



# THE DATA MIGRATION SOLUTION FOR SERVICE MANAGEMENT PLATFORMS

## PRODUCT USER GUIDE

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## Document Control

Document Version	Date	Amendments
3.0.0	24/01/2017	New section on Migrating Attachments
3.01	16/02/2017	Updates to section on Lookup Queries and new section on Form Mapping Options
3.02	01/03/2017	Updates to sections on Form Mapping Options and Execution Options
3.03	21/3/2017	Added supplementary notes to sections on Key Mappings and Lookups re performance and indexing
3.2	25/5/2017	Updates to sections on Lookup Queries, Assignment Mappings, Lookup Mappings, Execution Options. New sub-section on Temporary Variables. Update to Appendix A.
3.3	4/7/2017	Updates to sections on Launching and Licensing, Form Mapping Options and Migrating Attachments. New functions in addendum A, addition of Appendix F.
3.3.1	29/8/2017	Updates to sections on Source Filtering and Lookup Queries
3.4	22/9/2017	Updates to sections on licensing, configuration, opening an existing project, New Project from Template and Appendix G for use with Oracle DB source
3.5	10/11/2017	Updates to sections on Additional Form Mapping Options and Execution Options for new migration methods.
3.5.2	1/1/2018	Update to Execution options for Import Set Application
3.7	22/3/2018	Multiple updates for 3.7 release
3.7.3	25/4/2018	Corrections to section on Attachments; updates to section of Source Filtering when source server is ServiceNow.
3.81	27/6/2018	New sections on Virtual Table mappings and ID List field types. New function TODATE() added to appendix.
3.82	20/7/2018	Updated section on configuring a SQL Server Database source to include option for Sharepoint 2010.
3.90	28/8/2018	New section of creating ID Replacement mappings; Update to section on Key Mappings.
3.91	11/9/2018	Updates to sections: Key Mappings, Additional Form Mapping Options, Execution Options and Appendix D.
3.10.1	5/10/2018	Updates to Appendix A
3.10.2	10/10/2018	New sections on Handling Invalid Field Mappings and Handling Invalid Form Mappings. Updates to section on Execution Options, Validation.

## 1. Introduction

The aim of this guide is to step through all the functional components of ITSM Bridge and its use in conjunction with Service Management Applications. This guide relates to release 3.10 of ITSM Bridge unless indicated otherwise.

## 2. Audience and Scope

This document aims to provide an overall understanding of all functionality within ITSM Bridge and how it can be used to support the migration of data between service management applications. It is aimed at any end-user that wishes to use the product and does not require any prior technical knowledge. It is assumed that the reader is familiar with the applications for which they are migrating data to and from.

This guide assumes the following prerequisites:

The product has been installed on a client machine with access to the source and target servers over a local network or internet connection.

The user has administrator level access to both source and target applications.

### 3. Definitions

The following terms used to refer to different functionality within the product are referenced throughout this document:

Term	Meaning
Migration Project	A collection of Form Mappings with various attributes that can be migrated from one application server to another in a single execution and in a specific order.
Mappings List	A list of Form Mappings presented in order of execution.
Form Mapping	A collection of Field Mappings that define how data in a Source Form should be migrated to data in a specified Target Form or table.
Field Mapping	Specific details on how a Target field within a Form mapping should be populated. Field Mappings can be one of seven types (Simple, Assignment, Value Match, Reference, Lookup, List or ID Replacement)
Source Form	The form from which data is to be migrated.
Target Form / Table	The form or table to which data is to be migrated.
Template	A Migration Project that cannot be executed. Templates are used as the basis for other Migration Projects.

The terms **Fields** and **Forms** are used throughout this document. Depending on the application reference, these may also be referred to as **Columns** and **Tables**. For the sake of clarity, where applicable, wherever the term **Field** is used, substitute the word **Column** and wherever the term **Form** is used substitute the word **Table**. These terms are interchangeable and synonymous.

## 4. Pre-Requisites

In order to run ITSM Bridge, you will need the following software on your client machine (no software is installed on the server):

Java Runtime version 8 update 181 or later.

### **Supported Client Operating Systems for installation:**

Windows 7, Windows 10, Windows Server 2003 or later

Apple OS X Yosemite 10.10.5 or later.

