



ViewDS Identity Bridge: Getting Started

ViewDS Identity Bridge: Getting Started

For Identity Bridge Release 1.3

November 2020

Document Lifecycle

ViewDS may occasionally update documentation between software releases. Therefore, please visit www.viewds.com to ensure you have the PDF with most recent publication date. The site also hosts the most recent version of this document in HTML format.

This publication is copyright. Other than for the purposes of and subject to the conditions prescribed under the Copyright Act, no part of it may in any form or by any means (electronic, mechanical, microcopying, photocopying, recording or otherwise) be reproduced, stored in a retrieval system or transmitted without prior written permission. Inquiries should be addressed to the publishers.

The contents of this publication are subject to change without notice. All efforts have been made to ensure the accuracy of this publication. Notwithstanding, ViewDS Identity Solutions does not assume responsibility for any errors nor for any consequences arising from any errors in this publication.

The software and/or databases described in this document are furnished under a licence agreement. The software and/or databases may be used or copied only in accordance with the terms of the agreement.

ViewDS Identity Bridge is a trademark of ViewDS Identity Solutions.

Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.

All other product and company names are trademarks or registered trademarks of their respective holders.

Copyright © 1995-November 2020 ViewDS Identity Solutions

ABN 19 092 422 47

Contents

Introduction	1
About this guide	1
What is Identity Bridge	1
Glossary	2
Installing Identity Bridge	3
System requirements	3
Installing Identity Bridge	4
Specifying the workspace	5
Installing a license key	5
Upgrading Identity Bridge	5
Investigating the user interface	7
Menu bar	7
Toolbar	7
Quick search	8
Workspace Explorer	8
Main work area	9
Setting up and running projects	11
Create a project	11
Define resources	12
Create tasks	13
Specify source and target resource schemas	13
Running projects	15
Advanced options	17
Processes, functions and variables	17
Delta updates	20
Change logs	24
Support for Java classes and native libraries	25
Supported resource types	25
Built-in functions	27

Introduction

This guide provides the information you need to install, configure and use Identity Bridge Version 1.3.

Further instructions for specific tasks can be found in the Identity Bridge Studio help. Additionally, the release notes include information relating to this release of Identity Bridge.

This section includes:

- About this guide
- What is Identity Bridge
- Glossary

About this guide

This guide has the following sections:

- [Installing Identity Bridge](#)
- [Investigating the user interface](#)
- [Setting up and running projects](#)
- [Advanced options](#)

What is Identity Bridge

Identity Bridge is an identity synchronization and provisioning solution. It seamlessly integrates data between heterogeneous business systems across your enterprise and beyond.

Identity Bridge is a platform-independent application with two primary components:

- a graphical user interface, Identity Bridge Studio; and
- a synchronization engine.

Identity Bridge Studio allows you to build and maintain projects.

The synchronization engine can run independently to deploy projects as batch processes. A project can be scheduled through your operating system's task scheduler, such as Windows Scheduler or cron.

Glossary

The following terms have special meaning in Identity Bridge.

Project

An Identity Bridge project is an ordered collection of one or more synchronization tasks. Each project is defined in a separate XML configuration file. The Identity Bridge Engine is typically called to run an entire project, although it is possible to instruct it to run individual tasks. It is also possible to disable individual tasks within a project.

Resource

A generic name used in Identity Bridge to represent data sources and targets. Many resources such as LDAP Directories and Databases can be both source and target and used in many projects. The Identity Bridge Studio interface allows users to define resources as part of the workspace (from where they can be propagated into multiple projects) or local to a specific project.

Task

Synchronization tasks are the basic building blocks of Identity Bridge synchronization projects. Each task has a single source and target. The source and target can be of any combination of the 'connector' types supported by Identity Bridge.

Workspace

The file system directory used for the creation and maintenance of synchronization projects. The workspace facilitates the propagation of common resources and scripts between projects by providing a shared palette.

Workspace Explorer

The navigation pane on the left side of the work area that expands and collapses allowing you to locate the exact component you need.

Installing Identity Bridge

This section includes the instructions for installing and configuring Identity Bridge Studio.

It includes:

- [System requirements](#)
- [Installing Identity Bridge](#)
- [Specifying the workspace](#)
- [Installing a license key](#)
- [Upgrading Identity Bridge](#)

System requirements

Platform requirements

Identity Bridge is a platform independent Java application. The Java Runtime Environment (JRE) version 1.8 or greater must be installed on the machine on which you wish to run Identity Bridge. You can download and install the latest JRE for your platform from:

www.java.com/getjava/

Memory requirements

The Identity Bridge synchronization engine requires approximately 128MB of available memory and Identity Bridge Studio (IBS) requires around 512MB.

Disk space requirements

Identity Bridge requires approximately 80MB of disk space. Additional disk space is required for workspace and project files.

