TIBCO ActiveMatrix BusinessWorks™ Plug-in for Snowflake

User's Guide

Software Release 6.0
June 2020

TIBCO®

Important Information

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TIBCO Documentation and Support Services

How to Access TIBCO Documentation

Documentation for TIBCO products is available on the TIBCO Product Documentation website, mainly in HTML and PDF formats.

The TIBCO Product Documentation website is updated frequently and is more current than any other documentation included with the product. To access the latest documentation, visit https://docs.tibco.com.

Product-Specific Documentation

The following documentation for TIBCO ActiveMatrix BusinessWorks™ Plug-in for Snowflake is available on https://docs.tibco.com/products/tibco-activematrix-businessworks-plug-in-for-snowflake:

- *TIBCO ActiveMatrix BusinessWorks™ Plug-in for Snowflake Release Notes*
- *TIBCO ActiveMatrix BusinessWorks™ Plug-in for Snowflake Installation*
- *TIBCO ActiveMatrix BusinessWorks™ Plug-in for Snowflake User's Guide*

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- For an overview of TIBCO Support, visit http://www.tibco.com/services/support.
- For accessing the Support Knowledge Base and getting personalized content about products you are interested in, visit the TIBCO Support portal at https://support.tibco.com.
- For creating a Support case, you must have a valid maintenance or support contract with TIBCO. You also need a user name and password to log in to https://support.tibco.com. If you do not have a user name, you can request one by clicking Register on the website.

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TIBCO ActiveMatrix BusinessWorks™ Plug-in for Snowflake Overview

TIBCO ActiveMatrix BusinessWorks™ is an easy to use integration product suite for enterprise, web, and mobile applications. TIBCO ActiveMatrix BusinessWorks uses the Eclipse graphical user interface (GUI) and TIBCO Business Studio for BusinessWorks™ for defining business processes and the process engine to execute the business processes.

TIBCO ActiveMatrix BusinessWorks™ Plug-in for Snowflake provides the interoperability between TIBCO ActiveMatrix BusinessWorks and Snowflake. With this plug-in, you can perform operations on the Snowflake data warehouse entities using JDBC. The Snowflake data warehouse uses a new SQL database engine with an architecture designed for the cloud.

TIBCO ActiveMatrix BusinessWorks Plug-in for Snowflake extends TIBCO ActiveMatrix BusinessWorks and adds a Snowflake JDBC connection shared resource and a Snowflake Palette to TIBCO Business Studio™ for BusinessWorks™ (hereinafter referred to as "TIBCO Business Studio").

With this plug-in, you can perform operations using services supported by Snowflake. The plug-in supports the following features:

- **ActiveMatrix BusinessWorks Plug-in for Snowflake Connection Shared Resource:** You can use this feature to connect to the Snowflake data warehouse.
- **ActiveMatrix BusinessWorks Plug-in for Snowflake Palette:** The palette supports the following activities:
  - The Snowflake Insert Activity: Use this activity to run the insert SQL statements on the Snowflake data warehouse.
  - The Snowflake Query Activity: Use this activity to run the query SQL statements on the Snowflake data warehouse.
  - The Snowflake Update Activity: Use this activity to run the update SQL statements on the Snowflake data warehouse.

Getting Started

A typical workflow for the plug-in (to achieve different goals) includes creating a process, testing it in the debugger, and deploying the application.

Most procedures in a typical workflow are performed in TIBCO Business Studio for BusinessWorks. See TIBCO Business Studio for BusinessWorks Overview if you are not familiar with it.

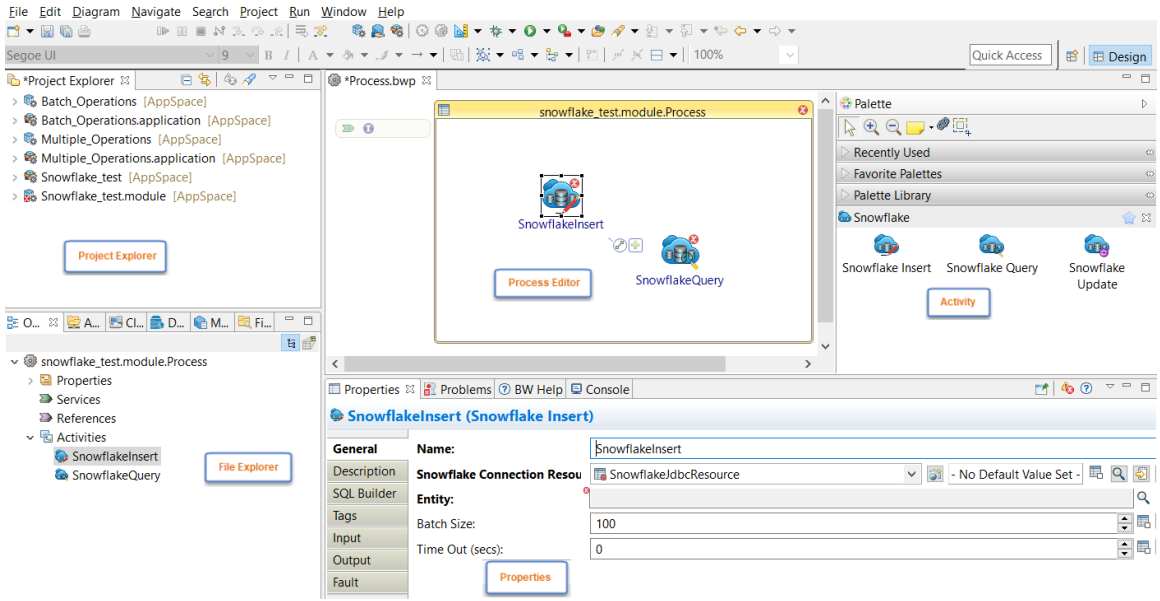
The following list has the sequence of topics that can help you get started with TIBCO ActiveMatrix BusinessWorks Plug-in for Snowflake:

1. Creating a Project
2. Creating and Configuring the Snowflake Connection Resource
3. Configuring a Process
4. Testing a Process
5. Deploying Applications

When configuring the shared resources or activities, some fields might inherit the module properties. To modify the value of such fields, you must specify the values on the **Module Properties** tab of the Module Properties editor.

TIBCO Business Studio for BusinessWorks Overview

TIBCO Business Studio for BusinessWorks is an Eclipse-based integration development environment that is used to design, develop, and test ActiveMatrix BusinessWorks applications. The studio provides a workbench in which you can create, manage, and navigate resources in your workspace. A *workspace* is the central location on your computer where all data files are stored.



The following table introduces the workbench UI elements highlighted in the image:

UI Element	Description
Menu	Contains menu items such as File, Edit, Navigate, Search, Project, Run, Window, and Help.

UI Element	Description
Toolbar	Contains buttons for frequently used commands such as: • New  • Save  • Enable/Disable Business Studio Capabilities  • Create a new BusinessWorks Application Module  • Debug  • Run 
Perspectives	Contains an initial set and layout of views that are required to perform a certain task. TIBCO Business Studio for BusinessWorks launches the Design perspective by default. Use the Design perspective when designing a process and the Debug perspective when testing and debugging a process. To change the perspective, select **Window** > **Open Perspective** > ***perspective_name*** from the main menu. Or, you can click the icon at the top right-hand side of the workbench and select the perspective to open.
Views	Lists the resources and helps you navigate within the workbench. For example, the Project Explorer view displays the ActiveMatrix BusinessWorks applications, modules, and other resources in your workspace, and the Properties view displays the properties for the selected resource. To open a view, select **Window** > **Show View** > ***view_name*** from the main menu.
Editors	Provides a canvas to configure, edit, or browse a resource. Double-click a resource in a view to open the appropriate editor for the selected resource. For example, double-click on a process `(MortgageAppConsumer.bwp)` in the Project Explorer view to open the process in the editor.
Palette	Contains a set of widgets and a palette library. A *palette* groups activities that perform similar tasks, and provides quick access to activities when configuring a process.

Creating a Project

Projects are TIBCO ActiveMatrix BusinessWorks application modules that are created in TIBCO Business Studio for BusinessWorks. Begin by creating a project, and then add resources and processes.

