema

Procedure

1. In the Repository, expand the Metadata node.
2. Right-click Web Service and select Create WSDL schema from the context menu list.
3. Enter the generic schema information such as its Name and Description.
4. Click **Next** to select the schema type in step 2.

**Selecting the type of schema (Simple)**

**About this task**

In this step, you need to indicate whether you want to create a simple or an advanced schema. In this example, a simple schema is created.

**Procedure**

1. In the dialog box, select the **Simple WSDL** option.
2. Click **Next** to continue.

**Specifying the URI and method**

**About this task**

This step involves the definition of the URI and other parameters required to obtain the desired values.
In the **Web Service Parameter** zone:

**Procedure**

1. Enter the URI which will transmit the desired values, in the **WSDL** field, `http://www.webservicex.net/country.asmx?wsdl` in this example.
2. If necessary, select the **Need authentication?** check box and then enter your authentication information in the **User** and **Password** fields.
3. If you use an http proxy, select the **Use http proxy** check box and enter the information required in the **host**, **Port**, **user** and **password** fields.
4. Enter the **Method** name in the corresponding field, `GetCountryByCountryCode` in this example.
5. In the **Value** table, **Add** or **Remove** values as desired, using the corresponding buttons.
6. Click **Refresh Preview** to check that the parameters have been entered correctly.
In the **Preview** tab, the values to be transmitted by the Web Service method are displayed, based on the parameters entered.

**Finalizing the end schema (Simple WSDL)**

**About this task**

You can modify the schema name (**metadata**, by default) and modify the schema itself using the toolbar.

![Create new WSDL schema](image)
Centralizing metadata for Data Integration

Procedure
1. Add or delete columns using the ± and × buttons.
2. Modify the order of the columns using the ↑ and ↓ buttons.
3. Click Finish.
   The new schema is added to the Repository under the Web Service node. You can now drop it onto the design workspace as a tWebServiceInput component in your Job.

Setting up an advanced schema

This section describes how to define an Advanced WebService schema. For information about how to define a Simple WSDL schema, see Setting up a simple schema on page 389.

Next, you need to define the input and output schemas and schema-parameter mappings in the Input mapping and Output mapping tabs.

Note:
Depending on the type of the output, you can choose to normalize or denormalize the results by clicking the Normalize and Denormalize buttons.

Defining general properties of the advanced Web Service schema

Procedure
1. In the Repository view, expand the metadata node.
2. Right-click Web Service and select Create WSDL schema from the context menu list.
3. Enter the generic schema information, such as its Name and Description.
4. Click **Next** to select the schema type in step 2.

**Selecting the type of schema (Advanced)**

**About this task**

In this step, you must indicate whether you want to create a **Simple** or an **Advanced** schema. In this example, an **Advanced** schema is created.

**Procedure**

1. In the dialog box, select the **Advanced WebService** option.
2. Click **Next** to define precise Web Service parameters.

**Defining the port name and operation**

**Procedure**

1. Type in the URI of the Web Service WSDL file manually by typing in the **WSDL** field, or click the **Browse...** button to browse your directory if your WSDL is stored locally.

2. Click the **Refresh** button to retrieve the list of port names and operations available.
3. Select the port name to be used, in the Port Name zone, countrySoap12 in this example.

4. Select the operation to be carried out in the Operation zone.

   In this example, select GetCountryByCountryCode(parameters):string to retrieve the country name for a given country code.

**Defining the input schemas and mappings**

**About this task**

To define the input schema and mappings, do the following:

**Procedure**

1. Click the Input mapping tab to define the input schema and set the parameters required to execute the operation.

2. In the table to the right, select the parameters row and click the [+] button to open the [ParameterTree] dialog box.
3. Select the parameter you want to use and click OK to close the dialog box.
   A new row appears showing the parameter you added, CountryCode in this example.

4. In the table to the left, click the Schema Management button to open the [Schema] dialog box.

5. Define the input schema.
   In this example, the schema has only one column: CountryCode.

6. Click OK to validate this addition and close the dialog box.

7. Create mappings between schema columns and parameters.
   In this example, drop the CountryCode column from the left table onto the parameters.CountryCode row to the right.
   A red line shows that the column is mapped.
Note:
If available, use the Auto Map button situated to the top of the tab, to carry out the mapping automatically.

Defining the output schemas and mappings

About this task
To define the output schema and mappings, proceed as follows:

Procedure
1. Click the Output mapping tab to define the output schema and set its parameters.
2. In the table to the left, select the parameter row and click the [+] button to add a parameter.
   The [ParameterTree] dialog box opens.
3. Select the parameter and click **OK** to close the dialog box.

   A new row appears showing the parameter you added, `GetCountryByCountryCodeResult` in this example.

4. In the table to the right, click `[...]` to open the **Schema** dialog box.

5. Define the output schema.

   In this example, the schema has only one column: `Result`.

6. Click **OK** to validate your addition and close the dialog box.

7. Create output parameter-schema mappings.

   In this example, drop the `parameters.GetCountryByCountyCodeResult` row from the table to the left onto the `Result` column to the right.
8. Click **Next** to finalize the schema.

**Finalizing the end schema (Advanced WebService)**

**About this task**

In this step the wizard displays the output schema generated.
You can customize the metadata by changing or adding information in the Name and Comment fields and make further modifications using the toolbar, for example:

**Procedure**

1. Add or delete columns using the + and - buttons.
2. Change the column order by clicking the ↑ and ↓ arrows.
3. Click Finish to finalize your advanced schema.

The new schema is added to the Repository under the corresponding Web Service node. You can now drop it onto the design workspace as a tWebService component in your Job.

**Centralizing an FTP connection**

If you need to connect to an FTP server regularly, you can centralize the connection information under the Metadata node in the Repository view.

All of the connections created appear under the FTP server connection node, in the Repository view.

You can drop the connection metadata from the Repository onto the design workspace. A dialog box opens in which you can choose the component to be used in your Job.
For further information about how to drop metadata onto the workspace, see Using centralized metadata in a Job on page 415.

**Defining the general properties of the connection FTP**

**About this task**

To create a connection to an FTP server, follow the steps below:

**Procedure**

1. Expand the **Metadata** node in the **Repository** tree view.

2. Right-click **FTP** and select **Create FTP** from the context menu.
   
   The connection wizard opens:

   ![FTP Connection Wizard](image)

3. Enter the generic schema information such as its **Name** and **Description**.

   **Note:**
The status field is a customized field which can be defined in the [Preferences] dialog box (Window > Preferences). For further information about setting preferences, see Setting Talend Studio preferences on page 471.

4. When you have finished, click Next to enter the FTP server connection information.

**Connecting to an FTP server**

**About this task**

In this step we shall define the connection information and parameters.

**Procedure**

1. Enter your **Username** and **Password** in the corresponding fields.

2. In the **Host** field, enter the name of your FTP server host.

3. Enter the **Port** number in the corresponding field.

4. Select the **Encoding** type from the list.

5. From the **Connection Model** list, select the connection model you want to use:
   - Select **Passive** if you want the FTP server to choose the port connection to be used for data transfer.
   - Select **Active** if you want to choose the port yourself.

6. In the **Parameter** area, select a setting for FTP server usage. For standard usage, there is no need to select an option.
• Select the SFTP Support check box to use the SSH security protocol to protect server communications.

An Authentication method appears. Select Public key or Password according to what you use.

• Select the FTPs Support check box to protect server communication with the SSL security protocol.

• Select the Use Socks Proxy check box if you want to use this option, then enter the proxy information (the host name, port number, username and password).

7. Click Finish to close the wizard.

Working with Hierarchical Mapper

Talend Studio enables you to access structures, maps and namespace containers created in the Mapping perspective by expanding the Hierarchical Mapper node, which is located under the Metadata folder in the Repository tree view in the Integration perspective.

For more information on working with these elements, see the Talend Data Mapper User Guide.

Exporting metadata as context and reusing context parameters to set up a connection

For every metadata connection (File, Database or Talend MDM, etc.), you can export the connection details to a new context group in the Repository for reuse in other connections or across different Jobs, or reuse variables of an existing context group to set up your metadata connection.

Exporting connection details as context variables

About this task

To export connection details as context variables in a new context group in the Repository, follow the steps below:

Procedure

1. Upon creating or editing a metadata connection in the wizard, click Export as context.
2. In the [Create / Reuse a context group] wizard that opens, select Create a new repository context and click Next.
Centralizing metadata for Data Integration

3. Type in a name for the context group to be created, and add any general information such as a description if required.

The name of the Metadata entry is proposed by the wizard as the context group name, and the information you provide in the **Description** field will appear as a tooltip when you move your mouse over the context group in the Repository.
4. Click **Next** to create and view the context group, or click **Finish** to complete context creation and return to the connection wizard directly.

   In this example, click **Next**.

5. Check the context group generation result.

   To edit the context variables, go to the **Contexts** node of the Repository, right-click the newly created context group, and select **Edit context group** to open the [Create / Edit a context group] wizard after the connection wizard is closed.

   To edit the default context, or add new contexts, click the [+] button at the upper right corner of the wizard.

   To add a new context variable, click the [+] button at the bottom of the wizard.

   For more information on handling contexts and variables, see Using contexts and variables on page 73.
6. Click Finish to complete context creation and return to the connection wizard.
The relevant connection details fields in the wizard are set with the context variables. To unset the connection details, click the Revert Context button.

**Using variables of an existing context group to set up a connection**

**About this task**

To use variables of an existing context group centrally stored in the Repository to set up a connection, follow the steps below:

**Procedure**

1. When creating or editing a metadata connection in the wizard, click Export as context.
2. In the [Create / Reuse a context group] wizard that opens, select **Reuse an existing repository context** and click **Next**.
3. Select a context group from the list and click **Next**.

4. For each variable, select the corresponding field of the connection details, and then click **Next** to view and edit the context variables, or click **Finish** to show the connection setup result directly.
In this example, click Next.

5. Edit the contexts and/or context variables if needed. If you make any changes, your centralized context group will be updated automatically.

For more information on handling contexts and variables, see Using contexts and variables on page 73.

6. Click Finish to validate context reuse and return to the connection wizard.
The relevant connection details fields in the wizard are set with the context variables. To unset the connection details, click the **Revert Context** button.
Using centralized metadata in a Job

About this task

For recurrent use of files and database connections in various Jobs, we recommend you to store the connection and schema metadata in the Repository tree view under the Metadata node. Different folders under the Metadata node will group the established connections including those to databases, files and systems.

Different wizards will help you centralize connection and schema metadata in the Repository tree view. For more information about the [Metadata Manager] wizards, see Centralizing database metadata on page 261.

Once the relevant metadata is stored under the Metadata node, you will be able to drop the corresponding components directly onto the design workspace.

Procedure

1. In the Repository tree view of the Integration perspective, expand Metadata and the folder holding the connection you want to use in your Job.
2. Drop the relevant connection or schema onto the design workspace.

A dialog box prompts you to select the component you want to use among those offered.
3. Select the component and then click **OK**. The selected component displays on the design workspace.

**Results**

Alternatively, according to the type of component (Input or Output) you want to use, perform one of the following operations:

- **Output**: Press **Ctrl** on your keyboard while you are dropping the component onto the design workspace to directly include it in the active Job.

- **Input**: Press **Alt** on your keyboard while you drop the component onto the design workspace to directly include it in the active Job.

If you double-click the component, the **Component** view shows the selected connection details as well as the selected schema information.

**Note:**

If you select the connection without selecting a schema, then the properties will be filled with the first encountered schema.
Using routines

Managing routines

What are routines

Routines are fairly complex Java functions, generally used to factorize code. They therefore optimize data processing and improve Job capacities.

You can also use the Repository tree view to store frequently used parts of code or extract parts of existing company functions, by calling them via the routines. This factorization makes it easier to resolve any problems which may arise and allows you to update the code used in multiple Jobs quickly and easily.

On top of this, certain system routines adopt the most common Java methods, using the Talend syntax. This allows you to escalate Java errors in the studio directly, thereby facilitating the identification and resolution of problems which may arise as your integration processes evolve with Talend.

There are two types of routines:

- **System routines**: a number of system routines are provided. They are classed according to the type of data which they process: numerical, string, date...

- **User routines**: these are routines which you have created or adapted from existing routines.

  **Note**: You do not need any knowledge of the Java language to create and use Talend routines.

All of the routines are stored under **Code > Routines** in the Repository tree view.

For further information concerning the system routines, see Accessing the System Routines on page 417.

For further information about how to create user routines, see Creating user routines on page 419.

  **Note**: You can also set up routine dependencies on Jobs. To do so, simply right click a Job on the Repository tree view and select Set up routine dependencies. In the dialog box which opens, all routines are set by default. You can use the tool bar to remove routines if required.

Accessing the System Routines

**About this task**

To access the system routines, click **Code > Routines > system**. The routines or functions are classed according to their usage.

  **Note**:

  The **system** folder and its content are read only.
Each class or category in the system folder contains several routines or functions. Double-click the class that you want to open.

All of the routines or functions within a class are composed of some descriptive text, followed by the corresponding Java code. In the Routines view, you can use the scrollbar to browse the different routines. Or alternatively:

**Procedure**

1. Press **Ctrl+O** in the routines view.  
   A dialog box displays a list of the different routines in the category.
2. Click the routine of interest.  
   The view jumps to the section comprising the routine’s descriptive text and corresponding code.

   **Note:** The syntax of routine call statements is case sensitive.

**Customizing the system routines**

**About this task**

If the system routines are not adapted to your specific needs, you can customize them by copying and pasting the content in a user routine, then modify the content accordingly.

To customize a system routine:

**Procedure**

1. First of all, create a user routine by following the steps outlined in *Creating user routines* on page 419. The routine opens in the workspace, where you shall find a basic example of a routine.
2. Then, under **Code > Routines > system**, select the class of routines which contains the routine(s) you want to customize.

3. Double-click the class which contains the relevant routine to open it in the workspace.

4. Use the **Outline** panel on the bottom left of the studio to locate the routine from which you want to copy all or part of the content.

5. In the workspace, select all or part of the code and copy it using **Ctrl+C**.

6. Click the tab to access your user routine and paste the code by pressing **Ctrl+V**.

7. Modify the code as required and press **Ctrl+S** to save it.

**Results**

We advise you to use the descriptive text (in blue) to detail the input and output parameters. This will make your routines easier to maintain and reuse.

**Managing user routines**

Talend Studio allows you to create user routines, to modify them or to modify system routines, in order to fill your specific needs.