Internal dependencies

The Identity Bridge engine makes use of the following versions of these third party libraries:

- [Mozilla Rhino](#) - 1.7.9: To provide JavaScripting functionality
- [JavaMail API](#) - 1.6.0: To provide send mail functionality
- [JSON.simple](#) - 1.1.1: To encode and decode JSON text

Installing Identity Bridge

The Identity Bridge distribution includes two platform specific installers for platforms that have been fully tested and are officially supported by ViewDS. A platform independent zip file is also provided for users who wish to use Identity Bridge on an unsupported platform.

The platform-specific installers are:

- **Linux:** `identitybridge-1.3-linux.sh`
- **Windows:** `identitybridge-1.3-windows.exe`

Platform-specific installation

To install Identity Bridge Studio on one of the supported platforms:

1. Download the appropriate Identity Bridge Studio installer for your platform (listed above).
2. Double-click on the installer and follow the on-screen prompts. The installer wizard installs the Identity Bridge Studio.
3. Identify a workspace location. This should be a location on your network that is accessible to anyone who will use Identity Bridge. Create the required directory if it does not already exist.
4. If you plan to use JDBC Resources, copy the required JDBC drivers (*.jar files) to the `/ib_data/lib` directory in your workspace.

The precise location of this directory will depend on your Java installation.

Platform-independent installation

Although ViewDS does not formally support platforms other than those listed above, Identity Bridge is known to run well on other platforms provided that the [system requirements](#) are satisfied.

To install the platform independent .zip file:

1. Download `identitybridge-1.3.zip` and extract the contents to the required directory, `<IBSroot>`.
2. Identify a workspace location. This should be a location on your network that is accessible to anyone who will use Identify Bridge. Create the required directory if it does not already exist.
3. Navigate to `<IBSroot>/bin` and run the appropriate executable or shell script file for your platform.
4. If you plan to use JDBC Resources, copy the required JDBC drivers (*.jar files) to the `/ib_data/lib` directory in your workspace.

Specifying the workspace

The first time you launch Identity Bridge Studio you are prompted for a workspace location. This workspace is where all your project files will be stored. Use the browse button to navigate to the required location or enter the full path.

Installing a license key

Identity Bridge is licensed separately from other ViewDS products. To obtain an Identity Bridge license key you should contact ViewDS Support either online via our support desk viewds.zendesk.com or by email support@viewds.com.

You can install and run Identity Bridge without a license key however you will be unable to run synchronization tasks.

Identity Bridge Studio

To install the license key through Identity Bridge Studio:

NOTE: In a typical Windows installation you must launch Identity Bridge Studio as a user with Administrator privileges in order to install a license key.

1. Select **Tools > Options** from the menu.
2. Choose the **Identity Bridge** options and select the **License** tab.
3. Paste your license key into the box and click **OK**.

Command prompt

To install the licence key from the command prompt:

1. Navigate to the `<install_dir>/identitybridge/config` directory.
2. Copy the provided `license.xml` file to this location.

Upgrading Identity Bridge

To upgrade from a previous version of Identity Bridge, you should complete the following steps:

Backup licence key

1. Navigate to the `<IBSroot>/identitybridge/config` directory. By default `<IBSroot>` on Windows is `C:\Program Files (x86)\identitybridge`.
2. Copy the `license.xml` file in that location to a temporary location.

Uninstall previous version of Identity Bridge

Use the Windows **Uninstall or change a program** feature to uninstall **ViewDS Identity Bridge** or use a comparable process to uninstall Identity Bridge on Linux.

Install Identity Bridge 1.3

Follow the [installation instructions](#) to install Identity Bridge 1.3.

Reinstate license key

1. Navigate to the `<IBSroot>/identitybridge/config` directory. By default `<IBSroot>` on Windows is `C:\Program Files (x86)\identitybridge`.
2. Copy the `license.xml` file you saved previously to this location.

Alternatively, follow the [license key instructions](#) to install the license key via the Identity Bridge Studio interface.

NOTE: In a typical Windows installation, you must launch Identity Bridge Studio as a user with Administrator privileges in order to do this.

Upgrading from 1.0?

You must verify existing Identity Bridge 1.0 projects using Identity Bridge Studio.

The first time you launch Identity Bridge Studio 1.3, it will automatically load your previous Identity Bridge 1.0 Workspace and update the projects it contains to make them compatible with Identity Bridge 1.3.

NOTE: It will not be possible to run processes and tasks created using Identity Bridge 1.0 from the command line using the Identity Bridge 1.3 engine until you have done this.

NOTE: If you elected to remove the directory containing your Identity Bridge user profile when you uninstalled Identity Bridge 1.0, then your previous Identity Bridge 1.0 workspace will not be automatically loaded and you must browse to its location in Identity Bridge Studio in order for the projects it contains to be updated.

Upgrading from 1.1 or 1.2?

There is no requirement to verify existing Identity Bridge 1.1 or 1.2 projects before using them with Identity Bridge 1.3.