An Eclipse project is an application module configured for TIBCO ActiveMatrix BusinessWorks. An application module is the smallest unit of resources that is named, versioned, and packaged as part of an application.

When importing an existing project to the current workspace of TIBCO Business Studio for BusinessWorks, if you click **Select root directory** in the Import Projects dialog box, you must select the **Copy projects into workspace** check box.

Procedure

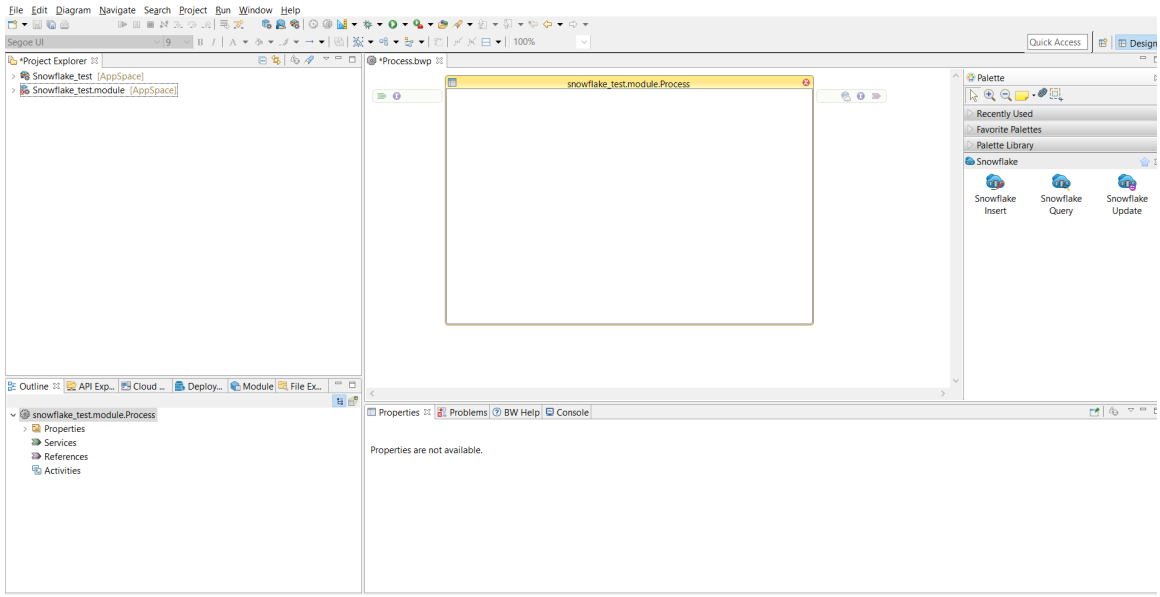
1. Start TIBCO Business Studio for BusinessWorks in one of the following ways:
   - Microsoft Windows: Click **Start** > **All Programs** > **TIBCO** > *TIBCO_HOME* > **TIBCO Business Studio <*version_number*>** > **Studio for Designers**.
   - macOS and Linux: Run the TIBCO Business Studio executable file located at `TIBCO_HOME/studio/<version_number>/eclipse`.

   On macOS, to load the environment variables in the `launchd.conf` file correctly, ensure that the shell is `bash` when you start TIBCO Business Studio on a command line.
2. From the menu, click **File** > **New** > **BusinessWorks Resources** to open the BusinessWorks Resource wizard.
3. On the Select a wizard page, click **BusinessWorks Application Module** and click **Next** to open the Project page.
4. On the Project page, configure the project that you want to create:
   a) In the **Project name** field, enter a project name.
   b) If you do not want to use the default location (current workspace) for the project, clear the **Use default location** check box and click **Browse** to select a new location.
   c) In the Version field, retain the default version of the application module or enter a new version.
   d) To automatically create an empty process and an application when creating the project, ensure that the **Create empty process** and **Create Application** check boxes are selected.
   e) Optional: To create a Java module, select the **Use Java configuration** check box.
   f) Click **Finish**.

Result

The project with the specified settings is displayed in the Project Explorer view.



Creating and Configuring the Snowflake JDBC Connection Resource

After creating a project, you can add a Snowflake JDBC connection shared resource to establish connection between the plug-in and the Snowflake data warehouse.

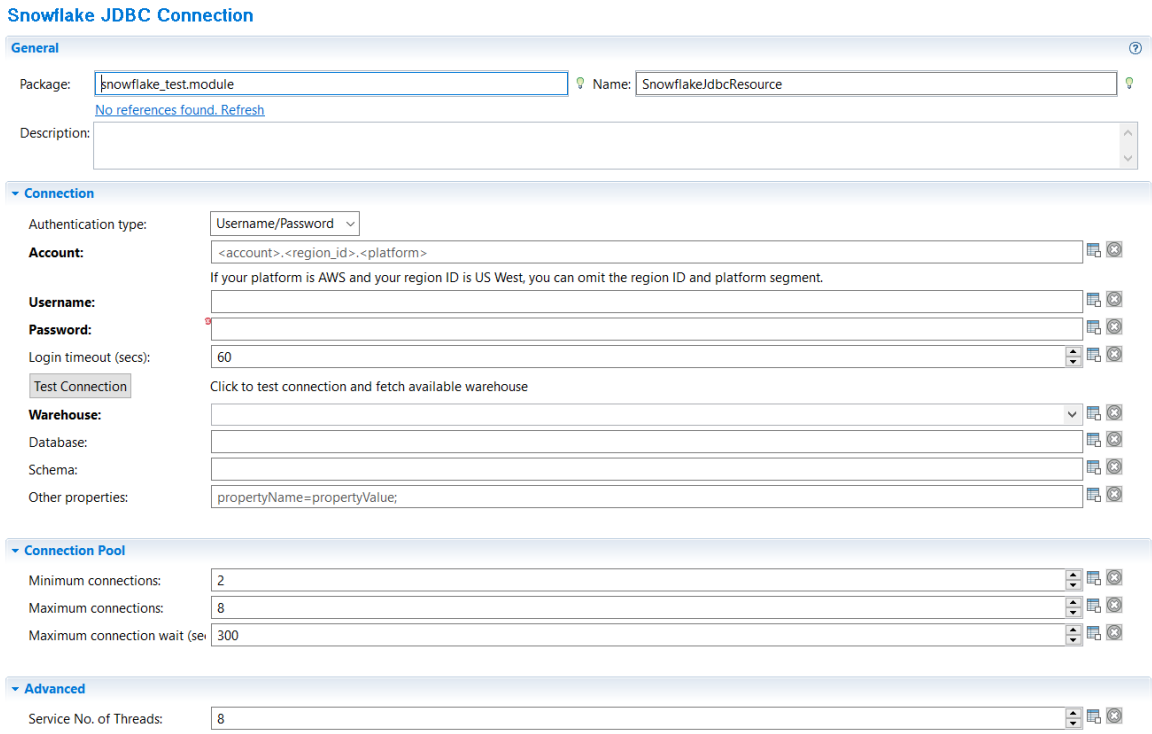
Procedure

1. In the Project Explorer view, right-click **Resources** folder and select **New** > **Snowflake JDBC Connection**.

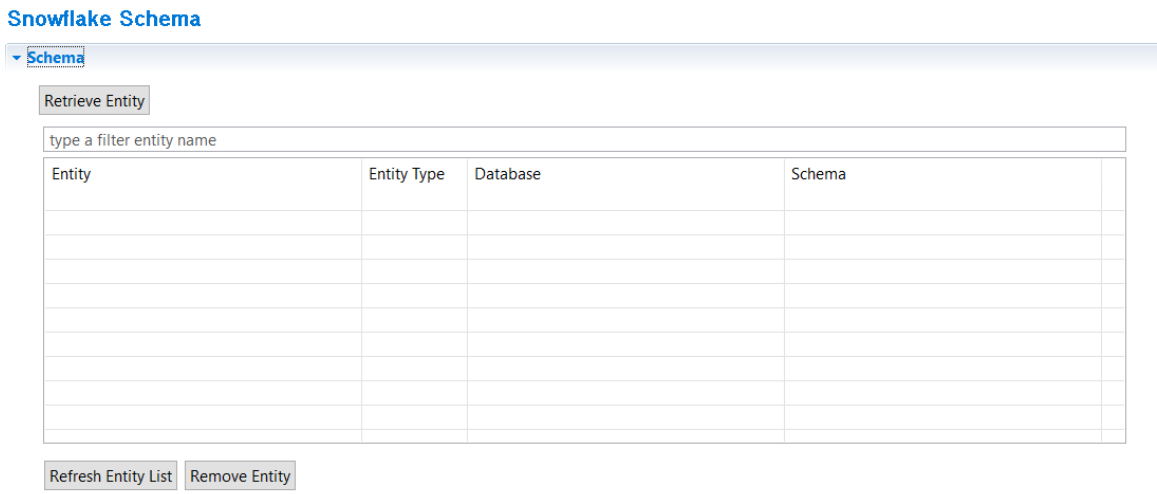
   Hint: The project must be expanded to display all the folders.