### **Memory Requirements**

We recommend a minimum of 8GB of RAM on the client machine where ITSM Bridge is installed. If you are running very large migrations or migrations with lots of large attachments then we recommend either 16GB or 32GB depending on the volume and size and the number of parallel executions. Also see advanced settings in the Launching and Licensing section below.

### **Network Access**

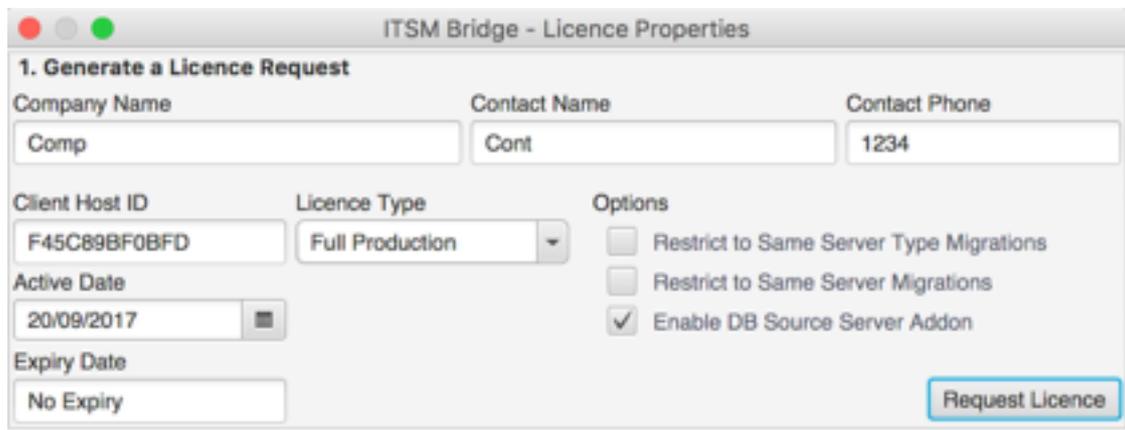
ITSM Bridge uses web services to connect to source and target servers. If either of your servers are outside of your local network, you may need to adjust your firewall settings to ensure that you can send and receive SOAP messages to/from external systems. By default web services/SOAP uses network port 443 to connect.

## 5. Launching & Licensing

To launch ITSM Bridge on a Windows 64 bit machine, unzip the **ITSMBridgeWin<version>.zip** file, run the setup.exe, then open the application called ITSMBridge from the Start->Programs menu, or click on the ITSMBridge icon on the Desktop.

To launch ITSM Bridge on a Mac, unzip the **ITSMBridgeMac-<version>.zip** file, then open the file called **runITSMBridge.jar** (if this is the first time that you have opened the file, you may have to use the Ctrl->Open option.)

The first time you launch ITSM Bridge, the licence properties screen will appear.



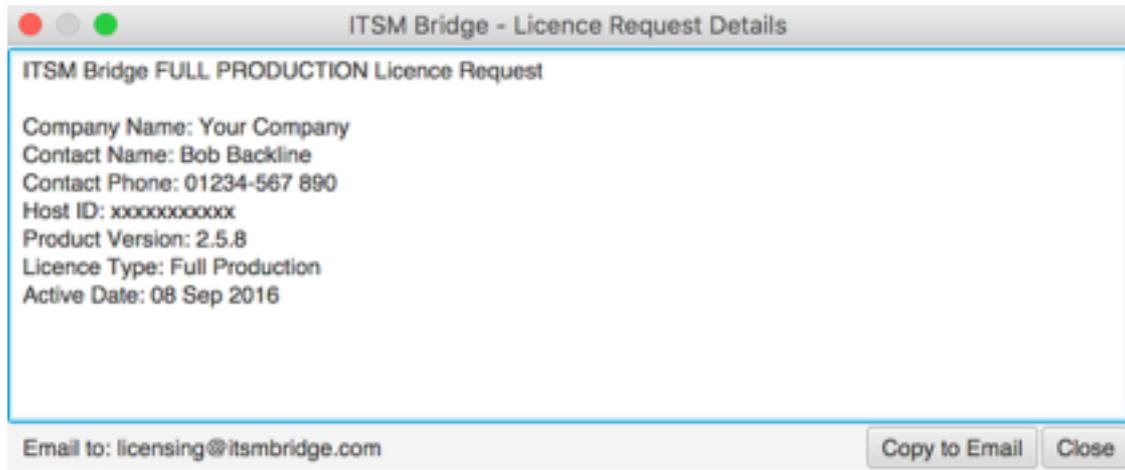
Enter your company name, contact name and phone number, licence type (**Evaluation, Rental or Full Production**) and activation date (the Client Host ID field should already be populated).