**Creating user routines**

**About this task**

You can create your own routines according to your particular factorization needs. Like the system routines, the user routines are stored in the **Repository** tree view under **Code > Routines**. You can add folders to help organize your routines and call them easily in any of your Jobs.
To create a new user routine, complete the following:

**Procedure**

1. In the **Repository** tree view, expand **Code** to display the **Routines** folder.

![Repository tree view](image)

2. Right-click **Routines** and select **Create routine**.

3. The **[New routine]** dialog box opens. Enter the information required to create the routine, i.e., its name, description...

4. Click **Finish** to proceed to the next step.

![Create routine dialog box](image)

The newly created routine appears in the **Repository** tree view, directly below the **Routines** node. The routine editor opens to reveal a model routine which contains a simple example, by default, comprising descriptive text in blue, followed by the corresponding code.
Note: We advise you to add a very detailed description of the routine. The description should generally include the input and output parameters you would expect to use in the routine, as well as the results returned along with an example. This information tends to be useful for collaborative work and the maintenance of the routines.

The following example of code is provided by default:

```java
public static void helloExample(String message) {
    if (message == null) {
        message = "World"; //NON-NLS-1$
    }
    System.out.println("Hello " + message + "!");
}
```

5. Modify or replace the model with your own code and press Ctrl+S to save the routine. Otherwise, the routine is saved automatically when you close it.

Results

Note: You can copy all or part of a system routine or class and use it in a user routine by using the Ctrl+C and Ctrl+V commands, then adapt the code according to your needs. For further information about how to customize routines, see Customizing the system routines on page 418.

Editing user routines

About this task

You can modify the user routines whenever you like.

Note: The system folder and all of the routines held within are read only.

To edit your user routines:

Procedure

1. Right click the routine you want to edit and select Edit Routine.
2. The routine opens in the workspace, where you can modify it.
3. Once you have adapted the routine to suit your needs, press Ctrl+S to save it.

Results

If you want to reuse a system routine for your own specific needs, see Customizing the system routines on page 418.

Editing user routine libraries

About this task

You can edit the library of any of the user routines by importing external .jar files for the selected routine. These external library files will be listed, like modules, in the Modules view in your current Studio. For more information on the Modules view, see the Talend Installation and Upgrade Guide.

The .jar file of the imported library will be also listed in the library file of your current Studio.

To edit a user routine library, complete the following:
Procedure

1. If the library to be imported isn’t available on your machine, either download and install it using the Modules view or download and store it in a local directory.

2. In the Repository tree view, expand Code > Routines.

3. Right-click the user routine you want to edit its library and then select Edit Routine Library. The [Import External Library] dialog box displays.

4. Click New to open the [New Module] dialog box where you can import the external library.

   Note:
   You can delete any of the already imported routine files if you select the file in the Library File list and click the Remove button.

5. Specify the library file to be imported:
• If you have installed the library using the **Modules** view, enter the full name of the library file in the **Input a library’s name** field.

• If you have stored the library file in a local directory, select the **Browse a library file** option and click browse to set the file path in the corresponding field.

6. If required, enter a description in the **Description** field.

7. Click **OK** to confirm your changes.

   The imported library file is listed in the **Library File** list in the [Import External Library] dialog box.

8. Click **Finish** to close the dialog box.

   The library file is imported into the library folder of your current Studio and also listed in the **Module** view of the same Studio. You may need to restart your Studio to bring the external library into effect.

   For more information about the **Modules** view, see the *Talend Installation and Upgrade Guide*.

**Calling a routine from a Job**

Pre-requisite: You must have at least one Job created, in order to run a routine. For further information regarding how to create a Job, see *Creating a Job* on page 26.

You can call any of your user and system routines from your Job components in order to run them at the same time as your Job.

To access all the routines saved in the **Routines** folder in the **Repository** tree view, press **Ctrl+Space** in any of the fields in the **Basic settings** view of any of the **Talend** components used in your Job and select the one you want to run.

Alternatively, you can call any of these routines by indicating the relevant class name and the name of the routine, followed by the expected settings, in any of the **Basic settings** fields in the following way:

```
<ClassName>.<RoutineName>
```
Use case: Creating a file for the current date

About this task

This scenario describes how to use a routine. The Job uses just one component, which calls a system routine.

Procedure

1. In the Palette, click File > Management, then drop a tFileTouch component onto the workspace. This component allows you to create an empty file.
2. Double-click the component to open its Basic settings view in the Component tab.
3. In the FileName field, enter the path to access your file, or click [...] and browse the directory to locate the file.
4. Close the double inverted commas around your file extension as follows: "D:/Input/customer".txt.
5. Add the plus symbol (+) between the closing inverted commas and the file extension.
6. Press Ctrl+Space to open a list of all of the routines, and in the auto-completion list which appears, select TalendDate.getDate to use the Talend routine which allows you to obtain the current date.
7. Modify the format of the date provided by default, if required.
8. Enter the plus symbol (+) next to the getDate variable to complete the routine call, and place double inverted commas around the file extension.
**Warning:** If you are working on Windows, the "." between the hours and minutes and between the minutes and seconds must be removed.

9. Press F6 to run the Job.

The `tFileTouch` component creates an empty file with the days date, retrieved upon execution of the `GetDate` routine called.

### System routines

#### Numeric Routines

Numeric routines allow you to return whole or decimal numbers in order to use them as settings in one or more Job components. To add numeric IDs, for instance.

To access the routines, double click on the **Numeric** category, in the **system** folder. The Numeric category contains several routines, notably `sequence`, `random` and decimal (`convertImpliedDecimalFormat`):

<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>sequence</td>
<td>Returns an incremental numeric ID.</td>
<td><code>Numeric.sequence(&quot;Parameter name&quot;, start value, increment value)</code></td>
</tr>
<tr>
<td>resetSequence</td>
<td>Creates a sequence if it doesn’t exist and attributes a new start value.</td>
<td><code>Numeric.resetSequence (Sequence Identifier, start value)</code></td>
</tr>
<tr>
<td>removeSequence</td>
<td>Removes a sequence.</td>
<td><code>Numeric.RemoveSequence (Sequence Identifier)</code></td>
</tr>
<tr>
<td>random</td>
<td>Returns a random whole number between the maximum and minimum values.</td>
<td><code>Numeric.random(minimum start value, maximum end value)</code></td>
</tr>
<tr>
<td>convertImpliedDecimalFormat</td>
<td>Returns a decimal with the help of an implicit decimal model.</td>
<td><code>Numeric.convertImpliedDecimalFormat (&quot;Target Format&quot;, value to be converted)</code></td>
</tr>
</tbody>
</table>

The three routines `sequence`, `resetSequence`, and `removeSequence` are closely related:

- The `sequence` routine is used to create a sequence identifier, named `s1` by default, in the Job. This sequence identifier is global in the Job.
- The `resetSequence` routine can be used to initialize the value of the sequence identifier created by `sequence` routine.
- The `removeSequence` routine is used to remove the sequence identifier from the global variable list in the Job.
Creating a Sequence

The sequence routine allows you to create automatically incremented IDs, using a tJava component:

```java
System.out.println(Numeric.sequence("s1",1,1));
System.out.println(Numeric.sequence("s1",1,1));
```

The routine generates and increments the ID automatically:

```
[statistics] connecting to socket on port 3330
[statistics] connected
1
2
```

Converting an Implied Decimal

It is easy to use the convertImpliedDecimalFormat routine, along with a tJava component, for example:

```java
System.out.println(Numeric.convertImpliedDecimalFormat("9V99","123");
```

The routine automatically converts the value entered as a parameter according to the format of the implied decimal provided:

```
1.23
[statistics] disconnected
Job test_routine ended at 14:12 04/02/2010. [exit code=0]
```

Relational Routines

Relational routines allow you to check affirmations based on booleans.

To access these routines, double-click Relational under the system folder. The Relational class contains several routines, notably:

<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISNULL</td>
<td>Checks if the variable provided is a null value. It returns true if the value is NULL and false if the value is not NULL.</td>
<td>Relational.ISNULL(variable)</td>
</tr>
<tr>
<td>NOT</td>
<td>Returns the complement of the logical value of an expression.</td>
<td>Relational.NOT(expression)</td>
</tr>
<tr>
<td>isNull</td>
<td>Checks if the variable provided is a null value. It returns 1 if the value is NULL and 0 if the value is not NULL.</td>
<td>Relational.isNull(variable)</td>
</tr>
</tbody>
</table>

To check a Relational Routine, you can use the ISNULL routine, along with a tJava component, for example:

```java
String str = null;
System.out.println(Relational.ISNULL(str));
```
In this example, the test result is displayed in the Run view:

```
Starting job test_routine at 14:14 04/02/2010.
[statistics] connecting to socket on port 3375
[statistics] connected
true
[statistics] disconnected
Job test_routine ended at 14:14 04/02/2010. [exit code=0]
```

## StringHandling Routines

The **StringHandling** routines allow you to carry out various kinds of operations and tests on alphanumeric expressions, based on Java methods.

To access these routines, double-click **StringHandling** under the **system** folder. The **StringHandling** class includes the following routines:

<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPHA</td>
<td>Checks whether the expression is arranged in alphabetical order. Returns the true or false boolean accordingly.</td>
<td>StringHandling.ALPHA(&quot;string to be checked&quot;)</td>
</tr>
<tr>
<td>IS_ALPHA</td>
<td>Checks whether the expression contains alphabetical characters only, or otherwise. Returns the true or false boolean accordingly.</td>
<td>StringHandling.IS_ALPHA(&quot;string to be checked&quot;)</td>
</tr>
<tr>
<td>CHANGE</td>
<td>Replaces an element of a string with a defined replacement element and returns the new string.</td>
<td>StringHandling.CHANGE(&quot;string to be checked&quot;, &quot;string to be replaced&quot;,&quot;replacement string&quot;)</td>
</tr>
<tr>
<td>COUNT</td>
<td>Returns the number of times a substring occurs within a string.</td>
<td>StringHandling.COUNT(&quot;string to be checked&quot;, &quot;substring to be counted&quot;)</td>
</tr>
<tr>
<td>DOWNCASE</td>
<td>Converts all uppercase letters in an expression into lowercase and returns the new string.</td>
<td>StringHandling.DOWNCASE(&quot;string to be converted&quot;)</td>
</tr>
<tr>
<td>UPCASE</td>
<td>Converts all lowercase letters in an expression into uppercase and returns the new string.</td>
<td>StringHandling.UPCASE(&quot;string to be converted&quot;)</td>
</tr>
<tr>
<td>DQUOTE</td>
<td>Encloses an expression in double quotation marks.</td>
<td>StringHandling.DQUOTE(&quot;string to be enclosed in double quotation marks&quot;)</td>
</tr>
<tr>
<td>Routine</td>
<td>Description</td>
<td>Syntax</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>--------</td>
</tr>
<tr>
<td>EREPLACE</td>
<td>Substitutes all substrings that match the given regular expression in the given old string with the given replacement and returns a new string.</td>
<td><code>StringHandling.EREPLACE(oldStr, regex, replacement)</code></td>
</tr>
<tr>
<td>INDEX</td>
<td>Returns the position of the first character in a specified substring, within a whole string. If the substring specified does not exist in the whole string, the value -1 is returned.</td>
<td><code>StringHandling.INDEX(&quot;string to be checked&quot;, &quot;substring specified&quot;)</code></td>
</tr>
<tr>
<td>LEFT</td>
<td>Specifies a substring which corresponds to the first n characters in a string.</td>
<td><code>StringHandling.LEFT(&quot;string to be checked&quot;, number of characters)</code></td>
</tr>
<tr>
<td>RIGHT</td>
<td>Specifies a substring which corresponds to the last n characters in a string.</td>
<td><code>StringHandling.RIGHT(&quot;string to be checked&quot;, number of characters)</code></td>
</tr>
<tr>
<td>LEN</td>
<td>Calculates the length of a string.</td>
<td><code>StringHandling.LEN(&quot;string to check&quot;)</code></td>
</tr>
<tr>
<td>SPACE</td>
<td>Generates a string consisting of a specified number of blank spaces.</td>
<td><code>StringHandling.SPACE(number of blank spaces to be generated)</code></td>
</tr>
<tr>
<td>SQUOTE</td>
<td>Encloses an expression in single quotation marks.</td>
<td><code>StringHandling.SQUOTE(&quot;string to be enclosed in single quotation marks&quot;)</code></td>
</tr>
<tr>
<td>STR</td>
<td>Generates a particular character a the number of times specified.</td>
<td><code>StringHandling.STR('character to be generated', number of times)</code></td>
</tr>
<tr>
<td>TRIM</td>
<td>Deletes the spaces and tabs before the first non-blank character in a string and after the last non-blank character, then returns the new string.</td>
<td><code>StringHandling.TRIM(&quot;string to be checked&quot;)</code></td>
</tr>
<tr>
<td>BTRIM</td>
<td>Deletes all the spaces and tabs after the last non-blank character in a string and returns the new string.</td>
<td><code>StringHandling.BTRIM(&quot;string to be checked&quot;)</code></td>
</tr>
<tr>
<td>FTRIM</td>
<td>Deletes all the spaces and tabs preceding the first non-blank character in a string.</td>
<td><code>StringHandling.FTRIM(&quot;string to be checked&quot;)</code></td>
</tr>
<tr>
<td>Routine</td>
<td>Description</td>
<td>Syntax</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>--------</td>
</tr>
<tr>
<td>SUBSTR</td>
<td>Returns a portion of a string. It counts all characters, including blanks, starting at the beginning of the string.</td>
<td><code>StringHandling.SUBSTR(string, start, length)</code>&lt;br&gt;• <code>string</code>: the character string you want to search.&lt;br&gt;• <code>start</code>: the position in the string where you want to start counting.&lt;br&gt;• <code>length</code>: the number of characters you want to return.</td>
</tr>
<tr>
<td>LTRIM</td>
<td>Removes blanks or characters from the beginning of a string.</td>
<td><code>StringHandling.LTRIM(string[, trim_set])</code>&lt;br&gt;• <code>string</code>: the string you want to change.&lt;br&gt;• <code>trim_set</code>: the characters you want to remove from the beginning of the string. LTRIM will compare the <code>trim_set</code> to the string character-by-character, starting with the left side of the string, and remove characters until it fails to find a matching character in the <code>trim_set</code>. If this parameter is not specified, LTRIM will remove any blanks from the beginning of the string.</td>
</tr>
<tr>
<td>RTRIM</td>
<td>Removes blanks or characters from the end of a string.</td>
<td><code>StringHandling.RTRIM(string[, trim_set])</code>&lt;br&gt;• <code>string</code>: the string you want to change.&lt;br&gt;• <code>trim_set</code>: the characters you want to remove from the ending of the string. RTRIM will compare the <code>trim_set</code> to the string character-by-character, starting with the right side of the string, and remove characters until it fails to find a matching character in the <code>trim_set</code>. If this parameter is not specified, RTRIM will remove any blanks from the ending of the string.</td>
</tr>
<tr>
<td>LPAD</td>
<td>Converts a string to a specified length by adding blanks or characters to the beginning of the string.</td>
<td><code>StringHandling.LPAD(first_string, length[, second_string])</code>&lt;br&gt;• <code>first_string</code>: the string you want to change.&lt;br&gt;• <code>length</code>: the length you want the string to be after being padded.&lt;br&gt;• <code>second_string</code>: the characters you want to append to the left side of the <code>first_string</code>.</td>
</tr>
<tr>
<td>RPAD</td>
<td>Converts a string to a specified length by adding blanks or characters to the end of the string.</td>
<td><code>StringHandling.RPAD(first_string, length[, second_string])</code>&lt;br&gt;• <code>first_string</code>: the string you want to change.&lt;br&gt;• <code>length</code>: the length you want the string to be after being padded.&lt;br&gt;• <code>second_string</code>: the characters you want to append to the right side of the <code>first_string</code>.</td>
</tr>
<tr>
<td>Routine</td>
<td>Description</td>
<td>Syntax</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>INSTR</td>
<td>Returns the position of a character set in a string, counting from left to right and starting from 1. Note that it returns 0 if the search is unsuccessful and NULL if the search value is NULL.</td>
<td>StringHandling.INSTR(string, search_value, start, occurrence)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• string: the string you want to search.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• search_value: the set of characters you want to search for.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• start: the position in the string where you want to start the search. The default is 1, meaning it starts the search from the first character in the string.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• occurrence: the occurrence you want to search for.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For example, StringHandling.INSTR(&quot;Talend Technology&quot;, &quot;e&quot;, 3, 2), it will start the search from the third character 1 and return 7, the position of the second character e.</td>
</tr>
<tr>
<td>TO_CHAR</td>
<td>Converts numeric values to text strings.</td>
<td>StringHandling.TO_CHAR(numeric_value)</td>
</tr>
</tbody>
</table>