2. In the Snowflake JDBC Connection Resource dialog box, fill the **Resource Name** field and click **Finish**. To create the shared resource in a resources folder of a different project or in a different package, select **Resource Folder** or **Package** accordingly.
   The Snowflake Connection shared resource is created. The shared resource consists of two tabs: **Configuration** and **Schema**.

   Snowflake JDBC Connection: Configuration Tab



Snowflake JDBC Connection: Schema Tab



3. Configure the Snowflake JDBC Connection resource in the displayed editor, as described in Snowflake Connection and download the required table metadata in the **Schema** tab..

Configuring a Process

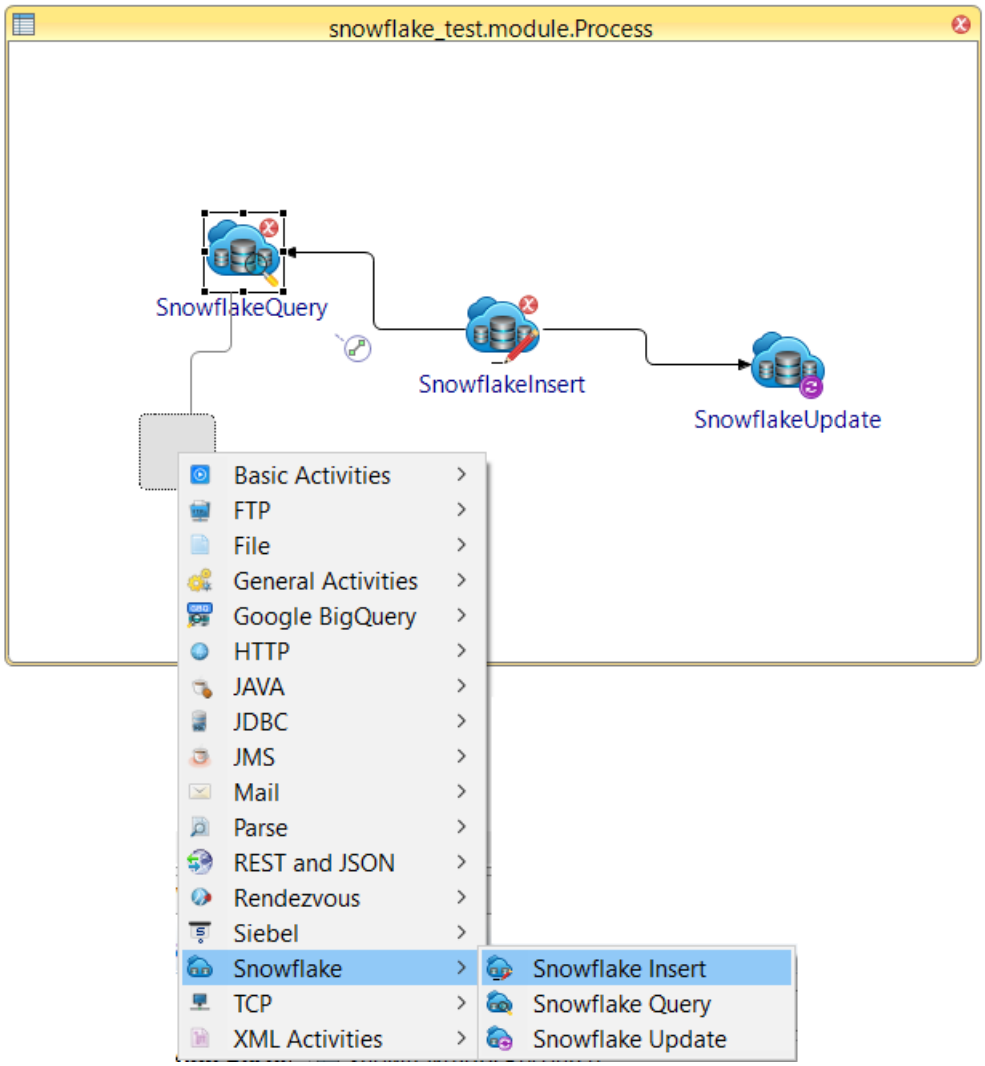
A newly created project contains an empty process. Configure the process by adding activities, conditions, and services to complete a task.

Prerequisites

1. Ensure that an empty process is created when creating a project. See Creating a Project for details.
2. Ensure that you have established a Snowflake connection. See Snowflake Connection for details.

Procedure

1. In the Project Explorer view, click the created project and open the empty process from the **Processes** folder.
2. Select an activity from the Palette view and drag it to the Process editor.
   For example, select and drop the Timer activity from the General Activities palette.
3. Click  and drag to create the new activity. In this manner, create links between the activities and configure the condition types.



4. Configure the added Snowflake activity. See as described in Snowflake Palette.

> A Snowflake Connection shared resource is required when configuring the activities. For details on creating the Snowflake Connection shared resource, see Configuring the Snowflake Connection Resource.

5. Save the project.

Testing a Process

After configuring a process, you can test the process to check whether the process completes the defined task.

Prerequisites

Ensure that you have configured a process. For details, see Configuring a Process.

Procedure

1. On the toolbar, click **Debug** > **Debug Configurations**.
2. Click **BusinessWorks Application** > **BWApplication** in the left pane.

By default, all the applications in the current workspace are selected on the **Applications** tab. Ensure that only the application you want to debug is selected on the **Applications** tab in the right pane.

3. Click **Debug** to test the process in the selected application.
   TIBCO Business Studio for BusinessWorks changes to the Debug perspective. The debug information is displayed in the Console view.
4. On the **Debug** tab, expand the running process and click an activity.
5. In the upper-right corner, click the **Job Data** tab, and then click the **Output** tab to check the activity output.

Deploying Applications

After testing, if the configured process works as expected, you can deploy the application that contains the configured process to a runtime environment. After deploying applications, you can manage TIBCO ActiveMatrix BusinessWorks applications by using TIBCO® Enterprise Administrator.

Prerequisites

The following tasks are required before deploying applications:

- While deploying application, add the following property in the app node's TRA file:
  ```
  java.property.javax.xml.datatype.DatatypeFactory=com.sun.org.apache.xerces.internal.jaxp.datatype.DatatypeFactoryImpl
  ```
- Creating a Project
- Generating an EAR File

You can deploy an application EAR file in the command-line mode with the **bwadmin** utility. See *TIBCO ActiveMatrix BusinessWorks Administration* for more details about how to deploy an application.

Deploying an application involves the following tasks:

Procedure

1. Upload an EAR file.
2. Deploy an application.
3. Configure an application.
4. Start an application.

Generating an EAR File

Application archives are enterprise archive (EAR) files that are created in TIBCO Business Studio for BusinessWorks. An EAR file is required when deploying an application.

Prerequisites

Create a project by following the steps described in Creating a Project.

Apart from the method described here, there are other ways to generate an EAR file, the following is one method. . For more information, see *TIBCO ActiveMatrix BusinessWorks Administration*.