Select one or more of the additional Licence Options:

- Restrict to Same Server Type (e.g. ServiceNow -> ServiceNow)
- Restrict to Same Server (Source and Target server must be the same)
- Enable DB Source Server Add-on (for using an external DB source)

Then click on the Request Licence button.

A separate licence request screen is presented like this:



Click on the Copy to Email button to launch your email client and send the request to **licensing@itsmbridge.com** in order to obtain your licence key.

Once you receive your licence key, paste the full key into the first field provided in the **Apply Licence Key** window. Then select the checkbox to confirm that you have read and accept the Licence Agreement and click on the **Apply** button next to the key. If the key was entered correctly then you should see a message in the **Licence Status** section indicating that the product is fully licensed. Click on the **Close** button to close the Licence screen.

## Evaluation Licences:

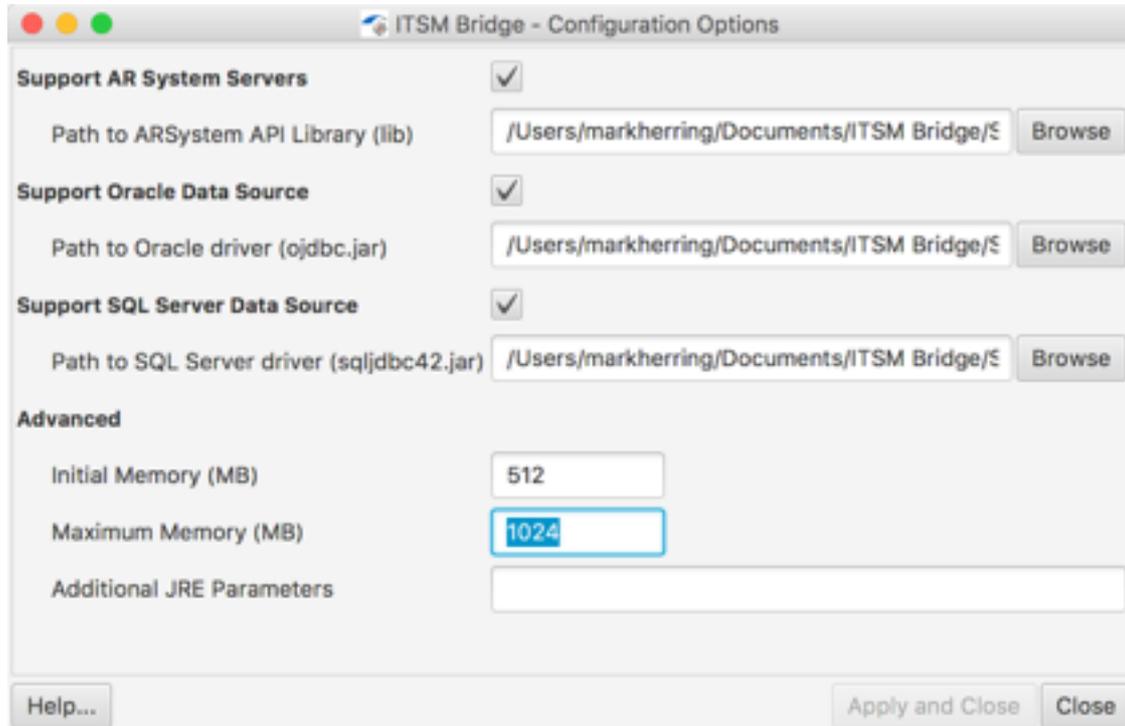
If you have an evaluation licence, the product will operate with full functionality for the duration of the evaluation period (usually 10 days). However there is a restriction limit of 50 records per form mapping that can be migrated within any migration project.

## Rental Licences:

If you have a rental licence, the product will operate with full functionality for the duration of the rental period. There are no restrictions on the number of records that can be migrated.