**Storing a string in alphabetical order**

It is easy to use the ALPHA routine along with a Java component, to check whether a string is in alphabetical order:

```java
System.out.println(StringHandling.ALPHA("abcdefg"));
```

The check returns a boolean value.

**Checking whether a string is alphabetical**

It is easy to use the IS_ALPHA routine along with a Java component, to check whether the string is alphabetical:

```java
System.out.println(StringHandling.IS_ALPHA("ab33cd"));
```

The check returns a boolean value.

Starting job test routine at 14:29 04/02/2010.

[statistics] connecting to socket on port 3469
[statistics] connected
true

Starting job routine1 at 11:45 23/02/2010.

[statistics] connecting to socket on port 3892
[statistics] connected
false
[statistics] disconnected
Job routine1 ended at 11:45 23/02/2010. [exit code=0]
Replacing an element in a string

It is easy to use the CHANGE routine along with a Java component, to replace one element in a string with another:

```java
System.out.println(StringHandling.CHANGE("hello world!", "world", "guy"));
```

The routine replaces the old element with the new element specified.

hello guy!

Checking the position of a specific character or substring, within a string

The INDEX routine is easy to use along with a Java component, to check whether a string contains a specified character or substring:

```java
System.out.println(StringHandling.INDEX("hello world!", "hello"));
System.out.println(StringHandling.INDEX("hello world!", "world"));
System.out.println(StringHandling.INDEX("hello world!", "!"));
System.out.println(StringHandling.INDEX("hello world!", "?"));
```

The routine returns a whole number which indicates the position of the first character specified, or indeed the first character of the substring specified. Otherwise, -1 is returned if no occurrences are found.

Starting job routine! at 15:47 24/02/2010

[statistics] connecting to socket on port 4027
[statistics] connected
0
11
-1
[statistics] disconnected
Job routine! ended at 15:47 24/02/2010. [exit code=0]

Calculating the length of a string

The LEN routine is easy to use, along with a Java component, to check the length of a string:

```java
System.out.println(StringHandling.LEN("hello world!"));
```

The check returns a whole number which indicates the length of the chain, including spaces and blank characters.

12

Deleting blank characters

The FTRIM routine is easy to use, along with a Java component, to delete blank characters from the start of a chain:

```java
System.out.println(StringHandling.FTRIM(" Hello world "));
```

The routine returns the string with the blank characters removed from the beginning.
TalendDataGenerator Routines

The TalendDataGenerator routines are functions which allow you to generate sets of test data. They are based on fictitious lists of first names, second names, addresses, towns and States provided by Talend. These routines are generally used when developing Jobs, using a tRowGenerator, for example, to avoid using production or company data.

To access the routines, double click on TalendDataGenerator under the system folder:

<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>getFirstName</td>
<td>returns a first name taken randomly from a fictitious list.</td>
<td>TalendDataGenerator.getFirstName()</td>
</tr>
<tr>
<td>getLastName</td>
<td>returns a random surname from a fictitious list.</td>
<td>TalendDataGenerator.getLastName()</td>
</tr>
<tr>
<td>getUsStreet</td>
<td>returns an address taken randomly from a list of common American street names.</td>
<td>TalendDataGenerator.getUsStreet()</td>
</tr>
<tr>
<td>getUsCity</td>
<td>returns the name of a town taken randomly from a list of American towns.</td>
<td>TalendDataGenerator.getUsCity()</td>
</tr>
<tr>
<td>getUsState</td>
<td>returns the name of a State taken randomly from a list of American States.</td>
<td>TalendDataGenerator.getUsState()</td>
</tr>
<tr>
<td>getUsStateId</td>
<td>returns an ID randomly taken from a list of IDs attributed to American States.</td>
<td>TalendDataGenerator.getUsStateId()</td>
</tr>
</tbody>
</table>

**Note:** No entry parameter is required as Talend provides the list of fictitious data.

You can customize the fictitious data by modifying the TalendGeneratorRoutines. For further information on how to customize routines, see Customizing the system routines on page 418.

Generating fictitious data

It is easy to use the different functions to generate data randomly. Using a tJava component, you can, for example, create a list of fictitious client data using functions such as getFirstName, getLastName, getUSCity:

```java
System.out.println(TalendDataGenerator.getFirstName());
System.out.println(TalendDataGenerator.getLastName());
System.out.println(TalendDataGenerator.getUsCity());
System.out.println(TalendDataGenerator.getUsState());
System.out.println(TalendDataGenerator.getUsStateId());
```
The set of data taken randomly from the list of fictitious data is displayed in the **Run** view:

```
Starting job test_routine at 14:44 04/02/2010.
[statistics] connecting to socket on port 390?
[statistics] connected
Jimmy
Arthur
Des Moines
Wyoming
UT
Milpas Street
[statistics] disconnected
Job test_routine ended at 14:44 04/02/2010. [exit code=0]
```

### Talend Date Routines

The TalendDate routines allow you to carry out different kinds of operations and checks concerning the format of Date expressions.

To access these routines, double-click **Talend Date** under the **system** folder:

<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>addDate</td>
<td>Adds n days, n months, n hours, n minutes or n seconds to a Java date and returns the new date. The Date format is: “yyyy”, “MM”, “dd”, “HH”, “mm”, “ss” or “SSS”.</td>
<td><code>TalendDate.addDate(&quot;String date initiale&quot;, &quot;format Date - eg.: yyyy/MM/dd&quot;, whole n,&quot;format of the part of the date to which n is to be added - eg.:yyyy&quot;)</code>.</td>
</tr>
<tr>
<td>compareDate</td>
<td>Compares all or part of two dates according to the format specified. Returns 0 if the dates are identical, -1 if the first date is earlier and 1 if the second date is earlier.</td>
<td><code>TalendDate.compareDate(Date date1, Date date2, &quot;format to be compared - eg.: yyyy-MM-dd&quot;)</code>.</td>
</tr>
<tr>
<td>diffDate</td>
<td>Returns the difference between two dates in terms of days, months or years according to the comparison parameter specified.</td>
<td><code>TalendDate.diffDate(Date1(), Date2(), &quot;format of the part of the date to be compared - eg.:yyyy&quot;)</code>.</td>
</tr>
<tr>
<td>diffDateFloor</td>
<td>Returns the difference between two dates by floor in terms of years, months, days, hours, minutes, seconds or milliseconds according to the comparison parameter specified.</td>
<td><code>TalendDate.diffDateFloor(Date1(), Date2(), &quot;format of the part of the date to be compared - eg.:MM&quot;)</code>.</td>
</tr>
<tr>
<td>formatDate</td>
<td>Returns a date string which corresponds to the format specified.</td>
<td><code>TalendDate.formatDate(&quot;date format - eg.: yyyy-MM-dd HH:mm:ss&quot;, Date() to be formatted)</code>.</td>
</tr>
<tr>
<td>formatDateLocale</td>
<td>Changes a date into a date/hour string according to the format used in the target country.</td>
<td><code>TalendDate.formatDateLocale (&quot;format target&quot;, java.util.Date date, &quot;language or country code&quot;)</code>.</td>
</tr>
<tr>
<td>Routine</td>
<td>Description</td>
<td>Syntax</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>getCurrentDate</td>
<td>Returns the current date. No entry parameter is required.</td>
<td>TalendDate.getCurrentDate()</td>
</tr>
<tr>
<td>getDate</td>
<td>Returns the current date and hour in the format specified (optional). This string can contain fixed character strings or variables linked to the date. By default, the string is returned in the format, DD/MM/CCYY.</td>
<td>TalendDate.getDate(&quot;Format of the string - ex: CCYY-MM-DD&quot;)</td>
</tr>
<tr>
<td>getFirstDayOfMonth</td>
<td>Changes the date of an event to the first day of the current month and returns the new date.</td>
<td>TalendDate.getFirstDayMonth(Date)</td>
</tr>
<tr>
<td>getLastDayOfMonth</td>
<td>Changes the date of an event to the last day of the current month and returns the new date.</td>
<td>TalendDate.getLastDayMonth(Date)</td>
</tr>
<tr>
<td>getPartOfDate</td>
<td>Returns part of a date according to the format specified. This string can contain fixed character strings or variables linked to the date.</td>
<td>Talendate.getPartOfDate(&quot;String indicating the part of the date to be retrieved, &quot;String in the format of the date to be parsed&quot;)</td>
</tr>
<tr>
<td>getRandomDate</td>
<td>Returns a random date, in the ISO format.</td>
<td>TalendDate.getRandomDate(&quot;format date of the character string&quot;,  String minDate, String maxDate)</td>
</tr>
<tr>
<td>isDate</td>
<td>Checks whether the date string corresponds to the format specified. Returns the boolean value true or false according to the outcome.</td>
<td>TalendDate.isDate(Date() to be checked, &quot;format of the date to be checked - eg.: yyyy-MM-dd HH:mm:ss&quot;)</td>
</tr>
<tr>
<td>parseDate</td>
<td>Changes a string into a Date. Returns a date in the standard format.</td>
<td>TalendDate.parseDate(&quot;format date of the string to be parsed&quot;,  &quot;string in the format of the date to be parsed&quot;)</td>
</tr>
<tr>
<td>parseDateInUTC</td>
<td>Changes a string into a Date in UTC. Returns a date in the UTC format.</td>
<td>TalendDate.parseDateInUTC(&quot;format date of the string to be parsed&quot;,  &quot;string in the format of the date to be parsed&quot;,  &quot;boolean about whether parsing is set to be lenient, that is to say, accepting the heuristic match with the format&quot;)</td>
</tr>
<tr>
<td>parseDateLocale</td>
<td>Parses a string according to a specified format and extracts the date. Returns the date according to the local format specified.</td>
<td>TalendDate.parseDateLocale(&quot;date format of the string to be parsed&quot;,  &quot;String in the format of the date to be parsed&quot;,  &quot;code corresponding to the country or language&quot;)</td>
</tr>
<tr>
<td>setDate</td>
<td>Modifies part of a date according to the part and value of the date specified and the format specified.</td>
<td>TalendDate.setDate(Date, whole n,  &quot;format of the part of the date to be modified - eg.:yyyy&quot;)</td>
</tr>
<tr>
<td>Routine</td>
<td>Description</td>
<td>Syntax</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>TO_CHAR</td>
<td>Converts a date to a character string.</td>
<td>TalendDate.TO_CHAR(date[,format])</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• date: the date value you want to convert to a character string.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• format: the string which defines the format of the return value.</td>
</tr>
<tr>
<td>TO_DATE</td>
<td>Converts a character string to a Date/Time datatype.</td>
<td>TalendDate.TO_DATE(string[, format])</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• string: the string you want to convert to a Date/Time datatype.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• format: the format string that matches the part of the string argument.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If not specified, the string value must be in the date format MM/dd/yyyy HH:mm:ss.SSS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For example, TalendDate.TO_DATE(&quot;04/24/2017 13:55:42.123&quot;) will return Mon Apr 24 13:55:42 CST 2017.</td>
</tr>
<tr>
<td>ADD_TO_DATE</td>
<td>Adds a specified amount to one part of a datetime value, and returns a date in the same format as the date you pass to the function.</td>
<td>TalendDate.ADD_TO_DATE(date, format, amount)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• date: the date value you want to change.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• format: the format string specifying the portion of the date value you want to change.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Valid format strings for year: Y, YY, YYY, and YYYY.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Valid format strings for month: MONTH, MM, and MON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Valid format strings for day: D, DD, DDD, DAY, and DY.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Valid format strings for hour: HH, HH12, and HH24.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Valid format string for minute: MI.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Valid format string for second: SS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Valid format string for millisecond: MS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• amount: the integer value specifying the amount of years, months, days, hours, and so on by which you want to change the date value.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For example,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>if TalendDate.getCurrentDate() returns Mon Apr 24 14:26:03 CST 2017,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TalendDate.ADD_TO_DATE(TalendDate.getCurrentDate(), &quot;YY&quot;, 1) will return Tue Apr 24 14:26:03 CST 2018.</td>
</tr>
</tbody>
</table>

**Formatting a Date**

The `formatDate` routine is easy to use, along with a **Java** component:

```java
System.out.println(TalendDate.format("dd-MM-yyyy", new Date()));
```
The current date is initialized according to the pattern specified by the `new date()` Java function and is displayed in the Run view:

```
Starting job routine at 17.28 25/02/2010.
2010-02-25 17:28:07
Job routine ended at 17.28 25/02/2010. [exit code=0]
```

### Checking a Date

It is easy to use the `isDate` routine, along with a `tJava` component to check if a date expression is in the format specified:

```
System.out.println(TalendDate.isDate("2010-02-09 00:00:00","yyyy-MM-dd HH:mm:ss"));
```