Procedure

1. In the File Explorer view, click the **Open Directory to Browse**  icon.

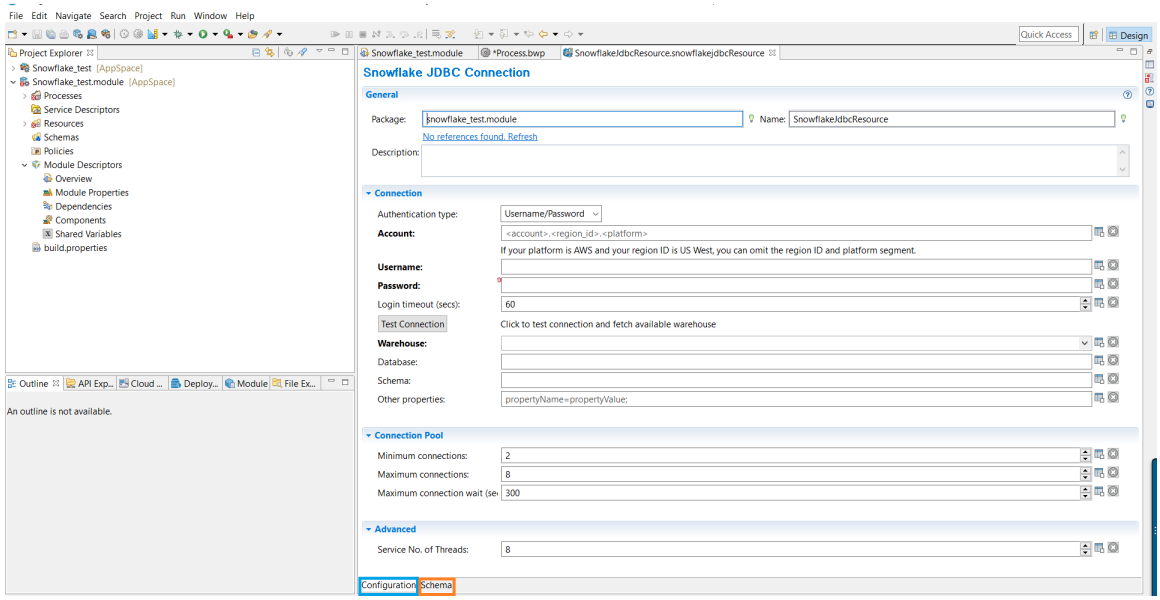
2. Select the folder where you want to generate the EAR file and click **OK**.
   The new folder is displayed in the File Explorer view.
3. Drag the application from the Project Explorer view to the new folder in the File Explorer view.

   The EAR file is generated with the name *<name>.<application>_<version>*.ear.

TIBCO ActiveMatrix BusinessWorks Plug-in for Snowflake Connection

You can use the Snowflake JDBC Connection shared resource to connect to the Snowflake data warehouse system using the Snowflake JDBC driver and download the entity metadata at design time.

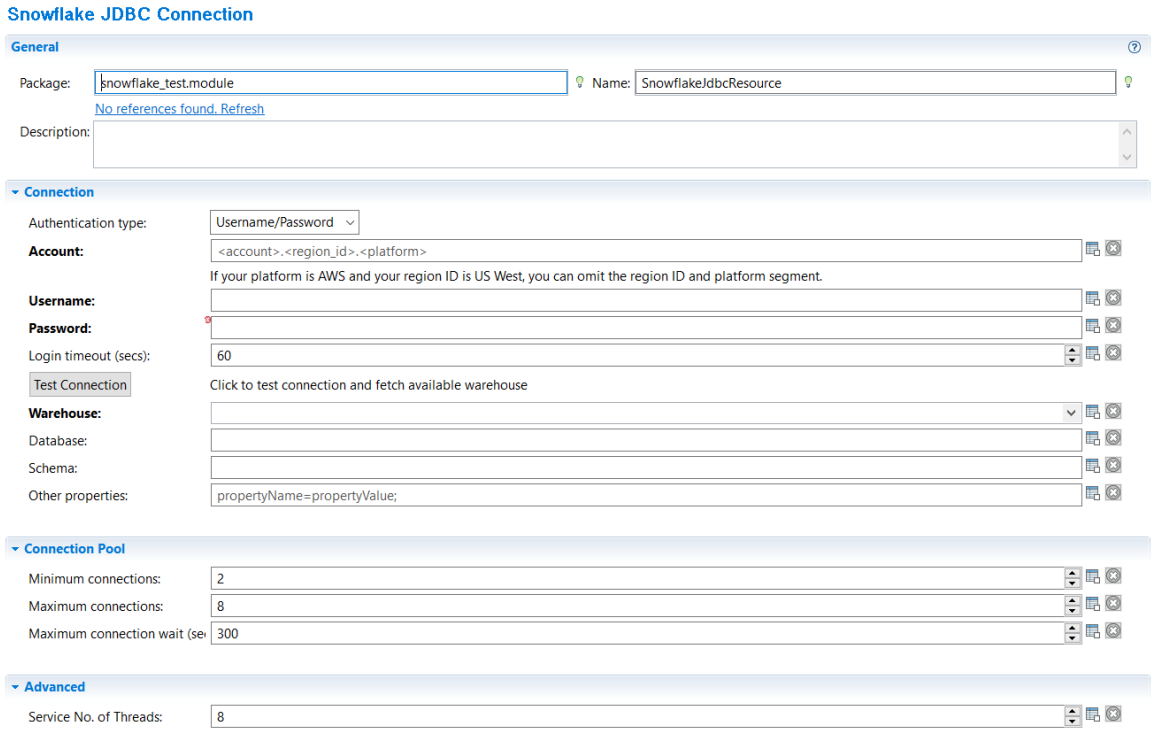
The plug-in Connection window has two tabs - **Configuration** and **Schema**.



The plug-in connection created in the shared module is not set to default when the Plug-in for Snowflake activities are created in the application module. You must manually select the Plug-in for Snowflake connection from the shared module.

Configuration

On the **Configuration** tab you can specify information to connect to Snowflake data warehouse. The **Configuration** tab has the following sections: General, Connection, Connection Pool, and Advanced.



General

The **General** panel fields are described below.

Field	Module Property	Description
Package	No	The name of the package where the shared resource is added.
Name	No	The name to be displayed as the label for the shared resource in the process.
Description	No	A short description for the shared resource.

Connection

The **Connection** panel has the following fields:

Field	Module Property	Description
Authentication type	No	Select authentication mechanism, in this version basic username and password is supported.
Account	Yes	Snowflake account name to be used for connection. It must be specified in the format [account.regionid.platform]. You can skip the regionid and platform if your region is US West and platform is Amazon Web Services (AWS).

Field	Module Property	Description
Username	Yes	The user name to connect to the Snowflake data warehouse.
Password	Yes	The password to connect to the Snowflake data warehouse.
Login timeout (secs)	Yes	The time (in seconds) to wait for a successful database connection. The default value is 60 seconds.
Warehouse	Yes	The warehouse to run queries which is selected from a list of warehouses.
Database	Yes	Default Database name to be used. Optional.
Schema	Yes	Default Schema name to be used. Optional.
Other Properties	Yes	Additional connection properties in the format [PropertyName=PropertyValue;]. Optional.

Connection Pool

Field	Module Property	Description
Minimum connections	Yes	The initial number of connections that are created when the pool is started. The default value is 2.
Maximum connections	Yes	The maximum number of connections that can be allocated from the connection pool at the same time. The default value is 8.
Maximum connection wait (secs)	Yes	The maximum number of seconds that the pool must wait for a connection to be returned before throwing an exception. The default value is 300 seconds.