## Initial Configuration

The first time you launch ITSM Bridge you will be presented with a configuration screen like this:



If you are planning to migrate to or from a Remedy AR System server then you must click on the checkbox for **'Support AR System Servers'** and provide the path to the ARSystem API Library. If you have any AR System client or server applications installed (in the default location) the path to the API Library (lib) folder will be automatically set. If the path remains blank or you want to use a different location, use the **Browse** button to navigate to it. The following java libraries are required depending on your version of AR System:

AR System Version	Library Files
7.6.04	arapi764_build002.jar arapiext764_build002.jar ardoc764_build002.jar log4j-1.2.14.jar
8.1	arapi81_build001.jar arapiext81_build001.jar ardoc81_build001.jar log4j-1.2.14.jar

AR System Version	Library Files
9.1	arapi91_build001.jar arapiext91_build001.jar ardoc91_build001.jar log4j-1.2.14.jar

If you have a different version of AR System to those listed above, the files required should have a similar format, e.g. arapi<version>\_build001.jar. Set the path to the location of these jar files on your local machine.

### Enabling Support for Oracle Data Source

If you have an ITSM Bridge license that allows selection from a DB Source Server (see above) and you want to use an Oracle database as your source then you must enter the location of the Oracle JDBC Driver on your local machine.

If the driver is not present on your local machine, it can be downloaded from the Oracle Website at [www.oracle.com/technetwork/database/features/jdbc/index-091264.html](http://www.oracle.com/technetwork/database/features/jdbc/index-091264.html).

First, check the 'Support Oracle Data Source' checkbox. Use the Browse button to navigate to the file. It will be named either **ojdbc6.jar** (for Oracle 11) or **ojdbc7.jar** (for Oracle 12). The location is then passed to ITSM Bridge on start up.

You must have a network connection from your local machine to the Oracle database that you want to use as a source.

### Enabling Support for SQL Server Data Source

The SQL Server JDBC drivers required to connect to a SQL Server database are not distributed with ITSM Bridge. You can specify the location of these in the configuration tool. If not present on the local machine, this file can be downloaded from the Microsoft Website (<https://www.microsoft.com/en-us/download/details.aspx?id=11774>). In the configuration tool, navigate to ... \sqljdbc\_4.2\enu\jre8\sqljdbc42.jar. This location is then passed to ITSM Bridge on start up.

First, check the 'Support SQL Server Data Source' checkbox. Use the Browse button to navigate to the file. It will be named sqljdbc\_4.2 This will support SQL Server 2008 through to 2012

## Advanced Settings

You can specify the initial memory and the maximum memory that the ITSM Bridge application will use. These may need to be increased from the defaults if you run a large project, particularly one containing:

- a) attachment data mappings;
- b) a very large number of records (> 1,000,000)
- c) a large number of reference mappings or inclusion filters, particularly if large volumes of data are being migrated.

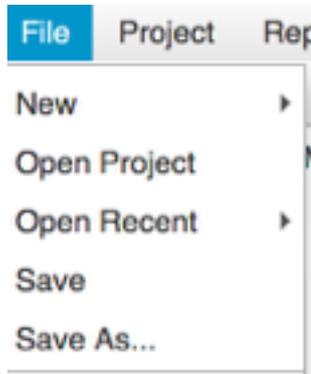
You should be sure that your machine can support the defined memory requirements to avoid memory allocation issues when starting up ITSM Bridge.

Optionally you can also define other Java Virtual Machine parameters to be passed on start up. Use this option only if you are experienced in JVM configuration. The settings are stored in a folder named 'ITSMBridge' in your Local Application data folder (Windows) or User.home (OS-X).

The configuration settings can be changed from within the ITSM Bridge application if necessary by selecting **Configure...** from the File menu.