A boolean is returned in the Run view:

```
Starting job routine at 17.36 25/02/2010.
true
Job routine ended at 17.36 25/02/2010. [exit code=0]
```

### Comparing Dates

It is easy to use the `compareDate` routine, along with a `tJava` component to compare two dates, for example to check if the current date is identical to, earlier than or later than a specific date, according to the format specified.

```
System.out.println(TalendDate.compareDate(new Date(),TalendDate.parseDate("yyyy-MM-dd", "2010/11/24", "yyyy-MM-dd"));
```

In this example the current date is initialized by the Java function `new date()` and the value -1 is displayed in the Run view to indicate that the current date is earlier than the second date.

```
Starting job routine at 18.09 25/02/2010.
-1
Job routine ended at 18.09 25/02/2010. [exit code=0]
```

### Configuring a Date

It is easy to use the `setDate` routine, along with a `tJava` component to change the year of the current date, for example:

```
System.out.println(TalendDate.formatDate("yyyy/MM/dd HH:mm:ss",new Date ()));
System.out.println(TalendDate.setDate(newDate(),2011,"yyyy"));
```

The current date, followed by the new date are displayed in the Run view:

```
Starting job routine at 18.03 26/02/2010.
2010/02/26 18:03:14
Sat Feb 26 18:03:14 CET 2011
Job routine ended at 18.03 26/02/2010. [exit code=0]
```
**Parsing a Date**

It is easy to use the `parseDate` routine, along with a `tJava` component to change a date string from one format into another Date format, for example:

```java
System.out.println(TalendDate.parsedate("yyyy/MM/dd HH:mm:ss", "1979-10-20 19:00:59");
```

The string is changed and returned in the Date format:

Starting job routine at 11:58 01/03/2010.
Sat Oct 20 19:00:59 CET 1979
Job routine ended at 11:58 01/03/2010. [exit code=0]

**Retrieving part of a Date**

It is easy to use the `getPartOfDate` routine, along with a `tJava` component to retrieve part of a date, for example:

```java
Date D=TalendDate.parsedate("dd-MM-yyyy HH:mm:ss", "13-10-2010 12:23:45");
System.out.println(D.toString());
System.out.println(TalendDate.getPartofDate("DAY_OF_MONTH", D));
System.out.println(TalendDate.getPartOfDate("MONTH", D));
System.out.println(TalendDate.getPartOfDate("YEAR", D));
System.out.println(TalendDate.getPartOfDate("DAY_OF_YEAR", D));
System.out.println(TalendDate.getPartOfDate("DAY_OF_WEEK", D));
```

In this example, the day of month (`DAY_OF_MONTH`), the month (`MONTH`), the year (`YEAR`), the day number of the year (`DAY_OF_YEAR`) and the day number of the week (`DAY_OF_WEEK`) are returned in the `Run` view. All the returned data are numeric data types.

Starting job routine at 10:52 17/12/2010.
[statistics] connecting to socket on port 3565
[statistics] connected
Wed Oct 13 12:23:45 CEST 2010
13
9
2010
236
4
[statistics] disconnected
Job routine ended at 10:52 17/12/2010. [exit code=0]

**Note:**

In the `Run` view, the date string referring to the months (`MONTH`) starts with 0 and ends with 11: 0 corresponds to January, 11 corresponds to December.

**Formatting the Current Date**

It is easy to use the `getDate` routine, along with a `tJava` component, to retrieve and format the current date according to a specified format, for example:

```java
System.out.println(TalendDate.getDate(CCYY-MM-DD));
```

The current date is returned in the specified format (optional):
**Talend String Routines**

The **Talend String** routines allow you to carry out various operations on alphanumerical expressions.

To access these routines, double click on **Talend String** under the **system** folder. The **Talend String** class contains the following routines:

<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>replaceSpecialCharForXML</td>
<td>returns a string from which the special characters (eg.: &lt;, &gt;, &amp;) have been replaced by equivalent XML characters.</td>
<td><code>TalendString.replaceSpecialCharForXML(&quot;string containing the special characters - eg.: Thelma &amp; Louise&quot;)</code></td>
</tr>
<tr>
<td>checkCDATAForXML</td>
<td>identifies characters starting with &lt;![CDATA[ and ending with ]]&gt;, as pertaining to XML and returns them without modification. Transforms the strings not identified as XML in a form which is compatible with XML and returns them.</td>
<td><code>TalendString.checkCDATAForXML(&quot;string to be parsed&quot;)</code></td>
</tr>
<tr>
<td>talendTrim</td>
<td>parses the entry string and removes the filler characters from the start and end of the string according to the alignment value specified: -1 for the filler characters at the end of the string, 1 for those at the start of the string and 0 for both. Returns the trimmed string.</td>
<td><code>TalendString.talendTrim(&quot;string to be parsed&quot;, &quot;filler character to be removed&quot;, character position)</code></td>
</tr>
<tr>
<td>removeAccents</td>
<td>removes accents from a string and returns the string without the accents.</td>
<td><code>TalendString.removeAccents(&quot;String&quot;)</code></td>
</tr>
<tr>
<td>getAsciiRandomString</td>
<td>generates a random string with a specific number of characters.</td>
<td><code>TalendString.getAsciiRandomString(whole number indicating the length of the string)</code></td>
</tr>
</tbody>
</table>

**Formatting an XML string**

It is easy to run the `replaceSpecialCharForXML` routine along with a **Java** component, to format a string for XML:

```java
System.out.println(TalendString.replaceSpecialCharForXML("Thelma & Louise"));
```

In this example, the "&" character is replaced in order to make the string XML compatible:
Trimming a string

It is easy to use the `talendTrim` routine, along with a `tJava` component to remove the string padding characters from the start and end of the string:

```java
System.out.println(TalendString.talendTrim("**talend open studio****", '⋆', -1));
System.out.println(TalendString.talendTrim("**talend open studio****", '⋆', 1));
System.out.println(TalendString.talendTrim("**talend open studio****", '⋆', 0));
```

The star characters are removed from the start, then the end of the string and then finally from both ends:

```
**talend open studio
talend open studio****
talend open studio
```

Removing accents from a string

It is easy to use the `removeAccents` routine, along with a `tJava` component, to replace the accented characters, for example:

```java
System.out.println(TalendString.removeAccents("sâcrebleü!"));
```

The accented characters are replaced with non-accented characters:

```
sacrebleu!
```

Talend StringUtil Routines

The `TalendStringUtil` class contains only one routine `DECODE` that allows you to search a value in a port. To access the routine, double-click `TalendStringUtil` under the `system` folder.
<table>
<thead>
<tr>
<th>Routine</th>
<th>Description</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECODE</td>
<td>Searches a port for a value you specify. If the function finds the value, it returns a result value, which you define. You can build an unlimited number of searches within a DECODE function.</td>
<td>TalendStringUtil.DECODE(value, defaultValue, search1, result1[, search2, result2]...)</td>
</tr>
<tr>
<td></td>
<td>• <code>value</code>: the value you want to search.</td>
<td>• <code>value</code>: the value you want to search.</td>
</tr>
<tr>
<td></td>
<td>• <code>defaultValue</code>: the value you want to return if the search does not find a matching value. The default value can be set to <code>null</code>.</td>
<td>• <code>defaultValue</code>: the value you want to return if the search does not find a matching value. The default value can be set to <code>null</code>.</td>
</tr>
<tr>
<td></td>
<td>• <code>search</code>: the value for which you want to search. The search value must have the same datatype as the <code>value</code> argument.</td>
<td>• <code>search</code>: the value for which you want to search. The search value must have the same datatype as the <code>value</code> argument.</td>
</tr>
<tr>
<td></td>
<td>• <code>result</code>: the value you want to return if the search finds a matching value.</td>
<td>• <code>result</code>: the value you want to return if the search finds a matching value.</td>
</tr>
</tbody>
</table>

Below is an example of how to use the **DECODE** routine with a **tJava** component. You need to add a **tJava** component to a new Job, then enter the following code, which will search the value for 10, in the **Code** field on the **Basic settings** view of the **tJava** component.

```java
TalendStringUtil<Integer, String> example = new TalendStringUtil<Integer, String>();
System.out.println(example.DECODE(10, "error", 5, "five", 10, "ten", 15, "fifteen", 20, "twenty"));
```

Note that you need to create a new object of the **TalendStringUtil** type, and better to use generic type to constrain the input data, then use the object to call the **DECODE** routine.

Press **F6** to run the Job. It will return **ten**, which is the result of the value 10.
Appendices

Customizing Talend Studio and setting Studio preferences

Customizing project settings

About this task

Talend Studio enables you to customize the information and settings of the project in progress, including the Palette, Job settings and Job version management, for example.

To customize project settings:

Procedure

1. Click on the Studio tool bar, or select File > Edit Project Properties from the menu bar. The [Project Settings] dialog box opens.
2. In the tree diagram to the left of the dialog box, select the setting you wish to customize and then customize it, using the options that appear to the right of the box.

Results

From the dialog box you can also export or import the full assemblage of settings that define a particular project:

- To export the settings, click on the Export button. The export will generate an XML file containing all of your project settings.
- To import settings, click on the Import button and select the XML file containing the parameters of the project which you want to apply to the current project.

Setting the compiler compliance level

About this task

The compiler compliance level corresponds to the Java version used for Job code generation.

For more information on the compiler compliance levels compatibility, see Talend Installation and Upgrade Guide.

Procedure

1. Click on the toolbar of the Studio main window, or click File > Edit Project Properties from the menu bar to open the [Project Settings] dialog box.
2. Expand the Build node and click Java Version.
3. From the JDK Compiler compliance level list, select the compiler compliance level you want to use, and then click OK.
Customizing Maven build script templates

Your Talend Studio provides the following default templates for generating build scripts:

- Maven script templates for standalone Job export
- A Maven script template for OSGi bundle export of Jobs

Based on the default, global build templates, you can create folder-level build scripts. Build scripts generated based on these templates are executed when building Jobs.

This section provides information on how to customize the build script templates. For information on how to build a Job, see Building Jobs on page 166.

Customizing the global build script templates

About this task

In the [Project Settings] dialog box, you can find and customize the default, global build script templates under the Build > Maven > Default node. These script templates apply to all Jobs or Routes in the root folder and all sub-folders except those with their own build script templates set up.

The following example shows how to customize the global POM script template for standalone Jobs:

**Procedure**

1. From the menu bar, click File > Edit Project properties to open the [Project Settings] dialog box.
2. Expand the Build > Maven > Default nodes, and then click the Standalone Job node to open the relevant view that displays the content of the POM script template.
Note:
Depending on the Studio product you are using, the project settings items in your Studio may differ from what is shown above.

3. Modify the script code in the text panel and click OK to finish your customization.

Customizing the folder-level build script templates

About this task
Based on the global build script templates, you can add and customize script templates for Jobs and Routes folder by folder under the Build > Maven > Setup custom scripts by folder node. The build script templates added for a folder apply to all Jobs or Routes in that folder and all its sub-folders except those with their own build script templates set up.

The following example shows how to add and customize the POM script template for building standalone Jobs from Jobs in the CA_customers folder:

Procedure

1. From the menu bar, click File > Edit Project properties to open the [Project Settings] dialog box.
2. Expand the Build > Maven > Setup custom scripts by folder > Job Designs > CA_customers nodes, and then click the Standalone Job node to open the relevant view, from which you can add script templates or delete all existing templates.
Note:

Depending on the Studio product you are using, the project settings items in your Studio may differ from what is shown above.

3. Click the **Create Maven files** button to create script templates based on the global templates for standalone Jobs.

4. Select the script template you want to customize, pom.xml in this example, to display the script code in the code view. Modify the script code in the text panel and click **OK** to finish your customization.
Once the build script templates are created for a folder, you can also go to the directory where the XML files are stored, `<studio_installation_directory>/workspace/<project_name>/process/CA_customers` in this example, and directly modify the XML file of the template you want to customize. Your changes will affect all Jobs in the folder and in all sub-folders except those with their own script set up.

Managing deployment versions of Jobs

About this task

Through the [Project Settings] dialog box, you can manage in a batch manner or individually the deployment version of each Job item to be published to the artifact repository.

Procedure

1. On the toolbar of the Studio main window, click or click File > Edit Project Properties from the menu bar to open the [Project Settings] dialog box.
2. In the tree view of the dialog box, expand Build > Maven and select Deployment Versioning to open the corresponding view.
3. In the Repository tree view, expand the node holding the items you want to manage their deployment versions and then select the check boxes of these items.

The selected items are displayed in the Items list to the right along with their current version in the Version column.

4. Make changes as required:

   - To set a deployment version for all the items, enter the version in the Project version field, select the Apply project version to items option, and click Apply version.

   - Click Select all subjobs if you want to update all of the subjobs dependent on the selected items at the same time.

   - To set the deployment version for one or more items individually, select the Change the version of each item individually option, select the item or items in the table below the Options area, enter the deployment version New version field, and click Apply.

   - Select the Use job versions option if you want to use the latest Job versions as the deployment versions for the selected items.

   - If you want to publish a snapshot version of the item or items, select the Use snapshot check box before applying the version setting.

5. Click OK to apply your changes and close the dialog box.

6. If any of the selected Jobs is opened in the design workspace, click OK in a new dialog box and then save your Job to apply the new deployment version to it.
Results
You can also set the deployment version of a Job in the Job view of it once opened in the design workspace. For more information, see Customizing deployment of a Job.

The deployment version settings you make in the [Project Settings] dialog box will be reflected in the Deployment tab in the Job view of the relevant item or items, and vice versa.

For more information on Job version management, see Managing Job and Route versions on page 182 and Version management on page 450.

For more information on how to publish a Job from the Studio to the artifact repository, see Publishing into the Artifact repository.

Palette Settings

About this task
You can customize the settings of the Palette display so that only the components used in the project are loaded. This will allow you to launch the Studio more quickly.

To customize the Palette display settings:

Procedure

1. On the toolbar of the Studio's main window, click or click File > Edit Project Properties on the menu bar to open the [Project Settings] dialog box.

Note:
In the **General** view of the [Project Settings] dialog box, you can add a project description, if you did not do so when creating the project.

2. In the tree view of the [Project Settings] dialog box, expand **Designer** and select **Palette Settings**. The settings of the current **Palette** are displayed in the panel to the right of the dialog box.

3. Select one or several components, or even set(s) of components you want to remove from the current project’s **Palette**.

4. Use the left arrow button to move the selection onto the panel on the left. This will remove the selected components from the **Palette**.

5. To re-display hidden components, select them in the panel on the left and use the right arrow button to restore them to the **Palette**.