Advanced

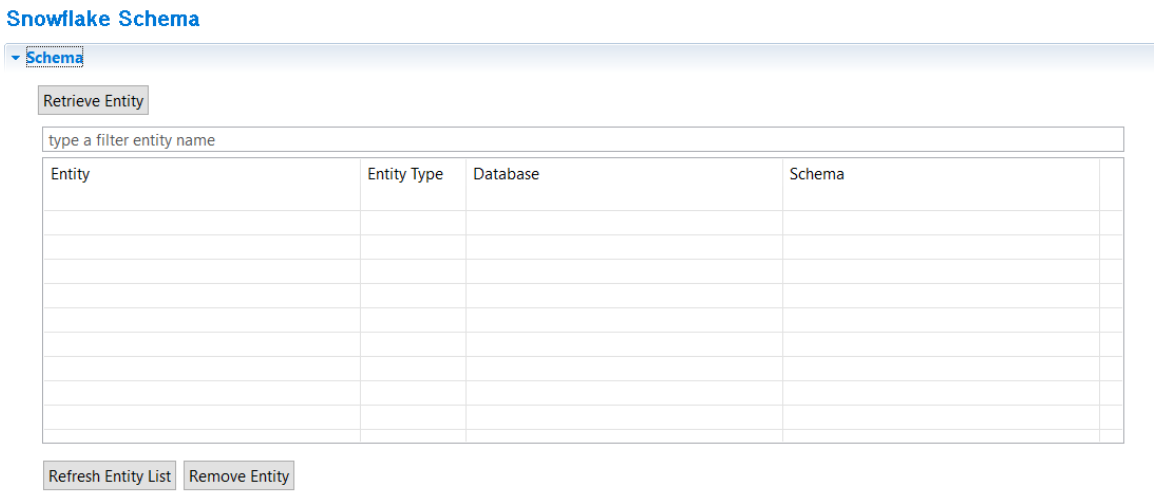
In the Advanced panel of the **Configuration** tab, you can specify additional information about the number of threads needed for processing requests.

Field	Module Property	Description
Service No. of Threads	Yes	The number of concurrent threads for processing requests to the activity. Default value: 8. (A value less than 1 is automatically changed to the default value).

Schema

The **Schema** tab lists the entities that have a downloaded metadata. To filter for specific Entities, enter the search string for the **Entity** column.

For this release, only the TABLE entity is supported.



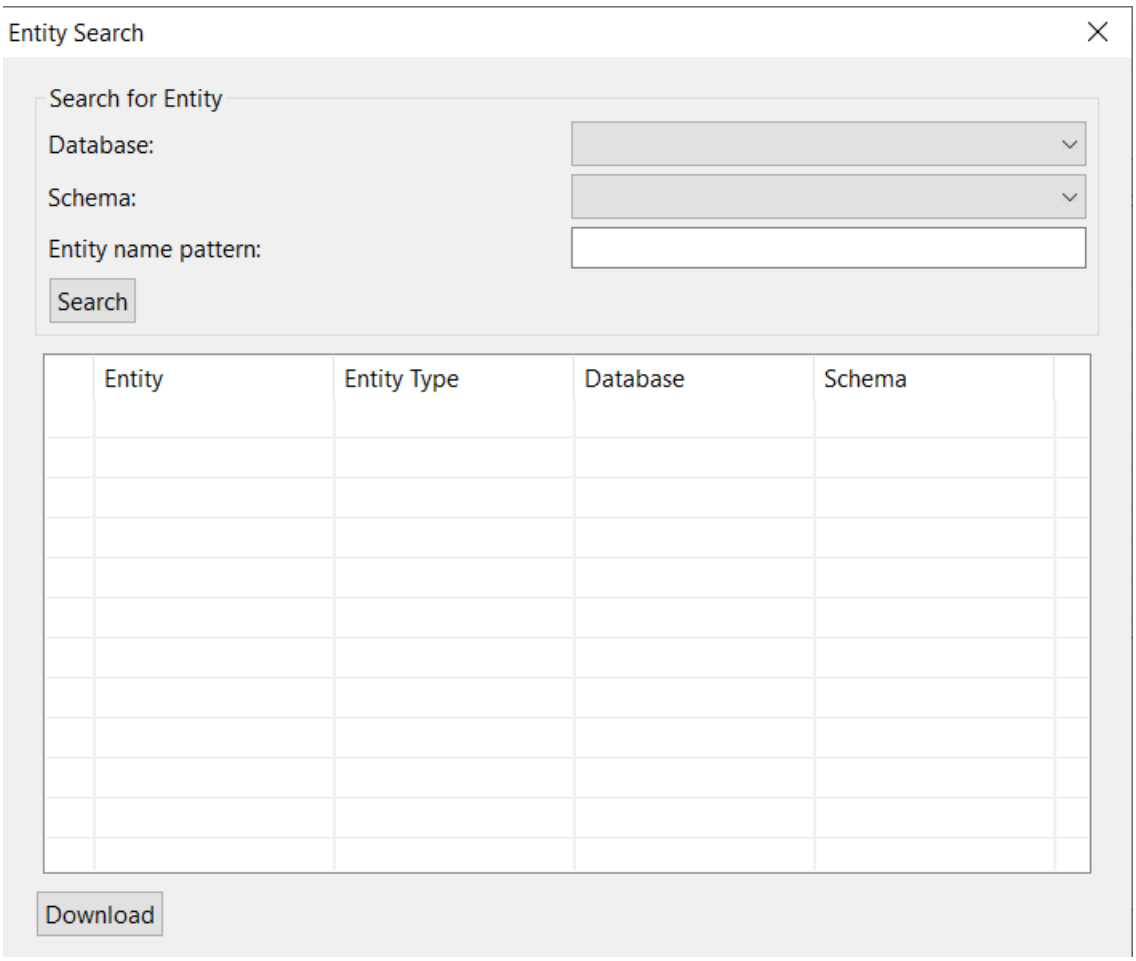
You can perform the following tasks on the **Schema** tab:

- **Retrieve Entity:** Search for entities and download the metadata.
- **Refresh Entity List:** Update the entity list and metadata of the entities previously downloaded.

  For the changes to reflect in the activity, click on the activity once.
- **Remove Entity:** Remove the downloaded entity from the list.

  Only one entity can be removed at a time.

Searching for an Entity



After clicking **Retrieve Entity**, the Entity Search page is displayed. You can search an entity here by selecting the database, schema, and entity name pattern.

The Snowflake Palette

A palette groups the activities that connect the same external applications together.

An ActiveMatrix BusinessWorks Plug-in for Snowflake palette is added after installing TIBCO ActiveMatrix BusinessWorks Plug-in for Snowflake. The palette contains the following activities:

- Snowflake Insert
- Snowflake Query
- Snowflake Update

The Snowflake Insert Activity

You can use this activity to run the insert SQL statements on the Snowflake data warehouse. You can insert multiple rows in the database in batches. Error in one batch does not stop the execution of the subsequent batch. The failure record of a batch depends on the behavior of the underlying Snowflake JDBC driver and Snowflake data warehouse engine. If a batch fails to insert one or more records, the detailed message is displayed in logs including the batch number, reason of failure, and rows that failed to insert. The insertion operation results in the formation of total rows attempted and total rows affected.

General

The **General** tab contains the following fields.

Field	Module Property	Description
Name	No	Specify the name to be displayed as the label for the activity in the process.
Snowflake Connection Resource	Yes	Click to select a Snowflake JDBC Connection shared resource. If no matching Snowflake JDBC Connection shared resource is found, click **Create Shared Resource** to create one. For more details, see Creating and Configuring the Snowflake JDBC Connection Resource.
Entity	No	Click to select an entity. The entities downloaded in Snowflake JDBC Connection shared resource's **Schema** tab is available for selection.
Batch Size	Yes	All incoming mesages are inserted performing SQL, number specified here defines how many SQL statements can be batched together that can be represented as a single SQL. The default value is 100.
Time Out	Yes	Defines activity timeout in seconds. Default value is 0, means activity timeout disabled.  Insert activity works in multiple batches, so per batch timeout is evaluated using timeout value specified. Refrain from using smaller timeout value.

Description

On the **Description** tab, provide a short description for the activity.

SQL Builder

The **SQL Builder** tab displays the metadata of the entity selected in the **General** tab.

Field	Editable	Description
Field Name	No	Displays name of the column.
Data Type	No	Displays the data type of the column.
Primary Key	No	Displays if the column is a primary key.
Not Null	No	Displays if the column accepts null value.
Dimension	No	Displays the dimension of the column.
Values	Yes	Displays the fields that must be part of the **Values** clause for an insert SQL statement. By default, **Values** column is selected for all the fields.