Investigating the user interface

The Identity Bridge Studio user interface comprises the following:

- [Menu bar](#)
- [Toolbar](#)
- [Quick search](#)
- [Workspace Explorer](#)
- [Main work area](#)

Menu bar

The Identity Bridge Studio menu bar contains the following menus:

- **File:** Provides access to file operations such as Select Workspace, New Project, Save All and Exit.
- **Edit:** Provides access to commands for editing JavaScript files including Undo, Redo, Cut, Copy and Paste.
- **View:** Allows you to toggle the display of the System Log and JavaScript features including the JavaScript source editor toolbar and line numbers.
- **Tools:** Provides access to the Options menu for Identity Bridge Studio.
- **Window:** Allows you to manage the display of windows in the Identity Bridge Studio interface.
- **Help:** Provides access to the Identity Bridge Studio online help

Toolbar

These tools are available in the Identity Bridge Studio main toolbar.

NOTE: Tools are active only when they are relevant to the current context.

- **Select Workspace:** Allows you to reset the Identity Bridge Studio workspace location.
- **New Project:** Opens the New Project window.
- **Save All:** Saves changes in all open tabs.

- **Run Project:** Invokes the Identity Bridge engine to run the selected project.
- **Run Task:** Invokes the Identity Bridge engine to run the selected task.
- **Refresh:** Refreshes the Identity Bridge Studio display by re-reading the configuration files in the workspace.

Quick search

A quick search box is in the top-right corner of the Identity Bridge Studio interface.

Start typing in the search box to view matching registered actions and help topics. Click an action to invoke it or click a help topic to view it.

Workspace Explorer

The Workspace Explorer provides a hierarchical list view of the current workspace. It comprises three expandable sections:

- **Projects:** Displays all of the projects defined in the current workspace. Each project can be expanded to list all project specific variables, functions, resources and tasks. Each task can be further expanded to display any task specific variables and processes it uses.
- **Functions:** Displays all of the workspace-wide functions that have been defined. Workspace-wide functions can be used in multiple projects.
- **Resources:** Displays all of the workspace-wide resources that have been defined. Workspace-wide resources can be used in multiple projects.

Double-click on an item in the Workspace Explorer to display and edit configuration details about that item.

For example, double-click on a project to open it in a new project tab in the main work area, double-click on a function to open the workspace JavaScript file in the JavaScript editor in the main work area, and double-click on a resource to open the Resource Configuration dialog for that resource.

Right click on an item in the Workspace Explorer to display relevant commands in a context menu.

For example, right-click on a project to display a context menu containing commands including Rename Project, Run Project, View Project Log and Delete.

Main work area

Identity Bridge projects are displayed in the main work area on separate Project tabs. In addition, a Palette tab that contains workspace-wide functions and resources is also displayed.

Each Project tab comprises three views:

- [Design View](#) (default view)
- [List View](#)
- [Properties](#)

Design View

Design View is a graphical representation of the project. It allows you to build synchronization processes by identifying resources as either sources or targets and linking them together with tasks. Design View has two modes:

- **Move Mode:** Use this mode to drag resources to and from the workspace Palette and move project resources around the project space.
- **Connect Mode:** Use this mode to create new tasks by left clicking on the resource you want to use as the source and dragging the connector to the required target resource.

NOTE: You can drag the connector back to the source resource if you want the source and target to be the same.

Right click on an item or in empty space in the Design View to display relevant commands in a context menu.

List View

List View is a tabular representation of the tasks in the project, listed in order of execution.

Double-click on a task in the table to open it in a new Task tab in the main work area.

Left-click and drag tasks in the table to change the order in which they are displayed and executed.

Properties

Properties displays the current project properties and lists any project variables that have been defined.

Setting up and running projects

Setting up a synchronization project involves the following basic steps, each of which is described in more detail below:

- [Create a project](#)
- [Define resources](#)
- [Create tasks](#)
- [Specify source and target resource schemas](#)
- [Running projects](#)

Create a project

The first step in setting up a new synchronization project is to create a new project or make a copy of an existing project.

To create a new project:

1. Select **File > New Project** from the menu.
2. Provide a **Name** for your project in the text field.
3. Optionally, provide a **Description** for your project in the text box.
4. Click **Save**.

A new empty project is added to the Workspace Explorer under **Projects**.

NOTE: You can also add a new project directly from the Workspace Explorer. Right-click **Projects** under **WORKSPACE** in the Workspace Explorer and select **New Project** from the context menu.

Alternatively, to make a copy of an existing project:

1. Right-click on the project you want to copy in the Workspace Explorer and select **Copy** from the context menu.
2. Provide a name for the new project in the text field
3. Click **OK**.

Define resources

Resources are the data stores for your synchronization projects. Resource definitions include the type of data store and the parameters used to access it (location, username and password, and so on).

Resources can be specific to a project, for example flat file input or output resources, or they can be reusable resources, like LDAP and SQL sources, which can be used across multiple projects and should be defined at the workspace level.