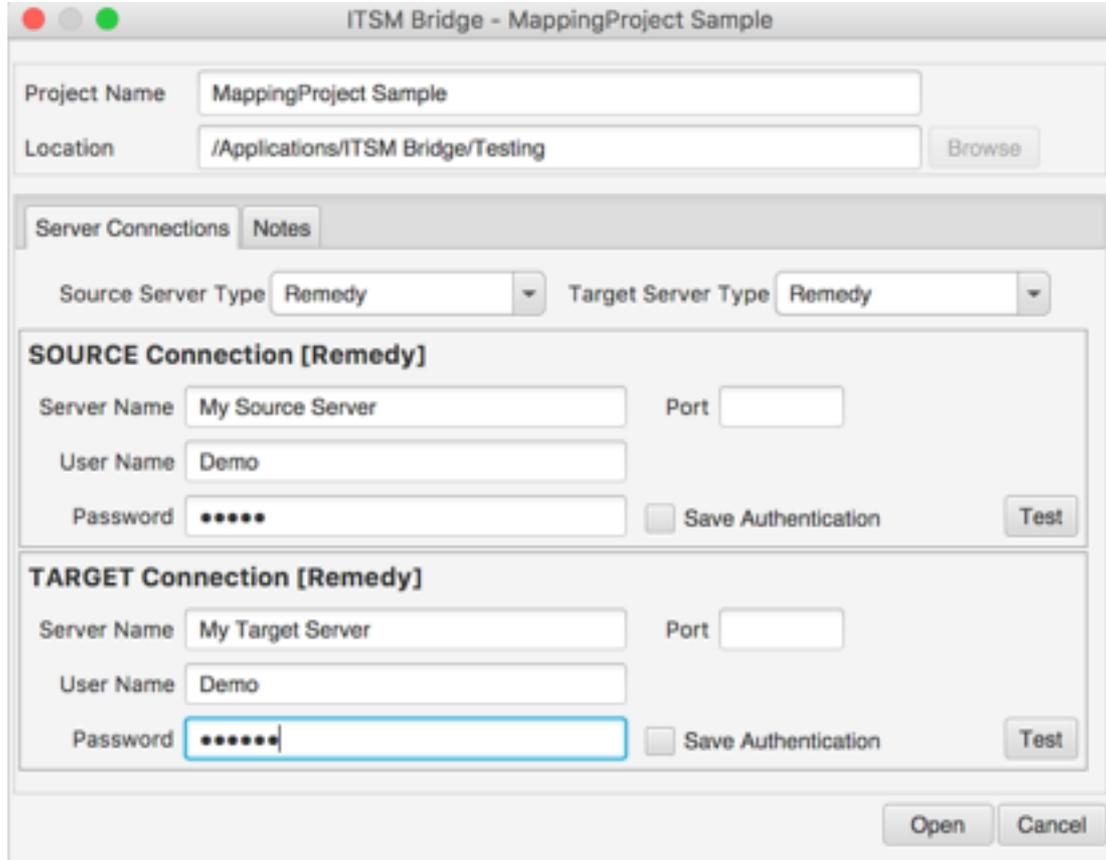
## 6. Opening an Existing Migration Project

Before you can start a migration, you must create a new project or open an existing one using the File menu.



When opening an existing project, a file browser screen will be presented.

Select the folder with the project name that you want to open. After opening the project a new screen will be presented as shown below with the details of the project source and target servers:



The screenshot shows a dialog box titled "ITSM Bridge - MappingProject Sample". It contains the following fields and controls:

- Project Name:** MappingProject Sample
- Location:** /Applications/ITSM Bridge/Testing (with a "Browse" button)
- Server Connections:** A tabbed interface with "Server Connections" selected.
- Source Server Type:** Remedy (dropdown)
- Target Server Type:** Remedy (dropdown)
- SOURCE Connection [Remedy]:**
  - Server Name: My Source Server
  - Port: (empty)
  - User Name: Demo
  - Password: \*\*\*\*\*
  - Save Authentication:
  - Test: (button)
- TARGET Connection [Remedy]:**
  - Server Name: My Target Server
  - Port: (empty)
  - User Name: Demo
  - Password: \*\*\*\*\*
  - Save Authentication:
  - Test: (button)
- Buttons:** Open, Cancel

Check that the Source Server Type and Target Server Type are correct (both set to Remedy if you are migrating between Remedy servers).

Enter the **Source Server Name**, **User Name** and **Password**. Note that this must be a user with Administrator level access to the Remedy or ServiceNow application. If necessary enter the **Port Number** required to access the Source server. See separate section below on **configuring an Oracle database source**.

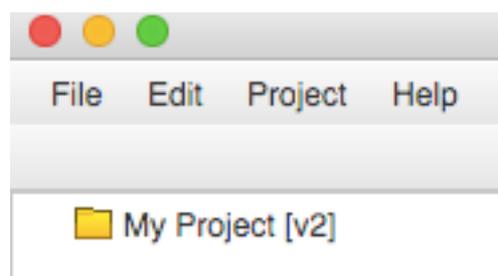
Next enter the same details for the Target server where the data will be migrated to. Again the account must have administrator level access to the Remedy or ServiceNow application.