6. Click **Apply** to validate your changes and **OK** to close the dialog box.

**Results**

![Note:](image)

To get back to the **Palette** default settings, click **Restore Defaults**.

For more information on the **Palette**, see [Changing the Palette layout and settings](#) on page 460.

**Type mapping**

You can set the parameters for type conversion in Talend Studio, from Java towards databases and vice versa.

**Accessing mapping files**

**Procedure**

1. On the toolbar of the Studio main window, click ![File](image) or click **File > Edit Project Properties** from the menu bar to open the [Project Settings] dialog box.

2. In the tree view of the dialog box, expand **General** and select **Metadata of Talend Type** to open the relevant view.
The **Metadata Mapping File** area lists the XML files that hold the conversion parameters for each database type used in Talend Studio.

- You can import, export, or delete any of the conversion files by clicking **Import**, **Export** or **Remove** respectively.
- You can modify a conversion file according to your needs by selecting the file and clicking the **Edit** button to open the [Edit mapping file] dialog box and then modify the XML code directly in the open dialog box.

**Frequently used attributes in dbType element**

Using attributes in the conversion mappings, you can define the default values or behavior of the relevant schema columns. The table below describes the frequently used attributes in the **dbType** element.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ignoreLen</td>
<td>When set to <code>true</code>, the length that you set for newly added columns of the type in schema (by <strong>Edit schema</strong>) on components will be ignored.</td>
</tr>
<tr>
<td>ignorePre</td>
<td>When set <code>true</code>, the precision that you set for newly added columns of the type in schema (by <strong>Edit schema</strong>) on components will be ignored.</td>
</tr>
<tr>
<td>default</td>
<td>When set <code>true</code>, the type defined in this element will be the default type of newly added columns (by <strong>Edit schema</strong>) on components.</td>
</tr>
<tr>
<td>defaultLength</td>
<td>Sets the default length of newly added columns of the type (by <strong>Edit schema</strong>) on components.</td>
</tr>
<tr>
<td>defaultPrecision</td>
<td>Sets the default precision of newly added columns of the type (by <strong>Edit schema</strong>) on components.</td>
</tr>
</tbody>
</table>
Version management

About this task

You can also manage the version of each item in the Repository tree view through General > Version Management of the [Project Settings] dialog box.

To do so:

Procedure

1. On the toolbar of the Studio main window, click or click File > Edit Project Properties from the menu bar to open the [Project Settings] dialog box.

2. In the tree view of the dialog box, expand General and select Version Management to open the corresponding view.

3. In the Repository tree view, expand the node holding the items you want to manage their versions and then select the check boxes of these items.

   The selected items display in the Items list to the right along with their current version in the Version column and the new version set in the New Version column.

4. Make changes as required:
   - In the Options area, select the Change all items to a fixed version option to change the version of the selected items to the same fixed version.
   - Click Revert if you want to undo the changes.
   - Click Select all dependencies if you want to update all of the items dependent on the selected items at the same time.
• Click **Select all subjobs** if you want to update all of the subjobs dependent on the selected items at the same time.

• To increment each version of the items, select the **Update the version of each item** option and change them manually.

• Select the **Fix tRunjob versions if Latest** check box if you want the father job of current version to keep using the child Job(s) of current version in the tRunjob to be versioned, regardless of how their versions will update. For example, a tRunJob will update from the current version 1.0 to 1.1 at both father and child levels. Once this check box is selected, the father Job 1.0 will continue to use the child Job 1.0 rather than the latest one as usual, say, version 1.1 when the update is done.

⚠️ **Warning:** To use this check box, the father Job must be using child Job(s) of the latest version as current version in the tRunjob to be versioned, by having selected the Latest option from the drop-down version list in the Component view of the child Job(s). For more information on tRunJob, see Talend Help Center (https://help.talend.com).

5. Click **OK** to apply your changes and close the dialog box.

### Results

⚠️ **Note:** For more information on version management, see Managing Job and Route versions on page 182.

### Status management

#### About this task

You can also manage the status of each item in the **Repository** tree view through General > Status Management of the [Project Settings] dialog box.

To do so:

#### Procedure

1. On the toolbar of the Studio main window, click 📝 or click **File > Edit Project Properties** from the menu bar to open the [Project Settings] dialog box.

2. In the tree view of the dialog box, expand **General** and select **Status Management** to open the corresponding view.
3. In the Repository tree view, expand the node holding the items you want to manage their status and then select the check boxes of these items. The selected items display in the Items list to the right along with their current status in the Status column and the new status set in the New Status column.

4. In the Options area, select the Change all technical items to a fixed status check box to change the status of the selected items to the same fixed status.

5. Click Revert if you want to undo the changes.

6. To increment each status of the items, select the Update the version of each item check box and change them manually.

7. Click Apply to apply your changes and then OK to close the dialog box.

Results

Note:

For further information about Job status, see Status settings on page 457.

Job Settings

About this task

You can automatically use Implicit Context Load and Stats and Logs settings you defined in the [Project Settings] dialog box of the actual project when you create a new Job.

To do so:
Procedure

1. On the toolbar of the Studio main window, click or click **File > Edit Project Properties** from the menu bar to open the **Project Settings** dialog box.

2. In the tree view of the dialog box, click the **Job Settings** node to open the corresponding view.

3. Select the **Use project settings when create a new job** check boxes of the **Implicit Context Load** and **Stats and Logs** areas.

4. Click **Apply** to validate your changes and then **OK** to close the dialog box.

Stats & Logs

About this task

When you execute a Job, you can monitor the execution through the **tStatCatcher Statistics** option or through using a log component. This will enable you to store the collected log data in .csv files or in a database.

You can then set up the path to the log file and/or database once for good in the **Project Settings** dialog box so that the log data get always stored in this location.

To do so:

Procedure

1. On the toolbar of the Studio main window, click or click **File > Edit Project Properties** from the menu bar to open the **Project Settings** dialog box.

2. In the tree view of the dialog box, expand the **Job Settings** node and then click **Stats & Logs** to display the corresponding view.
Note:

If you know that the preferences for Stats & Logs will not change depending upon the context of execution, then simply set permanent preferences. If you want to apply the Stats & Logs settings individually, then it is better to set these parameters directly onto the Stats & Logs view. For more information about this view, see Automating the use of statistics & logs on page 108.

3. Select the **Use Statistics**, **Use Logs** and **Use Volumetrics** check boxes where relevant, to select the type of log information you want to set the path for.

4. Select a format for the storage of the log data: select either the **On Files** or **On Database** check box. Or select the **On Console** check box to display the data in the console.

**Results**

The relevant fields are enabled or disabled according to these settings. Fill out the **File Name** between quotes or the **DB name** where relevant according to the type of log information you selected.

You can now store the database connection information in the **Repository**. Set the **Property Type** to **Repository** and browse to retrieve the relevant connection metadata. The fields get automatically completed.

Note:

Alternatively, if you save your connection information in a Context, you can also access them through **Ctrl+Space**.
Context settings

About this task

You can define default context parameters you want to use in your Jobs.
To do so:

Procedure

1. On the toolbar of the Studio main window, click or click File > Edit Project Properties from the menu bar to open the Project Settings dialog box.
2. In the tree view of the dialog box, expand the Job Settings node and then select the Implicit Context Load check box to display the configuration parameters of the Implicit ContextLoad feature.

3. Select the From File or From Database check boxes according to the type of file you want to store your contexts in.
4. For files, fill in the file path in the From File field and the field separator in the Field Separator field.
5. For databases, select the Built-in or Repository mode in the Property Type list and fill in the next fields.
6. Fill in the Table Name and Query Condition fields.
7. Select the type of system message you want to have (warning, error, or info) in case a variable is loaded but is not in the context or vice versa.
8. Click Apply to validate your changes and then OK to close the dialog box.

Applying Project Settings

About this task

From the Project Settings dialog box, you can choose to which Job in the Repository tree view you want to apply the Implicit Context Load and Stats and Logs settings.
To do so:
Procedure

1. On the toolbar of the Studio main window, click or click File > Edit Project Properties from the menu bar to open the [Project Settings] dialog box.

2. In the tree view of the dialog box, expand the Job Settings node and then click Use Project Settings to display the use of Implicit Context Load and Stats and Logs option in the Jobs.

3. In the Implicit Context Load Settings area, select the check boxes corresponding to the Jobs in which you want to use the implicit context load option.

4. In the Stats Logs Settings area, select the check boxes corresponding to the Jobs in which you want to use the stats and logs option.

5. Click Apply to validate your changes and then OK to close the dialog box.

Configuring Log4j

About this task

Your Talend Studio includes the Apache logging utility log4j to provide logging at runtime. You can enable or disable log4j loggers in components and customize the log4j configuration globally for the project.

To do so:

Procedure

1. On the toolbar of the Studio main window, click or click File > Edit Project Properties from the menu bar to open the [Project Settings] dialog box.

2. In the tree view of the dialog box, click the Log4j node to open the Log4j view.
3. Select the **Activate log4j in components** check box to activate the log4j feature. By default, the log4j feature is activated when a project is created.

4. Change the global log4j configuration by modifying the XML instructions in the **Log4j template** area.
   
   For example, to configure the root logger to output all debug or higher messages, go to the **Root Logger** section and set the **value** attribute of the **priority** element of the **root** node to **debug**. For more information on the log4j parameters, see [http://wiki.apache.org/logging-log4j/Log4jXmlFormat](http://wiki.apache.org/logging-log4j/Log4jXmlFormat).

**Results**

You can also define the output level of log messages to override the global configuration at Job execution. For more information, see [Customizing log4j output level at runtime](#) on page 196.

**Status settings**

**About this task**

In the [**Project Settings**](#) dialog box, you can also define the Status.

To do so:

**Procedure**

1. On the toolbar of the Studio main window, click ![Settings](#) or click **File > Edit Project Properties** from the menu bar to open the [**Project Settings**](#) dialog box.
2. In the tree view of the dialog box, click the **Status** node to define the main properties of your **Repository** tree view elements.

The main properties of a repository item gathers information data such as **Name**, **Purpose**, **Description**, **Author**, **Version** and **Status** of the selected item. Most properties are free text fields, but the **Status** field is a drop-down list.

3. Click the **New...** button to display a dialog box and populate the **Status** list with the most relevant values, according to your needs. Note that the **Code** cannot be more than 3-character long and the **Label** is required.

4. Once you completed the status setting, click **OK** to save.
The Status list will offer the status levels you defined here when defining the main properties of your Job designs and business models.

5. In the [Project Settings] dialog box, click Apply to validate your changes and then OK to close the dialog box.

Security settings

About this task

You can hide or show your passwords on your documentations, metadata, contexts, and so on when they are stored in the Repository tree view.

To hide your password:

Procedure

1. On the toolbar of the Studio main window, click or click File > Edit Project Properties from the menu bar to open the [Project Settings] dialog box.
2. In the tree view of the dialog box, click the Security node to open the corresponding view.
3. Select the Hide passwords check box to hide your password.

   Note:
   If you select the Hide passwords check box, your password will be hidden for all your documentations, contexts, and so on, as well as for your component properties when you select Repository in the Property Type field of the component Basic settings view, as in the screen capture below. However, if you select Built-in, the password will not be hidden.

4. In the [Project Settings] dialog box, click Apply to validate your changes and then OK to close the dialog box.

Customizing the workspace

When using Talend Studio to design a data integration Job, you can customize the Palette layout and setting according to your needs. You can as well change the position of any of the panels that exist in the Studio to meet your requirements.

Note:
All the panels, tabs, and views described in this documentation are specific to Talend Studio. Some views listed in the [Show View] dialog box are Eclipse specific and are not subjects of this documentation. For information on such views, check Eclipse online documentation at http://www.eclipse.org/documentation/.
Changing the Palette layout and settings

The Palette contains all basic technical components and shapes as well as branches for Job design and business modeling in the design workspace. These components and shapes as well as branches are grouped in families and sub-families.

Talend Studio enables you to change the layout and position of your Palette according to your requirements. The below sections explain all management options you can carry out on the Palette.

Showing, hiding the Palette and changing its position

By default, the Palette might be hidden on the right hand side of your design workspace.

If you want the Palette to show permanently, click the left arrow, at the upper right corner of the design workspace, to make it visible at all times.

You can also move around the Palette outside the design workspace within the Integration perspective. To enable the standalone Palette view, click the Window menu > Show View... > General > Palette.

If you want to set the Palette apart in a panel, right-click the Palette head bar and select Detached from the contextual menu. The Palette opens in a separate view that you can move around wherever you like within the perspective.

Displaying/hiding components families

You can display/hide components families according to your needs in case of visibility problems, for example. To do so, right-click the Palette and select Display folder to display components families and Hide folder to display components without their families.

Note:

This display/hide option can be very useful when you are in the Favorite view of the Palette. In this view, you usually have a limited number of components that if you display without their
Maintaining a component family open

If you often use one or many component families, you can add a pin on their names to stop them from collapsing when you select components from other families.

To add a pin, click the pin icon on the top right-hand corner of the family name.

Filtering the Palette

You can select the components to be shown or hidden on your Palette. You can also add to the Palette the components that you developed yourself.

For more information about filtering the Palette, see Palette Settings on page 447.

For more information about adding components to the Palette, either from Talend Exchange or from your own development, see Downloading/uploading Talend Community components on page 91 and/or How to define the user component folder (Talend > Components) on page 475.

Setting the Palette favorite

About this task

The Palette offers you search and favorite possibilities that by turn facilitate its usage.

You can add/remove components to/from the Palette favorite view in order to have a quick access to all the components that you mostly use.

To do so:

Procedure

1. From the Palette, right-click the component you want to add to Palette favorite and select Add To Favorite.
2. Do the same for all the components you want to add to the Palette favorite then click the Favorite button in the upper right corner of the Palette to display the Palette favorite.

Only the components added to the favorite are displayed.

To delete a component from the Palette favorite, right-click the component you want to remove from the favorite and select Remove From Favorite.

To restore the Palette standard view, click the Standard button in the upper right corner of the Palette.
Changing components layout in the Palette

You can change the layout of the component list in the Palette to display them in columns or in lists, as icons only or as icons with short description.

You can also enlarge the component icons for better readability of the component list.

To do so, right-click any component family in the Palette and select the desired option in the contextual menu or click Settings to open the [Palette Settings] window and fine-tune the layout.

Changing panels positions

All panels in the open Studio can be moved around according to your needs.

All you need to do is to click the head border of a panel or to click a tab, hold down the mouse button and drag the panel to the target destination. Release to change the panel position.