To define a project specific resource:

1. In the Workspace Explorer, double-click on the project to which you want to add the resource. The selected project is displayed in a tab in the main work area. By default the project is displayed in the **Design View**.
2. Right-click in the empty project space and select **New Resource in Project** from the context menu. The **New Resource Wizard** is displayed.
3. Provide a name for the data source in the **Resource Name** text field.
4. Choose the type of the data source from list of supported **Connector Plugins**.
5. Optionally, add a **Description** of the data source in the text box.
6. Click **Next**.
7. Provide the necessary connection parameters for the data source. These will vary based on the type of the resource you are defining. Full details are provided in the Identity Bridge Studio help.
8. Optionally, use the **Test Connection** button to verify the connection parameters you have provided.
9. Click **Finish**.

The new resource is added to the Workspace Explorer under **Resources** in the project you selected. It is also displayed in the project **Design View**.

You can also access the **New Resource Wizard** directly from the Workspace Explorer:

- Right-click **Resources** in the project you want to add the resource to and select **New Resource in Project** from the menu.

Or, to define a workspace wide resource:

- From the Workspace Explorer, under **Workspace** right-click **Resources** and then click **New Resource in Workspace** from the menu.

Create tasks

Tasks are the basic building blocks of Identity Bridge synchronization projects. Each task links a source resource to a target resource. The source and target resources can be any of the resource types supported by Identity Bridge. You can create tasks in the Project tab Design View and using the Workspace Explorer.

To create a task in the Project tab Design View:

1. In the Workspace Explorer, double-click on the project you want to add the task to. The selected project is displayed in a new tab in the main work area. By default the project is displayed in **Design View** with **Move Mode** active.
2. Click **Connect Mode** to switch to connect mode.
3. In the project space, click on the source resource and drag to the target resource. An arrow is drawn between the source and target resources, representing the new task.
4. Double-click the task arrow. The task is displayed in a new **Task** tab in the main work area. The **Task** tab allows you to define task properties.
5. Provide a **Task Name** that identifies what the task will do.
6. In the **Index** box, specify a number corresponding to position in which the task will run in the project. Leave this field blank to generate the index automatically.
7. Optionally, provide a description of the task in the **Description** text box.
8. Click **Save All** on the main Identity Bridge toolbar to save your changes.

NOTE: You can also add a new task to a project directly from the Workspace Explorer. Right-click **Tasks** in the project you want to add the task to, select **New Task** from the context menu, and then follow steps 5 to 8 above.

Alternatively, to make a copy of an existing task:

1. Right-click on the task you want to copy in the Design View and select **Copy** from the context menu.
2. Provide a name for the new task in the text field
3. Click **OK**.

Specify source and target resource schemas

To map data in the source data store to data in the target you must specify source and target schemas. To specify the source schema:

1. On the **Task** tab toolbar, click **Source**. The resource properties for the source are displayed. The data on this tab will vary depending on the type of resource.
2. Check the values on the **General** tab and add any additional information. For example, for an SQL resource, enter the table name.

NOTE: Existing resource parameters can be overridden allowing you to, for example, provide alternate credentials for a particular task. Any overridden parameters are shown in italics on the **General** tab.

3. Click the **Schema** tab. The schema properties for the source are displayed.
4. Click **Load Schema** to read the schema for the source and populate dropdown lists in each row added to the [schema table](#) with the elements identified.
5. Alternatively, click **Load Template** to run a query based on the filter provided on the **Resource** tab to retrieve the first ten entries from the source data store and populate rows in the [schema table](#) using the values returned.
6. Or, click **Add** to manually define rows in the [schema table](#).

NOTE: When you populate either the **Name** or **Internal Reference** column for a given attribute, the other column is automatically populated with the same name by Identity Bridge Studio.

7. For LDAP and LDIF sources only, provide a suitable **DN Reference** (used internally to hold the distinguished name of each entry) in the text box. If no value is provided the default value of **dn** will be used.

To specify the target:

1. On the **Task** tab toolbar, click **Target**. The resource properties for the target are displayed. The data on this tab will vary depending on the type of resource.
2. Check the values on the **General** tab and add any necessary information.

NOTE: Existing resource parameters can be overridden allowing you to, for example, provide alternate credentials for a particular task. Any overridden parameters are shown in italics on the **General** tab.

3. Click the **Schema** tab. The schema properties for the target are displayed.
4. Define the target resource schema as described above for the source resource.

Schema table format

The format of the schema table is described below.

Schema Field	Source	Target	Description
Name	√	√	The name of the attribute/field in the source.
Internal Reference	√	√	The Identity Bridge identifier for the attribute/field. This is the name given to the attribute/field in the internal record passed between the source and target and the one used by script processes.
Internal Type	√	√	The data type the attribute/field should be treated as for internal processing.
Key Field	√	√	Identifies the attribute/field as a key field used to uniquely identify a record/entry. The key for a record can be made up of multiple fields.
Ignore Reading	√		Indicates that the attribute/field should be ignored when reading records. This is only required for fixed length or csv/tab delimited sources without header lines, where it is necessary to specify every field in the schema.
Ignore Delta	√		Indicates that the attribute/field should be excluded from those that are checked for changes when using the Delta function.
Ignore Writing		√	Indicates that the attribute/field should be ignored when writing records

Running projects

Identity Bridge projects can be run from Identity Bridge Studio or the command line.