If you want to retain the login details for each server, select the **Save Authentication** option. After selecting this option, the username and password are stored and do not need to be entered again the next time you open the same project from the same client machine. Otherwise you will need to re-enter them each time you open the project.

In order to check that the relevant servers can be accessed using the credentials provided, click on the **Test** button on the right for each server.

If the selected server is reachable then a confirmation message will be displayed. If the server is not reachable then a failure/timeout message will be displayed. Correct the Server name, User Name and Password and try the test again. If the server is still not reachable, try using the IP address of the server instead. Also check that you can connect to the server from your client machine without using ITSM Bridge.

Once access to both servers is confirmed, click on the **Open** button to open the project definition. A dialogue is then presented at the bottom left of the screen indicating that the product is establishing Source Connection and Cache, then Target Connection and Cache, which may take a few seconds. Then the name of the project should appear at the top of the left pane with the version number in brackets like this:



The project details can now be accessed either using the **Project menu**, or by right-clicking on the **My Project** text in the left pane.

### ***Opening a Recent Project***

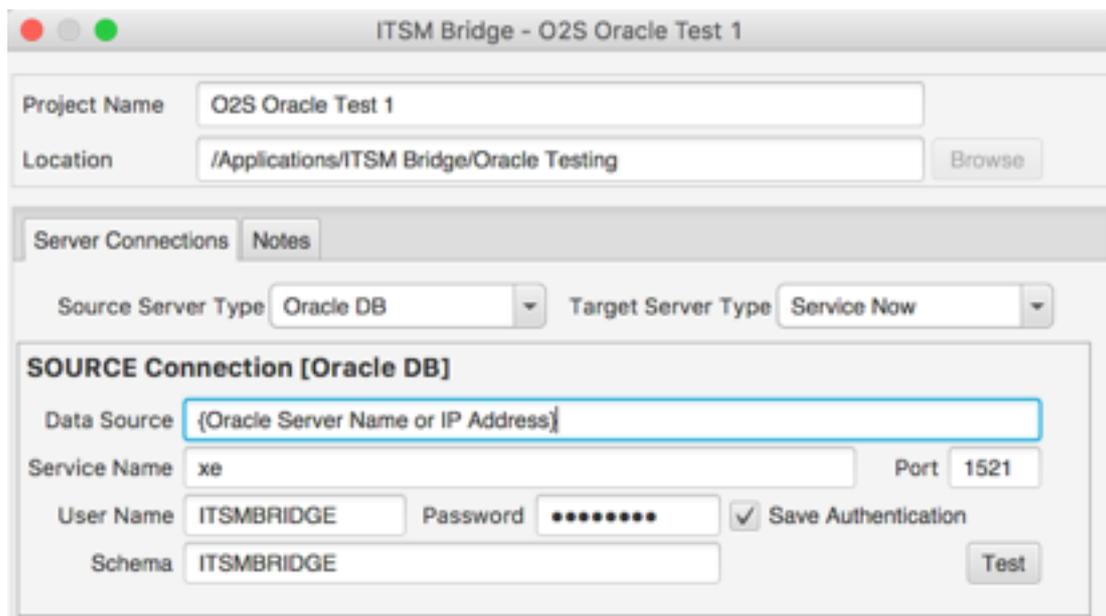
To open a recently opened project, select **File->Open Recent** from the menu then select the project name.

### ***Configuring an Oracle Database Source***

If you have an ITSM Bridge licence which includes the database source server add-on then you can configure ITSM Bridge to use an Oracle database as your data source.

Firstly check that you have setup the path to the corresponding JDBC driver (under **File->Configure**).

Once this has been set, select Oracle DB as your Source Server Type:



Then enter the Source Connection details for your Oracle database:

Data Source:	The name of your Oracle server or IP address
Service Name:	The name of the oracle service
Port:	The port number for this service (default 1521)
User Name:	The name of the oracle user to connect with
Password:	The oracle password for this user
Schema:	The schema for which you want to limit table read access

Note that if Schema is left blank then all tables owned by the connected user are presented within ITSM Bridge for data mappings. If Schema is set to 'ALL', then all tables including system tables that the user has read access to are presented within ITSM Bridge for data mappings. See **Appendix G** for restrictions on use of Oracle DB as a data source.