Click the minimize/maximize icons ( minimize / maximize ) to minimize the corresponding panel or maximize it. For more information on how to display or hide a panel/view, see Displaying Job configuration tabs/views on page 464.

Click the close icon ( close ) to close a tab/view. To reopen a view, click Window > Show View > Talend, then click the name of the panel you want to add to your current view.
If the Palette does not show or if you want to set it apart in a panel, go to Window > Show view... General > Palette. The Palette opens in a separate view that you can move around wherever you like within the perspective.

**Displaying Job configuration tabs/views**

The configuration tabs are located in the lower half of the design workspace of the Integration perspective. Each tab opens a view that displays detailed information about the selected element in the design workspace.

The Component, Run Job, and Contexts views gather all information relative to the graphical elements selected in the design workspace or the actual execution of the open Job.

**Note:**

By default, when you launch Talend Studio for the first time, the Problems tab will not be displayed until the first Job is created. After that, Problems tab will be displayed in the tab system automatically.

The Modules and Scheduler[deprecated] tabs are located in the same tab system as the Component, Logs and Run Job tabs. Both views are independent from the active or inactive Jobs open on the design workspace.

Some of the configuration tabs are hidden by default such as the Error Log, Navigator, Job Hierarchy, Problems, Modules and Scheduler[deprecated] tabs. You can show hidden tabs in this tab system and directly open the corresponding view if you select Window > Show view and then, in the open dialog box, expand the corresponding node and select the element you want to display.

**Filtering entries listed in the Repository tree view**

Talend Studio provides the possibility to choose what nodes, Jobs or items you want to list in the Repository tree view.
You can filter the **Repository** tree view by job name, Job status, the user who created the Job/items or simply by selecting/clearing the check box next to the node/item you want to display/hide in the view. You can also set several filters simultaneously.

**Filtering by Job name**

**About this task**

To filter Jobs listed in the **Repository** tree view by Job name, complete the following:

**Procedure**

1. In the Studio, click the icon in the upper right corner of the **Repository** tree view and select **Filter settings** from the contextual menu.
   
   The [Repository Filter] dialog box displays.
   
   ![Repository Filter Setting dialog box]

   The patterns are separated by comma, where * = any string, ? = any character, ,, = ,.

   The **Filter By User** field shows all users.

   The **Filter By Status** field shows the following:
   - DEV: development
   - TEST: testing
   - PROD: production
   - not set status

2. Select the **Filter By Name** check box.
   
   The corresponding field becomes available.
3. Follow the rules set below the field when writing the patterns you want to use to filter the Jobs. In this example, we want to list in the tree view all Jobs that start with tMap or test.

4. In the [Repository Filter] dialog box, click OK to validate your changes and close the dialog box. Only the Jobs that correspond to the filter you set are displayed in the tree view, those that start with tMap and test in this example.

Results

Note:

You can switch back to the by-default tree view, which lists all nodes, Jobs and items, by simply clicking the icon . This will cause the green plus sign appended on the icon to turn to a minus red sign ( ).

Filtering by user

About this task

To filter entries in the Repository tree view by the user who created the Jobs/items, complete the following:

Procedure

1. In the Studio, click the icon in the upper right corner of the Repository tree view and select Filter settings from the contextual menu. The [Repository Filter] dialog box displays.
2. Clear the All Users check box.

The corresponding fields in the table that follows become available.

<table>
<thead>
<tr>
<th>Login</th>
<th>FirstName</th>
<th>LastName</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:user@talend.com">user@talend.com</a></td>
<td>User</td>
<td>User</td>
</tr>
<tr>
<td><a href="mailto:dev1@talend.com">dev1@talend.com</a></td>
<td>dev1</td>
<td>Talend</td>
</tr>
<tr>
<td><a href="mailto:dev2@talend.com">dev2@talend.com</a></td>
<td>dev2</td>
<td>Talend</td>
</tr>
</tbody>
</table>

This table lists the authentication information of all the users who have logged in to Talend Studio and created a Job or an item.

3. Clear the check box next to a user if you want to hide all the Jobs/items created by him/her in the Repository tree view.

4. Click OK to validate your changes and close the dialog box.

All Jobs/items created by the specified user will disappear from the tree view.
Results

Note:
You can switch back to the by-default tree view, which lists all nodes, Jobs and items, by simply clicking the icon . This will cause the green plus sign appended on the icon to turn to a minus red sign ( ).

Filtering by Job status

About this task

To filter Jobs in the Repository tree view by the job status, complete the following:

Procedure

1. In the Studio, click the icon in the upper right corner of the Repository tree view and select Filter settings from the contextual menu.
   The [Repository Filter] dialog box displays.
   2. In the Filter By Status area, clear the check boxes next to the status type if you want to hide all the Jobs that have the selected status.
   3. Click OK to validate your changes and close the dialog box.
All Jobs that have the specified status will disappear from the tree view.

Results

Note:
You can switch back to the by-default tree view, which lists all nodes, Jobs and items, by simply clicking the icon. This will cause the green plus sign appended on the icon to turn to a minus red sign.

Choosing what repository nodes to display

About this task

To filter repository nodes, complete the following:

Procedure

1. In the Integration perspective of the Studio, click the icon in the upper right corner of the Repository tree view and select Filter settings from the contextual menu.

   The [Repository Filter] dialog box displays.

   ![Repository Filter Dialog Box]

2. Select the check boxes next to the nodes you want to display in the Repository tree view.
Consider, for example, that you want to show in the tree view all the Jobs listed under the **Job Designs** node, three of the folders listed under the **SQL Templates** node and one of the metadata items listed under the **Metadata** node.

3. Click **OK** to validate your changes and close the dialog box.

Only the nodes/folders for which you selected the corresponding check boxes are displayed in the tree view.

---

**Results**

- **Note:**

  If you do not want to show all the Jobs listed under the **Job Designs** node, you can filter the Jobs using the **Filter By Name** check box. For more information on filtering Jobs, see Filtering by Job name on page 465.
Setting Talend Studio preferences

You can define various properties for all the perspectives of Talend Studio according to your needs and preferences.

Numerous settings you define can be stored in the Preference and thus become your default values for all new Jobs you create.

The following sections describe specific settings that you can set as preference.

First, click the Window menu of Talend Studio, then select Preferences.

Java Interpreter path (Talend)

About this task

The Java Interpreter path is set based on the location of the Java file on your computer (for example C:\Program Files\Java\jre1.8.0_51\bin\java.exe).

To customize your Java Interpreter path:

Procedure

1. If needed, click the Talend node in the tree view of the [Preferences] dialog box.
2. Enter a path in the Java interpreter field if the default directory does not display the right path.

Results

On the same view, you can also change the preview limit and the path to the temporary files or the OS language.

Designer preferences (Talend > Appearance)

About this task

You can set component and Job design preferences to let your settings be permanent in the Studio.
Procedure

1. From the menu bar, click **Window > Preferences** to open the [Preferences] dialog box.
2. Expand the **Talend > Appearance** node.
3. Click **Designer** to display the corresponding view.

   On this view, you can define the way component names and hints will be displayed.

   ![Designer View]

4. Select the relevant check boxes to customize your use of the Talend Studio design workspace.

   **Nexus connection preferences (Talend > Nexus)**

   **About this task**

   You can configure how long your Talend Studio keeps connection with the Nexus server, from which your Talend Studio retrieves updates and custom libraries and to which you can publish your artifacts.

   **Procedure**

   1. From the menu bar, click **Window > Preferences** to display the [Preferences] dialog box.
2. Expand the **Talend** node and click **Nexus** to display the relevant view.
3. In the **Timeout for nexus connection (ms)** field, specify the time in milliseconds you want your Talend Studio to wait for an interaction with the Nexus server before cutting the connection, 0 for an infinite timeout.

4. Click **Apply** to apply your changes; click **OK** to validate the settings and close the **Preferences** dialog box.

**Results**

For more information on installing and configuring Nexus, see the Talend Installation and Upgrade Guide.

**Nexus update server preferences (Talend > Nexus > Libraries)**

**About this task**

You can set preferences for Talend Studio to the check for updates of custom libraries on the Nexus server.

**Procedure**

1. From the menu bar, click **Window > Preferences** to display the **Preferences** dialog box.
2. Expand the **Talend** and **Nexus** nodes in succession and then click **Libraries** to display the relevant view.
3. Set the preferences according to your needs:

   - In the **Jars check frequency** field, specify how often you want your Talend Studio to check for updates:
     - -1 if you don’t want your Talend Studio to check for updates at all.
     - 0 if you want your Talend Studio to check for updates at any action that needs a Jar or Jars, for example when a Job is built or executed from the Studio.
     - the number of days between two checks.

4. Click **Apply** to apply your changes; click **OK** to validate the settings and close the **[Preferences]** dialog box.

**Results**

For more information on installing and configuring Nexus, see the Talend Installation and Upgrade Guide.

**Bonita BPM Portal preferences (Talend > Bonita BPM Portal)**

**About this task**

When creating a BPM service, you can set its URI as well as the connection information to the Bonita BPM Portal.
Procedure

1. From the menu bar, click **Window > Preferences** to open the [Preferences] dialog box.
2. Expand the **Talend > Bonita BPM Portal** node.
3. Fill in the information as follows.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Username and Password</td>
<td>Enter the username and password to connect to the Bonita BPM Portal. By default, it is <code>install</code> and <code>install</code>.</td>
</tr>
<tr>
<td>Address</td>
<td>Enter the URL of the Bonita BPM Portal server. By default, it is <code>http://localhost:8040/bonita</code>.</td>
</tr>
</tbody>
</table>

4. Click **Apply** and then **OK** to validate the set preferences and close the dialog box.

How to define the user component folder (Talend > Components)

You can create and develop your own custom components for use in the **Integration** perspective of Talend Studio.

For further information about the creation and development of user components, see Talend Help Center (https://help.talend.com).

The following procedure applies only to the external components. For the preferences of all the components, see How to change specific component settings (Talend > Components) on page 476.

The user component folder is the folder that contains the components you created and/or the ones you downloaded from **Talend Exchange**. To define it, proceed as follows:

Procedure

1. In the tree view of the [Preferences] dialog box, expand the **Talend** node and select **Components**.

2. Enter the **User component folder** path or browse to the folder that contains the custom components to be added to the **Palette** of the Studio.
   
   In order to be imported to the **Palette** of the Studio, the custom components have to be in separate folders located at the root of the component folder you have defined.

3. Click **Apply** and then **OK** to validate the preferences and close the dialog box.
The Studio restarts and the external components are added to the Palette.

**Results**

This configuration is stored in the metadata of the workspace. If the workspace of Talend Studio changes, you have to reset this configuration again.

**How to change specific component settings (Talend > Components)**

**About this task**

You can modify some specific component settings such as the default mapping link display.

The following procedure applies to the external components and to the components included in the Studio. For the preferences specific to the user components, see How to define the user component folder (Talend > Components) on page 475.

To modify those specific components settings, proceed as follows:

**Procedure**

1. In the tree view of the [Preferences] dialog box, expand the Talend node and select Components.

![Components](image)

2. From the Default mapping links display as list, select the mapping link type you want to use in the tMap.

3. Under tRunJob, select the check box if you do not want the corresponding Job to open upon double clicking a tRunJob component.

   **Note:**

   You will still be able to open the corresponding Job by right clicking the tRunJob component and selecting Open tRunJob Component.

4. Under Component Assist, select the Enable Component Creation Assistant check box if you want to be able to add a component by typing its name in the design workspace. For more information, see Adding components to the Job on page 28.

5. Click Apply and then OK to validate the set preferences and close the dialog box.
Results

This configuration is stored in the metadata of the workspace. If the workspace of Talend Studio changes, you have to reset this configuration again.

Documentation preferences (Talend > Documentation)

About this task

You can include the source code on the generated documentation.

Procedure

1. From the menu bar, click Window > Preferences to open the [Preferences] dialog box.
2. Expand the Talend node and click Documentation to display the documentation preferences.

3. Customize the documentation preferences according to your needs:
   - Select the Source code to HTML generation check box to include the source code in the HTML documentation that you will generate.
   - Select the Use CSS file as a template when export to HTML check box to activate the CSS File field if you need to use a CSS file to customize the exported HTML files.

Results

For more information on documentation, see Generating HTML documentation on page 184 and Documentation tab on page 57.

REST Service preferences (Talend > ESB)

About this task

You can set the default endpoint URI for REST services and default Service Locator namespace. To do so:

Procedure

1. From the menu bar, click Window > Preferences to open the [Preferences] dialog box.
2. Expand the Talend > ESB node.
3. Click Service-REST to display the corresponding view.

   On this view, you can define the default endpoint URI for REST services and default Service Locator namespace.
Exchange preferences (Talend > Exchange)

About this task

You can set preferences related to your connection with Talend Exchange, which is part of the Talend Community, in Talend Studio. To do so:

Procedure

1. From the menu bar, click Window > Preferences to open the Preferences dialog box.
2. Expand the Talend node and click Exchange to display the Exchange view.
3. Set the Exchange preferences according to your needs:
   - If you are not yet connected to the Talend Community, click Sign In to go to the Connect to Talend Community page to sign in using your Talend Community credentials or create a Talend Community account and then sign in.
   - By default, while you are connected to the Talend Community, whenever an update to an installed community extension is available, a dialog box appears to notify you about it. If you often check for community extension updates and you do not want that dialog box to appear again, clear the Notify me when updated extensions are available check box.

Results

For more information on connecting to the Talend Community, see the Getting Started Guide. For more information on using community extensions in the Studio, see Downloading/uploading Talend Community components on page 91.

Adding code by default (Talend > Import/Export)

About this task

You can add pieces of code by default at the beginning and at the end of the code of your Job.
Procedure

1. From the menu bar, click **Window > Preferences** to open the [Preferences] dialog box.
2. Expand the **Talend** and **Import/Export** nodes in succession and then click **Shell Setting** to display the relevant view.

![Shell Setting dialog box]

3. In the **Command** field, enter your piece/pieces of code before or after `%GENERATED_TOS_CALL%` to display it/them before or after the code of your Job.

**Metadata Bridge preferences (Talend > Import/Export)**

**About this task**

You can set preferences for the **Talend** Metadata Bridge to make it work the way you want.

**Procedure**

1. From the menu bar, click **Window > Preferences** to display the [Preferences] dialog box.
2. Expand the **Talend** and **Import/Export** nodes in succession and then click **Metadata Bridge** to display the relevant view.
3. Set the preferences according to your use of the **Talend** Metadata Bridge:

- In the **Location** area, select the **Embedded** option to use the MIMB tool embedded in the **Talend** Metadata Bridge. This is the default option.
  
  To use the MIMB tool you have installed locally, select **Local Directory** and specify the installation directory of the MIMB tool.