From Identity Bridge Studio

Identity Bridge Studio enables you to run entire projects or individual tasks directly from the toolbar.

To run a project:

1. In the Workspace Explorer, double-click on the project you want to run.
2. Click **Run Project** on the main Identity Bridge toolbar.

To run a task:

1. In the Workspace Explorer, double-click on the task you want to run.
2. Click **Run Task** on the main Identity Bridge toolbar.

From the command line

The Identity Bridge synchronization engine can also be run independently to deploy projects as batch processes that can be scheduled by operating system specific task schedulers such as Windows Scheduler or cron.

To run a project from the command line:

1. Navigate to the `<install dir>/identitybridge/modules` directory.
2. Run the synchronization engine with the following command:

```
'java -jar com-viewds-identitybridge-engine-runner.jar -  
workspace <workspace directory path> -project <project name> [-  
task <task name>]'
```

Where:

`<workspace directory path>` is the workspace location

`<project name>` is the name of the project you wish to run and the optional

`<task name>` is the name of the task within that project you wish to run

Advanced options

In addition to the basic steps described in [Setting up and running projects](#), you can add optional processing steps to your synchronization project.

- [Processes, functions and variables](#)
- [Delta updates](#)
- [Change logs](#)
- [Support for Java classes and native libraries](#)

This section also describes the following:

- [Supported resource types](#)
- [Built-in functions](#)

Processes, functions and variables

[Processes](#) are procedures that modify the source data for a given task before it is written to the target resource. They are constructed using [variables](#) and [functions](#).

Although it is not necessary to use processes when synchronising data with Identity Bridge, doing so can add significant value to the synchronization process.

Variables

Variables can be created for individual tasks or whole projects. They are used by functions to store data that may change as the task or project progresses.

The steps required to create a variable are the same regardless of the type of variable you are creating.

NOTE: Task-specific variables are initialised each time the task is started whereas project wide variables are initialized when the project starts. This means that project-wide variables persist from one task to another, for example to maintain and pass a project error count.

To create a variable:

1. Navigate to the required Project or Task tab in the main work area.
2. Click **Properties** in the tab toolbar.

3. In the **Task** or **Project Variables** section, click **Add**. A new row is added to the variable table.
4. Double-click the **Variable Name** cell in the new row and enter a variable name.
5. Double-click the adjacent **Value** cell and enter an initial value for the variable. The following variable types are supported:
 - a. Simple string (e.g. v1 = ABC)
 - b. Integer indexed array (e.g. v2 = ["top", "person", "organizationalPerson"] where v2[0] = top , v2[1] = person, etc.)
 - c. Associative array (e.g. v3 = {"num":100, "is_vip":true, "name":"Tom"} where v3["num"] = 100, v3["name"] = Tom, etc.)
 - d. Complex array (e.g. v4 = [{"num":100, "is_vip":true, "name":"Tom"} {"num":200, "is_vip":false, "name":"Jerry"}] where v4[0]["num"] = 100, v4[1]["name"] = Jerry, etc.)
6. Click **Save All** on the main Identity Bridge toolbar to save your changes.

NOTE: A variable is only available for use in a function after it has been saved.

Functions

Functions are used to perform data manipulation in Identity Bridge. These functions can be called in a number of different contexts and it is important to understand what values (if any) are passed to the function by the Identity Bridge Engine and what values are returned, in order that you use the correct syntax for the function. See JavaScript Functions Editor in the Identity Bridge in-application help for further details.

Define a function

To define a function:

1. Navigate to the required Task tab in the main work area.
2. Click **Processes** in the Task tab toolbar.
3. Click **Define Function(s)**. A JavaScript source editor opens in a new tab. If any functions have already been defined for the project, then they will be displayed here. Otherwise the source editor will be empty.
4. Define your function using standard JavaScript. For example:

```
function assignDn(rec)
{
  // assign dn and objectClass for record. In this case dn_base
  variable is passed in as a task or project variable
  rec['dn'] = 'cn=' + rec['cn'] + dn_base;
  rec['objectClass'] = new Array( "top", "person",
```

```
"organizationalPerson" );  
return rec;  
}
```

5. Click **Save All** on the main Identity Bridge toolbar to save your changes.

Once a function has been created, it can be used in any task-specific process in the project.

NOTE: Functions become available for use in processes only after they have been saved.

View built-in functions

Identity Bridge also includes a number of [built-in functions](#).

To view a list of built-in functions:

1. In the JavaScript source editor, type:

```
$context.
```

2. Press the CTRL and SPACE keys together. A list of available functions is displayed.
3. Double click on a function in the list to copy it to the JavaScript source editor.