Input

All the fields in the **SQL Builder** tab that have **Values** column selected are a part of the **Input** tab. The **Input** tab displays the input schema of the activity as a tree structure. The information in the schema depends on the fields selected on the **SQL Builder** tab.

Output

The **Output** tab displays the **rowsAttempted** and **rowsAffected** fields. The **rowsAttempted** field holds the count of number of rows that were attempted by Snowflake Insert activity and the **rowsAffected** field holds the count of number of rows inserted successfully after the Snowflake Insert activity is invoked. The difference between these two is the number of rows that failed to insert. The **Output** tab displays the output schema of the activity as a tree structure. The output is read-only.

Fault

The **Fault** tab lists exceptions that are thrown by this activity.

The Snowflake Query Activity

Use this activity to run the query SQL statements on the Snowflake data warehouse.

General

The **General** tab contains the following fields.

Field	Module Property	Description
Name	No	Specify the name to be displayed as the label for the activity in the process.
Snowflake Connection Resource	Yes	Click  to select a Snowflake JDBC Connection shared resource. If no matching Snowflake JDBC Connection shared resource is found, click **Create Shared Resource** to create one. For more details, see Creating and Configuring the Snowflake JDBC Connection Resource.
Entity	No	Click  to select an entity. The entities downloaded in Snowflake JDBC Connection shared resource's **Schema** tab is available for selection.
Maximum Rows	Yes	The maximum number of rows to retrieve. To retrieve all rows, specify 0. The default value is 100.
Time Out	Yes	Defines activity timeout in seconds. The default value is 100 seconds.

Description

On the **Description** tab, provide a short description for the activity.

SQL Builder

The **SQL Builder** tab displays the metadata of the entity selected in the **General** tab.

Field	Editable	Description
Field Name	No	Displays name of the column.
Data Type	No	Displays the data type of the column.
Primary Key	No	Displays if the column is a primary key.
Not Null	No	Displays if the column accepts null value.
Dimension	No	Displays the dimension of the column.
Selected	Yes	Displays the fields that must be part of the SELECT query of an SQL statement. By default, the **Selected** column is selected for all the fields.
Parameter	Yes	Displays the fields that must be part of the WHERE clause of a query SQL statement.

Input

All the fields in the **SQL Builder** tab that have **Parameter** column selected are a part of the **Input** tab. The **Input** tab displays the input schema of the activity as a tree structure. The information in the schema depends on the fields selected on the **SQL Builder** tab.

Output

All the fields in the **SQL Builder** tab that have the **Selected** column selected are a part of the **Output** tab. Output of Snowflake Query activity holds multiple records. The **Output** tab displays the output schema of the activity as a tree structure. The output is read-only. The information in the schema depends on the fields selected on the **SQL Builder** tab.

Fault

The **Fault** tab lists exceptions that are thrown by this activity.

The Snowflake Update Activity

Use this activity to run the update SQL statements on the Snowflake database. You can update multiple rows in the database. This activity returns the information in the form of total rows affected.

General

The **General** tab contains the following fields.

Field	Module Property	Description
Name	No	Specify the name to be displayed as the label for the activity in the process.
Snowflake Connection Resource	Yes	Click  to select a Snowflake JDBC Connection shared resource. If no matching Snowflake JDBC Connection shared resource is found, click **Create Shared Resource** to create one. For more details, see Creating and Configuring the Snowflake JDBC Connection Resource.
Entity	No	Click  to select an entity. The entities downloaded in Snowflake JDBC Connection shared resource's **Schema** tab is available for selection.
Time Out	Yes	Defines activity timeout in seconds. Default value is 0, means activity timeout disabled.

Description

On the **Description** tab, provide a short description for the activity.

SQL Builder

The **SQL Builder** tab displays the metadata of the entity selected in the **General** tab.

Field	Editable	Description
Field Name	No	Displays name of the column.
Data Type	No	Displays the data type of the column.
Primary Key	No	Displays if the column is a primary key.
Not Null	No	Displays if the column accepts null value.
Dimension	No	Displays the dimension of the column.
Values	Yes	Displays the fields that must be a part of the SET clause for an update SQL statement. By default **Values** column is selected for all the fields.
Parameter	Yes	Displays the fields that must be part of the WHERE clause of an update SQL statement.

Input

All the fields in the **SQL Builder** tab that have **Values** and **Parameter** columns selected are a part of the **Input** tab. The **Input** tab displays the input schema of the activity as a tree structure. The information in the schema depends on the fields selected on the **SQL Builder** tab.

The columns which are not mapped are ignored automatically from the SQL query.

Output

The **Output** tab displays the **rowsAffected** field which holds the count of number of rows affected after the Snowflake Update activity is invoked. The **Output** tab displays the output schema of the activity as a tree structure. The output is read-only.

Fault

The **Fault** tab lists exceptions that are thrown by this activity.

Working with Sample Projects

The plug-in packages sample projects with the installer which help to understand how TIBCO ActiveMatrix BusinessWorks Plug-in for Snowflake works.

The sample projects are located at `TIBCO_HOME/bw/palettes/snowflake/<version_number>/samples` directory. The following sample projects are available:

- MultipleOperations
- BatchOperations

Importing Sample Projects

Before running the project, you need to import the sample projects to TIBCO Business Studio for BusinessWorks.

Procedure

1. Start TIBCO Business Studio for BusinessWorks using one of the following ways:
   - Microsoft Windows: Click **Start > All Programs > TIBCO > TIBCO_HOME > TIBCO Business Studio <*version_number*> > Studio for Designers**.
   - macOS or Linux: Run the TIBCO Business Studio executable file located in the `TIBCO_HOME/studio/<version_number>/eclipse` directory.
2. From the menu, click **File > Import**.
3. In the Import dialog box, expand the **General** folder and select the **Existing Studio Projects into Workspace** item. Click **Next**.
4. Select the **Select archive file** radio button and then click **Browse** to locate the sample project. The sample project is located in the *`TIBCO_HOME`*`/bw/palettes/snowflake/<version_number>/samples` directory.
5. Locate the sample project ZIP file and click **Open**.
6. Click **Finish**.

Setting Up a Project

Before running the project you must configure it.

Prerequisites

Run the DDL statement provided in the `DDL_worksheet.txt` in PUBLIC schema under TEST_DB database of your snowflake account. `DDL_worksheet.txt` can be located in the `TIBCO_HOME/bw/palettes/snowflake/<version_number>/samples` directory.

Procedure

1. In TIBCO Business Studio for BusinessWorks, expand the imported project in the **Project Explorer** view.
2. Expand the **Module Descriptors** resource, and then double-click **Module Properties**.
3. In the Module Properties panel, set the values for **Account**, **Username**, **Password** and **Warehouse** fields.

4. For the **BatchOperations** sample, additionally set value for the **Filename** field as the absolute path of `employees.csv` file, which can be located in the `TIBCO_HOME/bw/palettes/snowflake/<version_number>/samples` directory.
5. From the menu bar, click **File** > **Save** to save the project.

Running the Project

After setting up the sample project, you can run the project to see how the plug-in works.