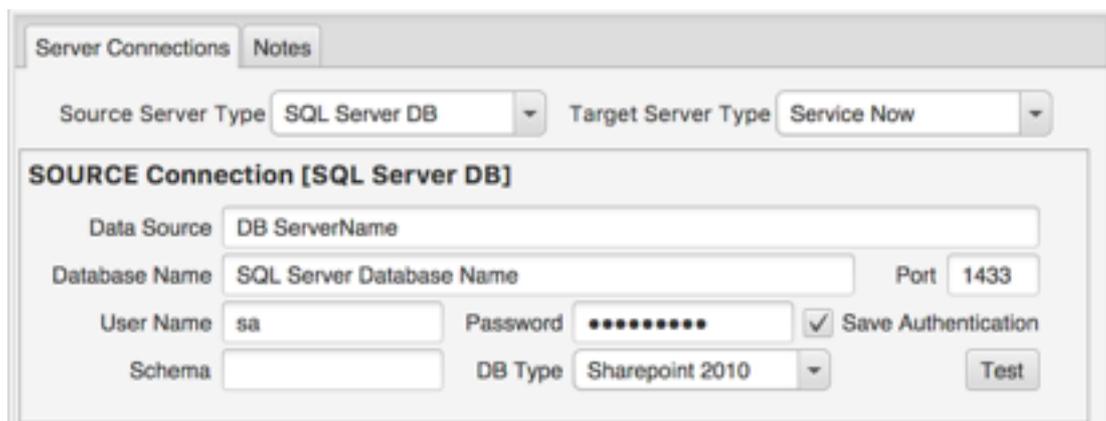
## Configuring a SQL Server Database Source

If you have an ITSM Bridge licence which includes the database source server add-on then you can configure ITSM Bridge to use a SQL Server database as your data source.

Firstly check that you have setup the path to the corresponding JDBC driver (under **File->Configure**).

Once this has been set, select SQL Server DB as your Source Server Type:

Then enter the Source Connection details for your SQL Server database:



The screenshot shows the 'Server Connections' window with the 'Notes' tab selected. The 'Source Server Type' is set to 'SQL Server DB' and the 'Target Server Type' is 'Service Now'. The 'SOURCE Connection [SQL Server DB]' section contains the following fields:

- Data Source: DB ServerName
- Database Name: SQL Server Database Name
- Port: 1433
- User Name: sa
- Password: [masked]
- Save Authentication:
- Schema: [empty]
- DB Type: Sharepoint 2010
- Test button

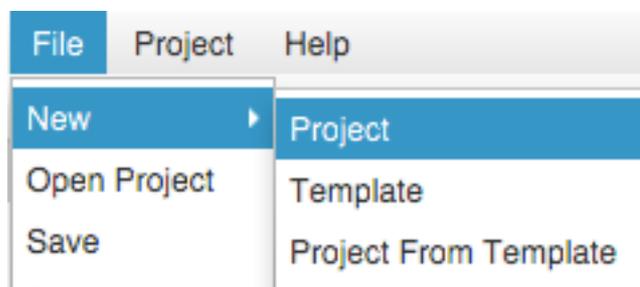
Data Source	The name of your SQL Server server or IP address
Database Name	The name of the SQL Server database
Port	The port number for this service (default 1433)
User Name	The name of the SQL Server user to connect with
Password	The SQL Server password for this user
Schema	The schema for which you want to limit table read access

DB Type	The type of database you are connecting to, either Sharepoint 2010 or 'Other'
---------	---

Note that if Schema is left blank then all tables owned by the connected user are presented within ITSM Bridge for data mappings. If Schema is set to 'ALL', then all tables including system tables that the user has read access to are presented within ITSM Bridge for data mappings.

## 7. Creating a New Migration Project

To create a new project from scratch, select **File->New->Project** option from the File menu.