NOTE: All functions for a given project are saved in the same *.js file.

Processes

There are four contexts in which functions can be called in a process:

- Task Initialization: This function is called when the task is initialized (before any records are processed).
- Task Termination: Called when the task is terminated (after all records are processed).
- Audit at Target: Called on a per entry/record basis at the target for the purposes of providing audit information and (optionally) subsequent additional processing.
- Per Entry/Record: These functions are called on a per entry/record basis. They can receive and return a single field/attribute or whole entries/records.

NOTE: The appropriate syntax for functions depends on the context in which they are called. See JavaScript Functions Editor in the Identity Bridge in-application help for further details.

To add an initialization, termination or audit function to a process:

1. Navigate to the required Task tab in the main work area.
2. Click **Processes** in the Task tab toolbar.

3. Optionally, select the required initialization function from the **Task Initialization Function** drop-down list.
4. Optionally, select the required termination function from the **Task Termination Function** drop-down list.
5. Optionally, select the required audit function from the **Audit Function at Target** drop-down list.
6. Click **Save All** on the main Identity Bridge toolbar to save your changes.

NOTE: Initialization, termination and audit functions should not be added to the function table.

To add a per entry/record function to a process:

1. Navigate to the required Task tab in the main work area.
2. Click **Processes** in the Task tab toolbar.
3. Click **Add**. A new row is added to the function table.
4. Double-click the **Function** cell in the new row and select a function from the drop-down list.
5. For functions that work only with a specific attribute/field, select the appropriate **Field Reference** from the drop-down list. The **Field Reference** column should be left empty for functions that receive and return whole records.
6. Repeat steps 3 to 5 above to add multiple functions to the process.
7. Left-click and drag functions in the table to change the order in which they are processed.

Delta updates

Identity Bridge provides a delta update feature that allows you to configure the synchronization process so that only records in the source that have been added or changed since last time are processed and passed to the target. Using this can improve the performance of synchronization processes and reduce the load on target systems.

The delta update feature can also be used to identify records that have been deleted from the source and delete, or otherwise process, the corresponding entries in the target.

NOTE: The delta update feature is also required in order to use the change log connectors supported by Identity Bridge. See the [Change logs](#) topic for further details.

Defining a delta database

In order to use the delta update functionality in Identity Bridge you must first define a delta database resource. Identity Bridge uses the delta database to store and manage a number

of data tables that keep track of changes to the source data.

To define a delta database resource:

1. In the **Workspace Explorer**, right-click **Resources** under **WORKSPACE** and select **New Resource in Workspace** from the context menu. The **New Resource Wizard** is displayed.
2. Provide a name for the delta database in the **Resource Name** box.
3. Choose **Delta Data Store** from the **Connector Plugins** list.
4. Optionally, add a **Description** of the delta database in the box.
5. Click **Next**.
6. Provide the JDBC URL of the delta database in the **Database JDBC URL** box, for example `jdbc:h2:tcp://localhost/~/test`.
7. Provide the Java Classname of the JDBC Driver for the delta database in the **JDBC Driver Class** box, for example `org.h2.Driver`.
8. Provide a valid username for the delta database in the **User Name** box.
9. If required, provide the password for the user in the **User Password** box. Most SQL databases can be used as the Identity Bridge delta database, for example, MSSQL, MYSQL, H2 and so on. However, the use of MS Access is not currently supported as it does not allow for suitably large key fields.
10. Ensure that you have copied the appropriate JDBC driver for your chosen SQL database into the `/ib_data/lib` directory in your workspace (see [Installing Identity Bridge](#) for more details).
11. Optionally, use the **Test Connection** button to verify the connection parameters you have provided.
12. Click **Finish**.
13. Click **Save All** on the main Identity Bridge toolbar to save your changes.

Adding a delta database to your project

To add a delta database to a project:

1. In the Workspace Explorer, double-click on the project you want to add the delta database to. The selected project is displayed in a tab in the main work area in the **Design View** with a **Palette** containing previously defined **Workspace Functions** and **Workspace Resources** on the right.
2. Ensure **Move Mode** is selected, then click and drag the delta database resource from the **Palette** to the **Design View**.
3. Click **Save All** on the main Identity Bridge toolbar to save your changes.

Adding the delta update feature to your synchronisation task

The delta update feature can be added to new or existing synchronisation tasks once a delta database resource has been added to the project.