- In the **Temp folder** field, specify the directory to hold the temporary files generated during metadata import/export executions, if you do not want to use the default directory.

- In the **Log folder** field, specify the directory to hold the logs files generated during metadata import/export executions, if you do not want to use the default directory.

- Select the **Show detailed logs** check box to generate detailed log files during metadata import/export executions.

4. Click **Apply** to apply your changes; click **OK** to validate the settings and close the [Preferences] dialog box.

**Results**

For more information on using the **Talend** Metadata Bridge to import/export metadata, see Talend Help Center (https://help.talend.com).

**Language preferences (Talend > Internationalization)**

**About this task**

You can set language preferences in Talend Studio. To do so:
Procedure
1. From the menu bar, click **Window > Preferences** to open the [Preferences] dialog box.
2. Expand the **Talend** node and click **Internationalization** to display the relevant view.
3. From the **Local Language** list, select the language you want to use for the graphical interface of Talend Studio.
4. Click **Apply** and then **OK** to validate your change and close the [Preferences] dialog box.
5. Restart the Studio to display the graphical interface in the selected language.

Palette preferences (Talend > Palette Settings)

**About this task**

From **Palette Settings** view you can set preferences for component searching from the **Palette** and even from the component list that appears on the design workspace when adding a component without using the **Palette**.

**Procedure**
1. From the menu bar, click **Window > Preferences** to display the [Preferences] dialog box.
2. Expand the **Talend** node and click **Palette Settings** to display the **Palette Settings** view.
3. To limit number of components that can be displayed on the **Recently Used** list, enter your preferred number in the **Recently used list size** field.
4. To enable searching a component using a phrase that describes the function or purpose of the component as search keywords in the search field of the **Palette** or in the text field that appears on the design workspace, select the **Also search from Help when performing a component searching** check box. With this check box selected, you can find your component on the **Palette** or on the component list on the design workspace as long as you can find it from the F1 Help information by using the same descriptive phrase as keywords.
5. To change the number of the search result entries when using a descriptive phrase as search key words, enter your preferred number in the Result limitation from Help field.

**Performance preferences (Talend > Performance)**

You can set performance preferences according to your use of Talend Studio. To do so, proceed as follows:

**Procedure**

1. From the menu bar, click Window > Preferences to open the Preferences dialog box.
2. Expand the Talend node and click Performance to display the repository refresh preference.

![Performance settings dialog box](image)

**Note:**
You can improve your performance when you deactivate automatic refresh.

3. Set the performance preferences according to your use of Talend Studio:
   
   - Select the Deactivate auto detect/update after a modification in the repository check box to deactivate the automatic detection and update of the repository.
   
   - Select the Check the property fields when generating code check box to activate the audit of the property fields of the component. When one property filed is not correctly filled in, the component is surrounded by red on the design workspace.

   **Note:**
   You can optimize performance if you disable property fields verification of components, for example if you clear the Check the property fields when generating code check box.

   - Select the Generate code when opening the job check box to generate code when you open a Job.
• Select the **Check only the last version when updating jobs or joblets** check box to only check the latest version when you update a Job.

• Select the **Propagate add/delete variable changes in repository contexts** to propagate variable changes in the Repository Contexts.

• Select the **Activate the timeout for database connection** check box to establish database connection time out. Then set this time out in the **Connection timeout (seconds)** field.

• Select the **Add all user routines to job dependencies, when create new job** check box to add all user routines to Job dependencies upon the creation of new Jobs.

• In the **Code Format timeout (seconds)** field, specify the number of seconds in which you want your Talend Studio to stop formatting the source code upon code generation, for example when you switch from the **Designer** view to the **Code** view or when you build a Job or Route. The value must be an integer greater than 0. Setting a small timeout value helps prevent performance issues at the price of lower readability of the source code, especially for a large, complex Job or Route.

**Debug and Job execution preferences (Talend > Run/Debug)**

**About this task**

You can set your preferences for debug and job executions in Talend Studio. To do so:

**Procedure**

1. From the menu bar, click **Window > Preferences** to display the [Preferences] dialog box.
2. Expand the **Talend** node and click **Run/Debug** to display the relevant view.
Results

- In the **Talend client configuration** area, you can define the execution options to be used by default:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stats port range</td>
<td>Specify a range for the ports used for generating statistics, in particular, if the ports defined by default are used by other applications.</td>
</tr>
<tr>
<td>Trace port range</td>
<td>Specify a range for the ports used for generating traces, in particular, if the ports defined by default are used by other applications.</td>
</tr>
<tr>
<td>Save before run</td>
<td>Select this check box to save your Job automatically before its execution.</td>
</tr>
<tr>
<td>Clear before run</td>
<td>Select this check box to delete the results of a previous execution before re-executing the Job.</td>
</tr>
<tr>
<td>Exec time</td>
<td>Select this check box to show Job execution duration.</td>
</tr>
<tr>
<td>Statistics</td>
<td>Select this check box to show the statistics measurement of data flow during Job execution.</td>
</tr>
<tr>
<td>Traces</td>
<td>Select this check box to show data processing during job execution.</td>
</tr>
<tr>
<td>Pause time</td>
<td>Enter the time you want to set before each data line in the traces table.</td>
</tr>
</tbody>
</table>

- In the **Job Run VM arguments** list, you can define the parameter of your current JVM according to your needs. The by-default parameters `-Xms256M` and `-Xmx1024M` correspond respectively to the minimal and maximal memory capacities reserved for your Job executions.

If you want to use some JVM parameters for only a specific Job execution, for example if you want to display the execution result for this specific Job in Japanese, you need open this Job's **Run** view and then in the **Run** view, configure the advanced execution settings to define the corresponding parameters.

For further information about the advanced execution settings of a specific Job, see Setting advanced execution settings on page 194.

For more information about possible parameters, check the site [http://www.oracle.com/technetwork/java/javase/tech/vmoptions-jsp-140102.html](http://www.oracle.com/technetwork/java/javase/tech/vmoptions-jsp-140102.html).

**Displaying special characters for schema columns (Talend > Specific settings)**

**About this task**

You may need to retrieve a table schema that contains columns written with special characters like Chinese, Japanese, Korean. In this case, you need to enable Talend Studio to read the special characters. To do so:

**Procedure**

1. From the menu bar, click **Window > Preferences** to open the [Preferences] dialog box.
2. On the tree view of the opened dialog box, expand the **Talend** node.
3. Click the **Specific settings** node to display the corresponding view on the right of the dialog box.
4. Select the **Allow specific characters (UTF8,..) for columns of schemas** check box.
Schema preferences (Talend > Specific Settings)

About this task
You can define the default data length and type of the schema fields of your components.

Procedure
1. From the menu bar, click Window > Preferences to open the [Preferences] dialog box.
2. Expand the Talend node, and click Specific Settings > Default Type and Length to display the data length and type of your schema.
3. Set the parameters according to your needs:

- In the **Default Settings for Fields with Null Values** area, fill in the data type and the field length to apply to the null fields.

- In the **Default Settings for All Fields** area, fill in the data type and the field length to apply to all fields of the schema.

- In the **Default Length for Data Type** area, fill in the field length for each type of data.

**SQL Builder preferences (Talend > Specific Settings)**

**About this task**

You can set your preferences for the SQL Builder. To do so:
Procedure

1. From the menu bar, click **Window > Preferences** to open the **[Preferences]** dialog box.
2. Expand the **Talend** and **Specific Settings** nodes in succession and then click **Sql Builder** to display the relevant view.

![Sql Builder](image)

3. Customize the SQL Builder preferences according to your needs:
   - Select the **add quotes, when you generated sql statement** check box to precede and follow column and table names with inverted commas in your SQL queries.
   - In the **AS400 SQL generation** area, select the **Standard SQL Statement** or **System SQL Statement** check boxes to use standard or system SQL statements respectively when you use an AS/400 database.
   - Clear the **Enable check queries in the database components (disable to avoid warnings for specific queries)** check box to deactivate the verification of queries in all database components.

**SSL settings preferences (Talend > SSL)**

About this task

You can set SSL preferences to configure your Talend Studio for secure communications with remote servers.

Procedure

1. From the menu bar, click **Window > Preferences** to display the **[Preferences]** dialog box.
2. Expand the **Talend** node and then click **SSL** to display the relevant view.
3. Define the Keystore Configuration for the local certificate to be sent to the remote host:
   a) Click **Browse** next to the Path field and browse to the keystore file that stores your local credentials.
   b) In the **Password** field, enter the keystore password.
   c) From the **Keystore Type** list, select the type of keystore to use.
4. Define the Truststore Configuration for verification of the remote host's certificate:
   a) Click **Browse** next to the Path field and browse to the truststore file.
   b) In the **Password** field, enter the truststore password.
   c) From the **Keystore Type** list, select the type of keystore to use.
5. Click **Apply** to apply your changes; click **OK** to validate the settings and close the [Preferences] dialog box.
6. Restart your Talend Studio for the configurations to take effect.
Usage Data Collector preferences (Talend > Usage Data Collector)

About this task

By allowing Talend Studio to collect your Studio usage statistics, you help users better understand Talend products and help Talend better learn how users are using the products, thus enabling Talend to improve product quality and performance to serve users better.

By default, Talend Studio automatically collects your Studio usage data and sends this data on a regular basis to servers hosted by Talend. You can view the usage data collection and upload information and customize the Usage Data Collector preferences according to your needs.

Note:

Be assured that only the Studio usage statistics data will be collected and none of your private information will be collected and transmitted to Talend.

Procedure

1. From the menu bar, click Window > Preferences to display the [Preferences] dialog box.
2. Expand the Talend node and click Usage Data Collector to display the Usage Data Collector view.

3. Read the message about the Usage Data Collector, and, if you do not want the Usage Data Collector to collect and upload your Studio usage information, clear the Enable capture check box.
4. To have a preview of the usage data captured by the Usage Data Collector, expand the Usage Data Collector node and click Preview.
To customize the usage data upload interval and view the date of the last upload, click **Uploading** under the **Usage Data Collector** node.

- By default, if enabled, the Usage Data Collector collects the product usage data and sends it to **Talend** servers every 10 days. To change the data upload interval, enter a new integer value (in days) in the **Upload Period** field.
- The read-only **Last Upload** field displays the date and time the usage data was last sent to **Talend** servers.

### Using SQL templates

#### What is ELT

Extract, Load and Transform (ELT) is a data manipulation process in database usage, especially in data warehousing. Different from the traditional ETL (Extract, Transform, Load) mode, in ELT, data is
extracted, loaded into the database and then is transformed where it sits in the database, prior to use. This data is migrated in bulk according to the data set and the transformation process occurs after the data has been loaded into the targeted DBMS in its raw format. This way, less stress is placed on the network and larger throughput is gained.

However, the ELT mode is certainly not optimal for all situations, for example,

• As SQL is less powerful than Java, the scope of available data transformations is limited.
• ELT requires users that have high proficiency in SQL tuning and DBMS tuning.
• Using ELT with Talend Studio, you cannot pass or reject one single row of data as you can do in ETL. For more information about row rejection, see Row connection on page 64.

Based on the advantages and disadvantages of ELT, the SQL templates are designed as the ELT facilitation requires.

**Introducing Talend SQL templates**

SQL is a standardized query language used to access and manage information in databases. Its scope includes data query and update, schema creation and modification, and data access control. Talend Studio provides a range of SQL templates to simplify the most common tasks. It also comprises a SQL editor which allows you to customize or design your own SQL templates to meet less common requirements.

These SQL templates are used with the components from the Talend ELT component family including tSQLTemplate, tSQLTemplateFilterColumns, tSQLTemplateCommit, tSQLTemplateFilterRows, tSQLTemplateRollback, tSQLTemplateAggregate and tSQLTemplateMerge. These components execute the selected SQL statements. Using the UNION, EXCEPT and INTERSECT operators, you can modify data directly on the DBMS without using the system memory.

Moreover, with the help of these SQL templates, you can optimize the efficiency of your database management system by storing and retrieving your data according to the structural requirements.

Talend Studio provides the following types of SQL templates under the SQL templates node in the Repository tree view:

• System SQL templates: They are classified according to the type of database for which they are tailored.
• User-defined SQL templates: these are templates which you have created or adapted from existing templates.

More detailed information about the SQL templates is presented in the below sections.

**Note:**
As most of the SQL templates are tailored for specific databases, if you change database in your system, it is inevitable to switch to or develop new templates for the new database.

**Managing Talend SQL templates**

Talend Studio enables you via the SQL Templates folder in the Repository tree view to use system or user-defined SQL templates in the Jobs you create in the Studio using the ELT components.

The below sections show you how to manage these two types of SQL templates.
Types of system SQL templates

This section gives detail information related to the different types of the pre-defined SQL templates. Even though the statements of each group of templates vary from database to database, according to the operations they are intended to accomplish, they are also grouped on the basis of their types in each folder.

The below table provides these types and their related information.

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
<th>Associated components</th>
<th>Required component parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate</td>
<td>Realizes aggregation (sum, average, count, etc.) over a set of data.</td>
<td>tSQLTemplateAggregate</td>
<td>Database name, Source table name, Target table name</td>
</tr>
<tr>
<td>Commit</td>
<td>Sends a Commit instruction to RDBMS.</td>
<td>tSQLTemplate, tSQLTemplateAggregate, tSQLTemplateCommit, tSQLTemplateFilterColumns, tSQLTemplateFilterRows, tSQLTemplateMerge, tSQLTemplateRollback</td>
<td>Null</td>
</tr>
<tr>
<td>Rollback</td>
<td>Sends a Rollback instruction to RDBMS.</td>
<td>tSQLTemplate, tSQLTemplateAggregate, tSQLTemplateCommit, tSQLTemplateFilterColumns, tSQLTemplateFilterRows, tSQLTemplateMerge, tSQLTemplateRollback</td>
<td>Null</td>
</tr>
<tr>
<td>DropSourceTable</td>
<td>Removes a source table.</td>
<td>tSQLTemplate, tSQLTemplateAggregate, tSQLTemplateFilterColumns, tSQLTemplateFilterRows</td>
<td>Table name (when use tSQLTemplate), Source table name</td>
</tr>
<tr>
<td>DropTargetTable</td>
<td>Removes a target table.</td>
<td>tSQLTemplateAggregate, tSQLTemplateFilterColumns, tSQLTemplateFilterRows</td>
<td>Target table name</td>
</tr>
<tr>
<td>FilterColumns</td>
<td>Selects and extracts a set of data from given columns in RDBMS.</td>
<td>tSQLTemplateAggregate, tSQLTemplateFilterColumns, tSQLTemplateFilterRows</td>
<td>Target table name (and schema), Source table name (and schema)</td>
</tr>
<tr>
<td>FilterRow</td>
<td>Selects and extracts a set of data from given rows in RDBMS.</td>
<td>tSQLTemplateAggregate, tSQLTemplateFilterColumns, tSQLTemplateFilterRows</td>
<td>Target table name (and schema), Source table name (and schema), Conditions</td>
</tr>
</tbody>
</table>
MergeInsert | Inserts records from the source table to the target table. | tSQLTemplateMerge tSQLTemplateCommit | Target table name (and schema)  
| | | Source table name (and schema)  
| | | Conditions

MergeUpdate | Updates the target table with records from the source table. | tSQLTemplateMerge tSQLTemplateCommit | Target table name (and schema)  
| | | Source table name (and schema)  
| | | Conditions

**Accessing a system SQL template**

To access a system SQL template, expand the SQL Templates node in the Repository tree view.