Prerequisites

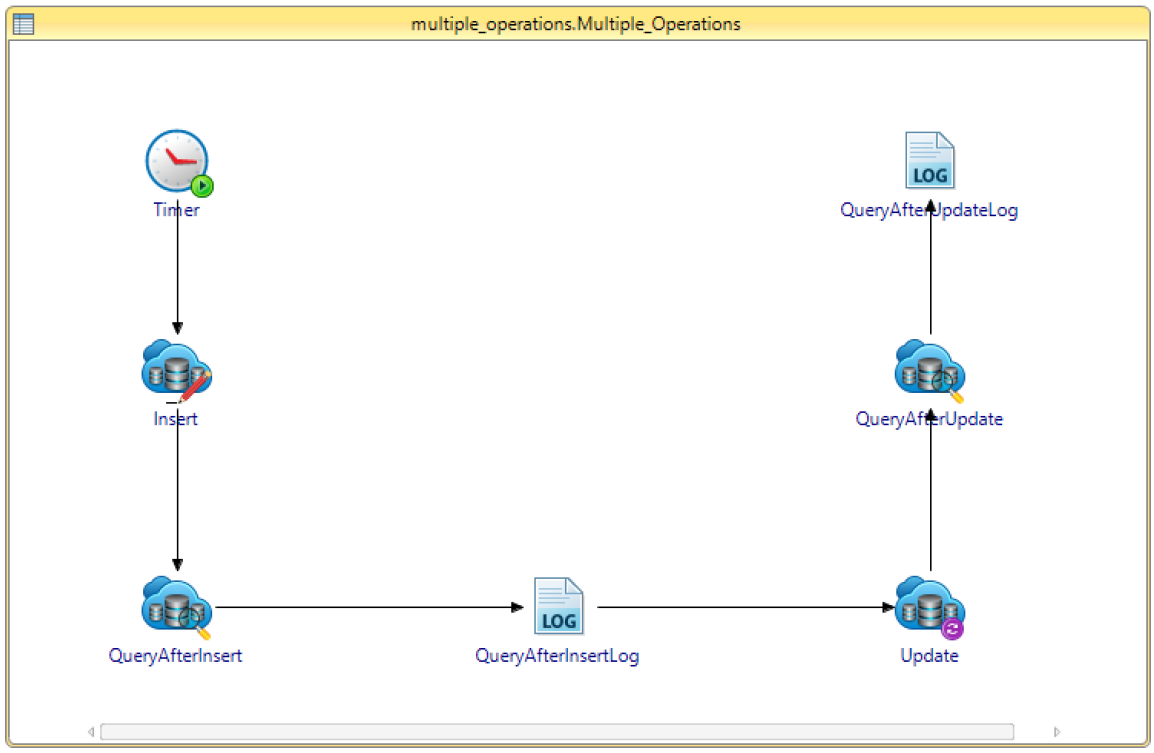
Ensure that you have set up the sample project to TIBCO Business Studio as described in Setting Up a Project.

Procedure

1. To run the selected process, from the menu, click **Run** > **Run Configurations** .
2. In the Run Configurations dialog box, expand **BusinessWorks Application**, and then click **BWApplication**.
3. On the **Applications** tab, all the sample applications are selected. You can clear the sample applications that you do not want to run.
4. Click **Run** to run the process.
5. Click the icon to stop the process.

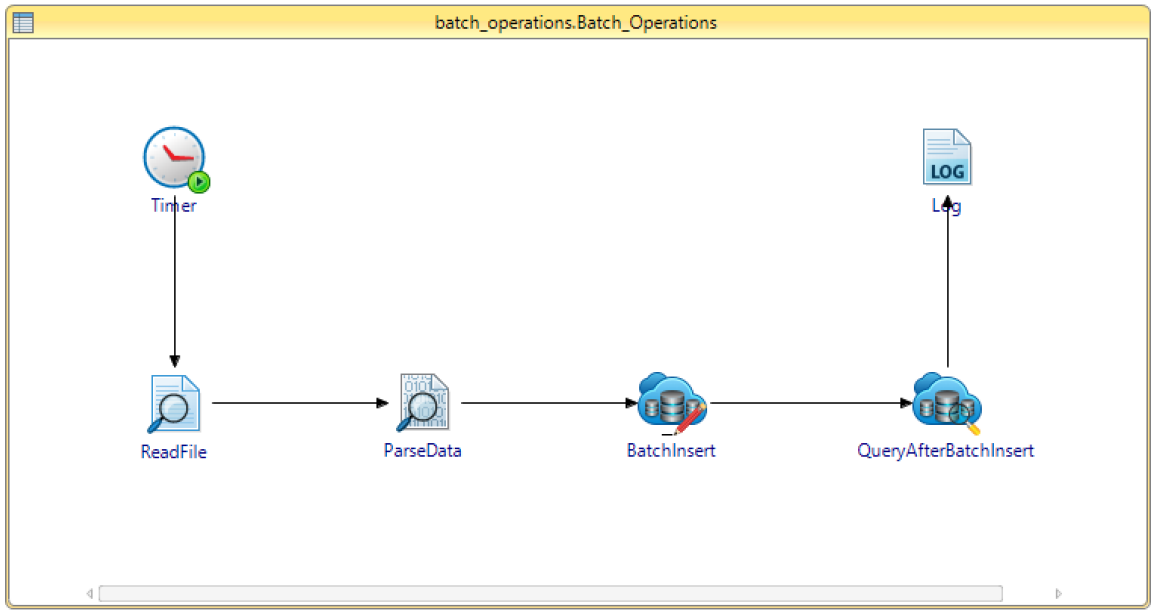
The MultipleOperations Project

The MultipleOperations project contains the **Multiple_Operations** process. This ActiveMatrix BusinessWorks process provides an example where multiple operations like Insert, Query, and Update are performed sequentially on the following Snowflake table TEST_DB.PUBLIC.EMPLOYEES.



The BatchOperations Project

The BatchOperations project contains the **Batch_Operations** process. This ActiveMatrix BusinessWorks process provides an example where a batch of 456 records is inserted in the following Snowflake table TEST_DB.PUBLIC.EMPLOYEES.



Troubleshooting

This topic contains basic troubleshooting information for a project.
If errors occur when you run a process in TIBCO Business Studio for BusinessWorks, first clean up the project. Cleaning deletes all the old files and reorganizes the project.

Procedure

1. In the Project Explorer view, right-click the project and click **Refresh**.
2. Select **Project** > **Clean** to start the cleaning process.

Managing Logs

Logs are used to trace and troubleshoot plug-in exceptions.

When an error occurs, you can check the logs to trace and troubleshoot the plug-in exceptions. By default, error logs are displayed in the Console view when you run a process in the Debug mode. You can change the log level of the plug-in to trace different messages and export logs to a file. Different log levels correspond to different messages. For details, see Log Levels.

A `logback.xml` file is located in the *`TIBCO_HOME`*`\bw\<version_number>\config\design\logback` directory.

Log Levels

The plug-in captures logs at different levels.

Log Level	Description
Info	Indicates normal plug-in operations. No action is needed. A tracing message tagged with Info indicates that a significant processing step is reached and logged for tracking or auditing purposes. Only info messages preceding a tracking identifier are considered as significant steps.
Warn	Indicates that an abnormal condition is found. Processing continues, but special attention from an administrator is recommended.
Error	Indicates that an unrecoverable error has occurred. Depending on the error severity, the plug-in may continue with the next operation or may stop altogether.
Debug	Indicates a developer-defined tracing message.
Trace	Includes all the information regarding the running process.

Setting Up Log Levels

By default, the log level is `Error`. You can set the log level to change the log level to trace different messages.

If neither the plug-in log nor the ActiveMatrix BusinessWorks log is configured in the `logback.xml` file, the error logs of the plug-in will be displayed in the Console view by default.

If the plug-in log is not configured but the ActiveMatrix BusinessWorks log is configured in the `logback.xml` file, the configuration for the ActiveMatrix BusinessWorks log is implemented by the plug-in.

Procedure

1. Navigate to the *`TIBCO_HOME`*`\bw\<version_number>\config\design\logback` directory and open the `logback.xml` file.
2. Add the following node in the Console Appender area to specify the log level for the plug-in.

```
<logger name="com.tibco.bw.palette.snowflake.runtime">
   <level value="DEBUG"/>
</logger>
```

   The `level` tag defines the log level and the value is one of the values mentioned in Log Levels.

When the `level` is set to `Debug`, the input and output for the plug-in activities are also displayed in the Console view. See Log Levels for more details regarding each log level.

3. Optional: Optional: Add one of the following nodes in the BusinessWorks Palette and Activity.

   Loggers area to specify a log level for the activity.

```
<logger name="com.tibco.bw.palette.snowflake.runtime.query">
 <level value="DEBUG"/>
</logger>
<logger name="com.tibco.bw.palette.snowflake.runtime.insert">
 <level value="DEBUG"/>
</logger>
<logger name="com.tibco.bw.palette.snowflake.runtime.update">
 <level value="DEBUG"/>
</logger>
```

The activities that are not configured with specific log levels also inherit log level configured for the plug-in or ActiveMatrix BusinessWorks.