To add the delta update feature to an existing synchronisation task:

1. In the project **Design View**, double-click the arrow associated with the task you want to edit. Alternatively, in the **Workspace Explorer**, expand the **Tasks** node within the project and double-click on the task you want to edit. The Task tab is displayed.
2. On the Task tab toolbar, click **Delta**. The delta update options for the task are displayed.
3. Select **Enable Delta Evaluation**. This enables the delta evaluation task which identifies changes in the source by generating hash values for each record and comparing these to the hash values stored in the delta database. New records are also identified.
4. Select the appropriate delta database from the **Delta Store Resource** dropdown list.
5. Provide an identifier, to be used as a prefix for Identity Bridge tables in the delta database, using the **Delta Table(s) Identifier** box.
6. Optionally, modify the **Processing Step Index** for the delta evaluation task. By default, this is set to 0, meaning that delta evaluation takes place before any other processes. In most cases this is appropriate. However, you may need to adjust the **Processing Step Index** if, for example, you want to transform the source data using a function prior to performing the delta evaluation.
7. Provide the name of the attribute/field used to uniquely identify entries in the source for delta evaluation in the **Source Key Reference** box.
8. Provide the name of the attribute/field used to uniquely identify entries in the target for delta evaluation in the **Target Key Reference** box. If more than one attribute or field is required to uniquely identify entries in the source and/or target, then you must create a composite attribute from those keys using a processing function.
9. Optionally, check **Enable Delta Confirmation**. This enables the delta confirmation task which verifies that the changes identified by the delta evaluation task have been made in the target and updates the delta database accordingly. This task always takes place last.
10. Provide the name of the attribute/field used to uniquely identify entries in the target for delta confirmation in the **Target Key Reference** box.
11. Click **Save All** on the main Identity Bridge toolbar to save your changes.

Using the delta update feature to handle deletes

The most common reason for using the delta update feature, aside from improving performance, is to identify deleted records in the source and delete (or otherwise process)

the corresponding records in the target. To use the delta update feature for this purpose a separate 'deletes' task which uses the delta database as the source must be created.

To create the deletes task:

1. In the **Workspace Explorer**, double-click on the project you want to add the deletes task to. The selected project is displayed in a new tab in the main work area. By default the project is displayed in **Design View** with **Move Mode** active.
2. Click **Connect Mode** to switch to connect mode.
3. In the project space, click on the delta database resource and drag to the target resource. An arrow is drawn between the delta database and target resources, representing the new deletes task.
4. Double-click the task arrow. The task is displayed in a new Task tab in the main work area.
5. Provide a **Task Name** that identifies what the task will do.
6. In the **Index** box, specify a number corresponding to position in which the task will run in the project. Leave this field blank to generate the index automatically.
7. Optionally, provide a description of the task in the **Description** text box.
8. Click **Save All** on the main Identity Bridge toolbar to save your changes.

To configure the deletes task:

1. On the Task tab toolbar, click **Source**. The resource properties for the delta database are displayed.
2. Enter the **Delta Table(s) Identifier**, as specified previously, in the box.
3. Check **Fetch untouched delta entries from last run** box. This compiles a list of records removed from the source since the last time the delta tables specified above were updated by identifying all delta entries for which the timestamp has not been updated.
4. Click the **Schema** tab. The schema properties for the delta database are displayed.
5. Click **Load Template** to populate rows in the schema table. The table is populated with two rows for **SOURCE_KEY** and **TARGET_KEY**.
6. On the Task tab toolbar, click **Target**. The resource properties for the target are displayed. The data on this tab will vary depending on the type of target resource.
7. Check the values on the **Resource** tab and ensure that the appropriate run mode for deletes is selected, for example **DELETE_EXIST** for to delete entries in an LDAP resource.
8. Click the **Schema** tab. The schema properties for the target are displayed.
9. Click **Load Source Schema** to copy the schema from the source schema definition.

If the target resource is not LDAP or the key reference is not the distinguished name, then you must map the **TARGET_KEY** internal reference to the corresponding key reference identifier in the target and check the **Key Field** box.

10. On the Task tab toolbar, click **Delta**. The delta update options for the deletes task are displayed.
11. Check **Enable Delta Confirmation**.

It is not necessary to **Enable Delta Evaluation** when configuring a deletes task since the evaluation task is inherent when using the delta database as the source.

12. Provide the name of the attribute/field used to uniquely identify entries in the target for delta confirmation in the **Target Key Reference** box.
13. Check **Delete Delta entry on Confirmation**. This will result deleted entries being removed from the delta database on successful completion of processing at the target.
14. Click **Save All** on the main Identity Bridge toolbar to save your changes.

Change logs

Change logs can be generated by some types of resources. They record all the changes made to the source data and can be used to facilitate 'on change' updates with Identity Bridge. Change logs are particularly useful when you want to make frequent updates or if your dataset is particularly large, since only data that has changed is passed from the source to Identity Bridge.

Identity Bridge includes connectors for LDAP Changelog and Active Directory Change Detection. In both cases a total update task is also required (for initial synchronisation and in the event that the source and target become mismatched). In addition, a delta database is required in both cases to enable the correct mapping of entries in the source to entries in the target.

Overviews of the steps required to set up both connectors are provided in the sections below:

LDAP Changelog

1. Create a total update task using the **LDAP** connector for the LDAP source (see [Define resources](#) and [Create Tasks](#)). Ensure that a delta database resource is defined and delta updates are configured for the total update task (see [Delta updates](#)).
2. Create a change log update task using the **LDAP Changelog** connector for the LDAP source. Ensure that the appropriate run mode for your chosen target is selected, for example **CHANGE_RECORD** for an LDAP target resource. Also, ensure that delta updates are configured for the change log update task.