Each folder contains a system sub-folder containing pre-defined SQL statements, as well as a UserDefined folder in which you can store SQL statements that you have created or customized.
Each system folder contains several types of SQL templates, each designed to accomplish a dedicated task.

Apart from the **Generic** folder, the SQL templates are grouped into different folders according to the type of database for which they are to be used. The templates in the **Generic** folder are standard, for use in any database. You can use these as a basis from which you can develop more specific SQL templates than those defined in Talend Studio.

**Note:**

The system folders and their content are read only.

From the **Repository** tree view, proceed as follows to open an SQL template:

**Procedure**

1. In the **Repository** tree view, expand **SQL Templates** and browse to the template you want to open.
2. Double-click the class that you want to open, for example, **Aggregate** in the **Generic** folder.

The Aggregate template view displays in the workspace.

**Results**

You can read the predefined **Aggregate** statements in the template view. The parameters, such as `TABLE_NAME_TARGET`, `operation`, are to be defined when you design related Jobs. Then the parameters can be easily set in the associated components, as mentioned in the previous section.

Everytime you click or open an SQL template, its corresponding property view displays at the bottom of the studio. Click the **Aggregate** template, for example, to view its properties as presented below:
For further information regarding the different types of SQL templates, see Types of system SQL templates on page 492.

Creating user-defined SQL templates

As the transformation you need to accomplish in ELT may exceed the scope of what the given SQL templates can achieve, Talend Studio allows you to develop your own SQL templates according to some writing rules. These SQL templates are stored in the UserDefined folders grouped according to the database type in which they will be used.

For more information on the SQL template writing rules, see SQL statements on page 500.

To create a user-defined SQL template:

**Procedure**

1. In the Repository tree view, expand SQL Templates and then the category you want to create the SQL template in.

2. Right-click UserDefined and select Create SQLTemplate to open the [New SQLTemplate] wizard.
3. Enter the information required to create the template and click Finish to close the wizard.

The name of the newly created template appears under UserDefined in the Repository tree view. Also, an SQL template editor opens on the design workspace, where you can enter the code for the newly created template.

Results

For further information about how to create a user-defined SQL template and how to use it in a Job, see Talend Help Center (https://help.talend.com).

A use case of system SQL templates

As there are many common, standardized SQL statements, Talend Studio allows you to benefit from various system SQL templates.

This section presents you with a use case that takes you through the steps of using MySQL system templates in a Job that:

• opens a connection to a Mysql database.
• collects data grouped by specific value(s) from a database table and writes aggregated data in a target database table.
• deletes the source table where the aggregated data comes from.
• reads the target database table and lists the Job execution result.

To connect to the database and aggregate the database table columns:
Configuring a connection to a MySQL database

Procedure

1. Drop the following components from the Palette onto the design workspace: tMysqlConnection, tSQLTemplateAggregate, tSQLTemplateCommit, tMysqlInput, and tLogRow.
2. Link tMysqlConnection to tSQLTemplateAggregate using a Trigger > On Subjob Ok connection.
3. Do the same to link tSQLTemplateAggregate to tSQLTemplateCommit and link tSQLTemplateCommit to tMysqlInput.
4. Link tMysqlInput to tLogRow using a Row > Main connection.
5. Double-click tMysqlConnection to open its Basic settings view.
6. In the Basic settings view, set the database connection details manually.

```sql
select * from table
```
7. Double-click **tSQLTemplateCommit** to open its **Basic settings** view.

8. On the **Database Type** list, select the relevant database type, and from the **Component List**, select the relevant database connection component if more than one connection is used.

**Grouping data, writing aggregated data and dropping the source table**

**Procedure**

1. Double-click **tSQLTemplateAggregate** to open its **Basic settings** view.

   ![tSQLTemplateAggregate](image)

   2. On the **Database Type** list, select the relevant database type, and from the **Component List**, select the relevant database connection component if more than one connection is used.

   3. Enter the names for the database, source table, and target table in the corresponding fields and define the data structure in the source and target tables.

      The source table schema consists of three columns: **First_Name**, **Last_Name** and **Country**. The target table schema consists of two columns: **country** and **total**. In this example, we want to group citizens by their nationalities and count citizen number in each country. To do that, we define the **Operations** and **Group by** parameters accordingly.

   4. In the **Operations** table, click the [+] button to add one or more lines, and then click the **Output column** cell and select the output column that will hold the counted data from the drop-down list.

   5. Click the **Function** cell and select the operation to be carried on from the drop-down list.

   6. In the **Group by** table, click the [+] button to add one or more lines, and then click the **Output column** cell and select the output column that will hold the aggregated data from the drop-down list.

   7. Click the **SQL Template** tab to open the corresponding view.
8. Click the [+] button twice under the SQL Template List table to add two SQL templates.

9. Click on the first SQL template row and select the MySQLAggregate template from the drop-down list. This template generates the code to aggregate data according to the configuration in the Basic settings view.

10. Do the same to select the MySQLDropSourceTable template for the second SQL template row. This template generates the code to delete the source table where the data to be aggregated comes from.

Note:
To add new SQL templates to an ELT component for execution, you can simply drop the templates of your choice either onto the component in the design workspace, or onto the component’s SQL Template List table.

Note:
The templates set up in the SQL Template List table have priority over the parameters set in the Basic settings view and are executed in a top-down order. So in this use case, if you select MySQLDropSourceTable for the first template row and MySQLAggregate for the second template row, the source table will be deleted prior to aggregation, meaning that nothing will be aggregated.

Reading the target database and listing the Job execution result

Procedure
1. Double-click tMysqlInput to open its Basic settings view.
2. Select the **Use an existing connection** check box to use the database connection that you have defined on the **tMysqlConnection** component.

3. To define the schema, select **Repository** and then click the [...] button to choose the database table whose schema is used. In this example, the target table holding the aggregated data is selected.

4. In the **Table Name** field, type in the name of the table you want to query. In this example, the table is the one holding the aggregated data.

5. In the **Query area**, enter the query statement to select the columns to be displayed.

6. Save your Job and press F6 to execute it.

The source table is deleted.

A two-column table **citizencount** is created in the database. It groups citizens according to their nationalities and gives their total count in each country.

### SQL template writing rules

#### SQL statements

An SQL statement can be any valid SQL statement that the related JDBC is able to execute. The SQL template code is a group of SQL statements. The basic rules to write an SQL statement in the SQL template editor are:

- An SQL statement must end with `;`
- An SQL statement can span lines. In this case, no line should be ended with `;` except the last one.
Comment lines

A comment line starts with # or --. Any line that starts with # or -- will be ignored in code generating.

Note:

There is no exception to the lines in the middle part of a SQL statement or within the <%%...%%> syntax.

The <%%...%%> syntax

This syntax can span lines. The following list points out what you can do with this syntax and what you should pay attention to.

- You can define new variables, use Java logical code like if, for and while, and also get parameter values.

For example, if you want to get the FILE_Name parameter, use the code as follows:

```
<%
String filename = __FILE_NAME__;
%>
```

- This syntax cannot be used within an SQL statement. In other words, it should be used between two separated SQL statements.

For example, the syntax in the following code is valid.

```
#sql sentence
DROP TABLE temp_0;
<%
#loop
for(int i=1; i<10; i++){
 %>
 #sql sentence
 DROP TABLE temp_<%=i %>;    
<%  
}
 %>
 #sql sentence
 DROP TABLE temp_10;
```

In this example, the syntax is used between two separated SQL templates: DROP TABLE temp_0; and DROP TABLE temp_<%=i%>;.

The SQL statements are intended to remove several tables beginning from temp_0. The code between <%% and %%> generate a sequence of number in loop to identify tables to be removed and close the loop after the number generation.

- Within this syntax, the <%%=...%%> or <%/.../> syntax should not be used.

<%%=...%%> and <%/.../> are also syntax intended for the SQL templates. The below sections describe related information.

Note:
Parameters that the SQL templates can access with this syntax are simple. They are often used for connection purpose and can be easily defined in components, such as `TABLE_NAME`, `DB_VERSION`, `SCHEMA_TYPE`, etc.

### The `<%=...%>` syntax

This syntax cannot span lines and is used for SQL statement. The following list points out what you can do with this syntax and what you should pay attention to.

- This syntax can be used to generate any variable value, and also the value of any existing parameter.
- No space char is allowed after `<%=`.
- Inside this syntax, the `<%...%>` or `<%/.../>` syntax should not be used.

The statement written in the below example is a valid one.

```sql
#sql sentence
DROP TABLE temp_<%=__TABLE_NAME__ %>;
```

The code is used to remove the table defined through an associated component.

For more information about what components are associated with the SQL templates, see [What is a Job design?](#) on page 25.

For more information on the `<%...%>` syntax, see [The `<%...%>` syntax](#) on page 501.

For more information on the `<%/.../>` syntax, see the following section.

**Note:**

Parameters that the SQL templates can access with this syntax are simple. They are often used for connection purpose and can be easily defined in components, such as `TABLE_NAME`, `DB_VERSION`, `SCHEMA_TYPE`, etc.

### The "<%/../>" syntax

This syntax cannot span lines. The following list points out what you can do with this syntax and what you should pay attention to.

- It can be used to generate the value of any existing parameter. The generated value should not be enclosed by quotation marks.
- No space char is allowed after `<%/>` or before `<%/>`.
- Inside this syntax, the `<%...%>` or `<%=%...%>` syntax should not be used.

The statement written in the below example is a valid one.

```sql
#sql sentence
DROP TABLE temp_</TABLE_NAME/>;
```

The statement identifies the `TABLE_NAME` parameter and then removes the corresponding table.

For more information on the `<%/../>` syntax, see [The `<%...%>` syntax](#) on page 501.
For more information on the `<%= ... %>` syntax, see The `<%= ... %>` syntax on page 502.

The following sections present more specific code used to access more complicated parameters.

**Note:**

Parameters that the SQL templates can access with this syntax are simple. They are often used for connection purpose and can be easily defined in components, such as `TABLE_NAME`, `DB_VERSION`, `SCHEMA_TYPE`, etc.

**Code to access the component schema elements**

Component schema elements are presented on a schema column name list (delimited by a dot `.`). These elements are created and defined in components by users.

The below code composes an example to access some elements included in a component schema. In the following example, the `ELT_METADATA_SHEMA` variable name is used to get the component schema.

```
<% String query = "select ";
    SCHEMA(__ELT_METADATA_SHEMA__); 
    for (int i=0; i < __ELT_METADATA_SHEMA__.length ; i++) {
        query += (__ELT_METADATA_SHEMA__[i].name + ","+); 
    }
    query += " from " + __TABLE_NAME__;
%>
<%=query %>
```

In this example, and according to what you want to do, the `__ELT_METADATA_SHEMA__[i].name` code can be replaced by `__ELT_METADATA_SHEMA__[i].dbType`, `__ELT_METADATA_SHEMA__[i].isKey`, `__ELT_METADATA_SHEMA__[i].length` or `__ELT_METADATA_SHEMA__[i].nullable` to access the other fields of the schema column.

The extract statement is `SCHEMA(__ELT_METADATA_SHEMA__);`. In this statement, `ELT_METADATA_SHEMA` is the variable name representing the schema parameter to be extracted. The variable name used in the code is just an example. You can change it to another variable name to represent the schema parameter you already defined.

**Warning:**

Make sure that the name you give to the schema parameter does not conflict with any name of other parameters.

For more information on component schema, see Basic Settings tab on page 49.

**Code to access the component matrix properties**

The component matrix properties are created and changed by users according to various data transformation purposes. These properties are defined by tabular parameters, for example, the operation parameters or groupby parameters that users can define through the `tSQLTemplateAggregate` component.

To access these tabular parameters that are naturally more flexible and complicated, two approaches are available:

- The `<.../>` approach:
is one of the syntax used by the SQL templates. This approach often needs hard coding for every parameter to be extracted.

For example, a new parameter is created by user and is given the name `NEW_PROPERTY`. If you want to access it by using `<NEW_PROPERTY/>`, the below code is needed.

```java
else if (paramName.equals("NEW_PROPERTY")) {
    List<Map<String, String>> newPropertyTableValue = (List<Map<String, String>>)
            ElementParameterParser.getObjectValue(node, "__NEW_PROPERTY__");
    for (int ii = 0; ii <newPropertyTableValue.size(); ii++) {
        Map<String, String> newPropertyMap =newPropertyTableValue.get(ii);
        realValue += ...;//append generated codes
    }
}
```

- The `EXTRACT(__GROUPBY__)` approach:

The below code shows the second way to access the tabular parameter (GROUPBY).

```java
<% String query = "insert into " + __TABLE_NAME__ + "(id, name, date_birth) select sum(id), name, date_birth from cust_...teradata group by";
    EXTRACT(__GROUPBY__); for (int i=0; i < __GROUPBY_LENGTH__ ; i++) {
    query += (__GROUPBY_INPUT_COLUMN__[i] + " ");
    }
    %>
    <%=query %>
```

When coding the statements, respect the rules as follows:

- The extract statement must use `EXTRACT(__GROUPBY__)`; Upcase should be used and no space char is allowed. This statement should be used between `<%` and `%`.

- Use `__GROUPBY_LENGTH__` in which the parameter name is followed by `_LENGTH`, to get the line number of the tabular GROUPBY parameters you define in the Groupby area on a Component view. It can be used between `<%` and `%` or between `<%=` and `%`.

- Use code like `__GROUPBY_INPUT_COLUMN__[i]` to extract the parameter values. This can be used between `<%` and `%` or between `<%=` and `%`.

- In order to access the parameter correctly, do not use the identical name prefix for several parameters. For example in the component, avoid to define two parameters with the names `PARAMETER_NAME` and `PARAMETER_NAME_2`, as the same prefix in the names causes erroneous code generation.