4. Optional: To control the debug log level for the Snowflake JDBC shared resource, set the following parameters:

```
<logger name="com.tibco.bw.sharedresource.snowflake.runtime">
    <level value="DEBUG"/>
  </logger>
```

5. Save the file.

Exporting Logs to a File

Modify the `logback.xml` file to export plug-in logs to a file.

Procedure

1. Navigate to the *TIBCO_HOME*`\bw\<version_number>\config\design\logback` directory and open the `logback.xml` file.

When deploying an application in TIBCO Enterprise Administrator, you must navigate to the *TIBCO_HOME*`/bw/<version_number>/domains/domain_name/appnodes/space_name/node_name` directory to find the `logback.xml` file.

2. Add the following node to specify the file location.

```
<appender name="FILE" class="ch.qos.logback.core.FileAppender">
   <file>c:/bw6-snowflake.log</file>
      <encoder>
        <pattern>%d{HH:mm:ss.SSS} [%thread] %-5level %logger{36}-%msg%n</pattern>
      </encoder>
</appender>
```

   The `file` tag defines the location to which the log is exported and its value is the absolute path to the file.

The file path must include the file name.

3. Add the following node to the `root` node at the bottom of the `logback.xml` file to enable exporting the logs to a file.

```
    <appender-ref ref="FILE" />
```

```
<root level="DEBUG">
   <appender-ref ref="STDOUT" />
   <appender-ref ref="FILE" />
</root>
```

4. Save the file.

Error Codes

The exceptions that are thrown by the plug-in are listed with corresponding descriptions and resolutions.

Error Code	Role	Category	Messages	Description
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500001	Error	BW-Plug-in	Unexpected error occurred.{0}	Message is shown when an unidentified error occurs while executing the activity.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500002	Error	BW-Plug-in	Failed to initialize activity.{0}\nActivity Name={1}\nProcess={2}\nModule={3}\nDeploymentUnit={4}:{5}	Message is shown when initialization fails for an activity.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500003	Error	BW-Plug-in	Failed to decrypt obfuscated password for field : {0}	Message is shown when decryption of obfuscated password fails.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500005	Error	BW-Plug-in	Failed to create Prepared Statement. {0}	Message is shown when prepared statement creation fails.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500006	Error	BW-Plug-in	Failed to set max rows. {0}	Message is shown for Snowflake database Query activity if error occurs when setting maximum rows.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500007	Error	BW-Plug-in	Failed to set parameters in prepared statement. {0}	Message is shown when error occurs while setting parameters in prepared statement.

Error Code	Role	Category	Messages	Description
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500008	Error	BW-Plug-in	Failed to retrieve values from ResultSet. {0}	Message is shown for Snowflake database Query activity if error occurs when retrieving values from ResultSet.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500009	Error	BW-Plug-in	Failed to execute query: {0}\n Error Message: {1}	Message is shown when error occurs in executing a query.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500010	Error	BW-Plug-in	Failed to close ResultSet. {0}	Message is shown for Snowflake database Query activity if error occurs in closing a ResultSet.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500011	Error	BW-Plug-in	Failed to close Prepared Statement. {0}	Message is shown when error occurs in closing prepared statement.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500012	Error	BW-Plug-in	Failed to close Snowflake Database Connection. {0}	Message is shown when error occurs in closing closing connection.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500013	Error	BW-Plug-in	Error occurred when generating XML Output for activity. {0}	Message is shown when error occurs while generating output for an activity.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500014	Error	BW-Plug-in	Invalid number of maximum rows entered in Activity: {0}. Value must be greater than or equal to 0, value was {1}	Message is shown for Snowflake database Query activity if you input negative value for maximum rows.

Error Code	Role	Category	Messages	Description
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500016	Error	BW-Plug-in	{0}	Message is shown for Snowflake database Insert activity if insert of one or more records fails.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-500017	Error	BW-Plug-in	Snowflake driver class not found. {0}	Message is shown when Snowflake JDBC driver class is not found
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-500001	Error	BW-Plug-in	Creating Shared Resource {0} failed due to [{1}]	Message is shown when error occurs during creation of shared resource.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-500002	Error	BW-Plug-in	Failed to decrypt obfuscated password for field : {0}	Message is shown when decryption of obfuscated password fails.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-500003	Error	BW-Plug-in	Failed to initialize connection pool for Shared Resource : {0} {1}	Message is shown when connection pool initialization fails.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-500004	Error	BW-Plug-in	Failed to close Snowflake Database Connection. {0}	Message is shown when error occurs in closing connection.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-500005	Error	BW-Plug-in	Failed to destroy connection pool for Shared Resource: {0} {1}	Message is shown when error occurs in destroying connection pool.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-100001	Trace	BW-Plug-in	{0}	Message is shown while printing events for activity.

Error Code	Role	Category	Messages	Description
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-100002	Trace	BW-Plug-in	Connection successful with Snowflake database using DatabaseURL: {0}	Message is shown on successful connection with Snowflake Database.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-100001	Trace	BW-Plug-in	{0}	Message is shown while printing events for shared resource.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-200001	Debug	BW-Plug-in	\nStart of the Activity {0}, \nInput received: \n {1} \n	Prints activity input.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-200002	Debug	BW-Plug-in	\nActivity {0}, Output data: \n {1} \n Exit of Activity {2}	Prints activity output.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-200003	Debug	BW-Plug-in	Query formed: {0}	Prints query formed
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-200004	Debug	BW-Plug-in	Batch Size entered: {0}	Message is shown for Snowflake database Insert activity and prints batch size.
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-200005	Debug	BW-Plug-in	Maximum rows entered: {0}	Message is shown for Snowflake database Query activity and prints maximum rows entered.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200001	Debug	BW-Plug-in	Creating Shared Resource {0}	Message is shown while creating the shared resource.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200002	Debug	BW-Plug-in	Starting Shared Resource {0}	Message is shown while executing the shared resource.

Error Code	Role	Category	Messages	Description
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200003	Debug	BW-Plug-in	Stopping Shared Resource {0}	Message is shown while stopping the shared resource.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200004	Debug	BW-Plug-in	Deleting Shared Resource {0}	Message is shown while deleting the shared resource.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200005	Debug	BW-Plug-in	Number of thread is {0}	Message is shown to print number of thread.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200006	Debug	BW-Plug-in	Minimum pool size is {0}	Message is shown to print minimum pool size.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200007	Debug	BW-Plug-in	Maximum pool size is {0}	Message is shown to print maximum pool size.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200008	Debug	BW-Plug-in	Connection pool initialized for Shared Resource {0}	Message is shown while initializing connection pool
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-200009	Debug	BW-Plug-in	Connection pool destroyed for Shared Resource {0}	Message is shown while destroying connection pool
TIBCO-BW-PALETTE-SNOWFLAKE_DATABASE_JDBC-400001	Warn	BW-Plug-in	No input received for activity : {0}	Message is shown for Snowflake database Insert activity and Snowflake database Update activity if no input is received for values node.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-400001	Warn	BW-Plug-in	Number of thread is invalid, default to 8	Message is shown when number of thread entered is less than 1.

Error Code	Role	Category	Messages	Description
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-400002	Warn	BW-Plug-in	Invalid minimum pool size entered. Value must be greater than or equal to 0, value was {0}, defaulted to 0	Message is shown when minimum pool size entered is less than 0.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-400003	Warn	BW-Plug-in	Invalid maximum pool size entered. Value must be greater than 0, value was {0}, defaulted to {1}	Message is shown when maximum pool size is less than 1.
TIBCO-BW-SR-SNOWFLAKE_DATABASE_CONNECTION-400004	Warn	BW-Plug-in	Minimum pool size: {0} should be less than or equal to Maximum pool size: {1}. Setting Maximum pool size to {2}	Message is shown when minimum pool size is greater than maximum pool size.