NOTE: It is not necessary to create a separate deletes task for the LDAP Changelog connector, as these are handled automatically.

Active Directory Change Detection

1. Create a total update task using the **Active Directory** connector for the Active Directory source. Ensure that a delta database resource is defined and delta updates are configured for the total update task.
2. Create a change log add and update task using the **Active Directory Change Detection** connector. Ensure that source **Scope** for the task is **ADDED_OR_UPDATED**. Ensure that the appropriate run mode for your chosen target is selected, for example **CHANGE_RECORD** for an LDAP target resource. Ensure that delta updates are configured for the add and update task.
3. Create a change log delete task using the **Active Directory Change Detection** connector. Ensure that source **Scope** for the task is **DELETED**. Ensure that the appropriate run mode for your chosen target is selected, for example **CHANGE_RECORD** for an LDAP target resource. Ensure that delta updates are configured and that **Delete Delta Entries on Confirmation** is checked for the **Delta Confirmation** task.

Support for Java classes and native libraries

It is possible to make use of Java classes (.jar files) and native libraries within Identity Bridge. To do this place the .jar files and libraries in the `/ib_data/lib` directory in your workspace.

Supported resource types

Generic LDAP

Active Directory Change Detection, Active Directory, LDAP Changelog and LDAP connectors.

- **Directory LDAP URL:** Connection information for the LDAP directory.
- **Security Level:** Authentication level to be used. The Identity Bridge help provides full details of the available options.
- **User DN:** Distinguished name of user.
- **Password:** Password for user.
- **Base DN:** Distinguished name of search base entry.

Delta Data Store

- **Database JDBC URL:** Connection information for delta database.
- **JDBC Driver Class:** Java driver for required connection.

- **User Name:** Valid user login to the delta database. Make sure this user has sufficient rights in the database to perform the tasks required.
- **User Password:** Valid password for the user.

Flat File

- **File:** Full path for the data file. Alternatively, use Browse to navigate to the data file and select it.
- **File Format:** Format of the data file. . The online help provides full details of the available options.
- **Delimiter:** Character or set of characters used as a separator for fields. The default delimiter is ','
- **Multi-Value Delimiter:** Character or set of characters used as a separator for multiple values within the same field. The default multi-value delimiter is '|'
- **Read Header Columns:** Indicates that the data file contains field header information.

LDIF File

- **LDIF File:** Full path to the data file. Alternatively, use Browse to navigate to the data file and select it.

SQL

- **Database JDBC URL:** Connection information for SQL database.
- **JDBC Driver Class:** Java driver for required connection.
- **User Name:** Valid user login to the SQL database. Make sure this user has sufficient rights in the database to perform the tasks required.
- **User Password:** Valid password for the user.

WebAPI (WsSimple)

- **Web Service URL:** URL for connecting to the Web Service. Enter the URL Identity Bridge should use to make Web API calls.
- **Security Level:** Authentication level to use. Choose one of the following:
 - **Username:** For UserPassword and UserPassword with SSL, the user name to authenticate as.
 - **Password:** For UserPassword and UserPassword with SSL, the password to authenticate with.
 - **Headers:** Additional HTTP headers required for the connection.

Built-in functions

IB Built-In Functions	Parameters
\$context.appendBinaryFile	(filePath, byteArray)
\$context.appendTextFile	(filePath, string)
\$context.debug	(string)
\$context.error	(string)
\$context.executeSQL	(resourceName, sql)
\$context.executeShellCommandGetBinary	(command)
\$context.executeShellCommandGetText	(command)
\$context.fromBase64	(base64String)
\$context.fromHex	(hexString)
\$context.getFailedCountAtTarget	()
\$context.getMD5Hash	(string)
\$context.getSucceededCountAtTarget	()
\$context.getWorkspaceDirectoryPath	()
\$context.isBase64	(input value)
\$context.print	(string)
\$context.readBinaryFile	(filePath)
\$context.readTextFile	(string)
\$context.readHttpURL	(httpURL, resourceType)
\$context.searchByLDAP*	(resourceName, columnsDefinition*, base, scope, filter)
\$context.searchBySQL*	(resourceName, columnsDefinition*, sql)
\$context.sendMail	(host, [port], [userName, Password], fromAddress, toAddress, [ccAddress, bccAddress], subject, text)
\$context.terminateProject	()
\$context.terminateTask	()
\$context.toBase64	(byteArray)

Advanced options

\$context.toHex	(byteArray)
\$context.warn	(string)
\$context.writeBinaryFile	(filePath, byteArray)
\$context.writeTextFile	()

* Previous versions of Identity Bridge support comma separated lists for the deprecated columnNames parameter and do not allow you to specify data types. As a result, these functions are not backwards compatible with earlier versions.