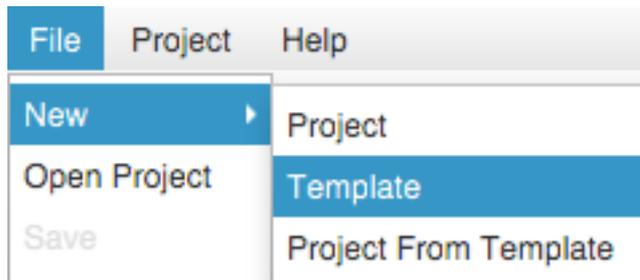
After selecting New Project option from the menu, the new project details window is displayed. This is the same as the window displayed when opening an existing project (see previous section), except that the Open button is replaced by a **Create** button. After entering the server details, use the **Test buttons** to confirm connectivity before clicking on the Create button.

After selecting Create, a dialogue is presented at the bottom left of the screen indicating that the product is establishing Source Connection and Cache, then Target Connection and Cache, which may take a few seconds. Then the name of the project should appear at the top of the left pane with the version number [1] in brackets.

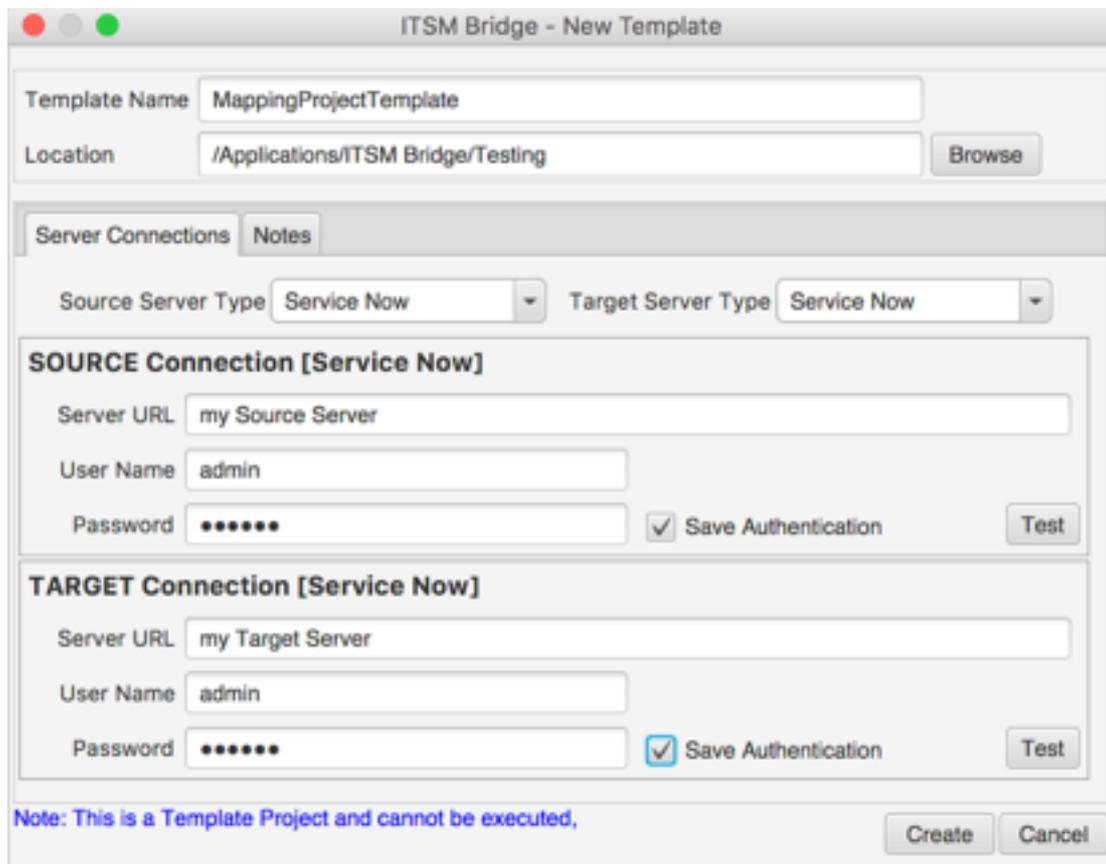
## 8. Creating a New Template Project

Template projects operate in exactly the same way as regular projects with the exception that they cannot be executed. If you have a set of form migrations that you want to re-use on multiple projects then it makes sense to store them in a template. You can then base one or more new projects on this template and execute those projects separately.

To create a new template, select **File->New->Template** from the menu.



The new template properties window is then presented like this:



Enter the server details, administrator user names and passwords and click Create to create the Template. Select the Save Authentication option next to each server to retain the login details for this template.

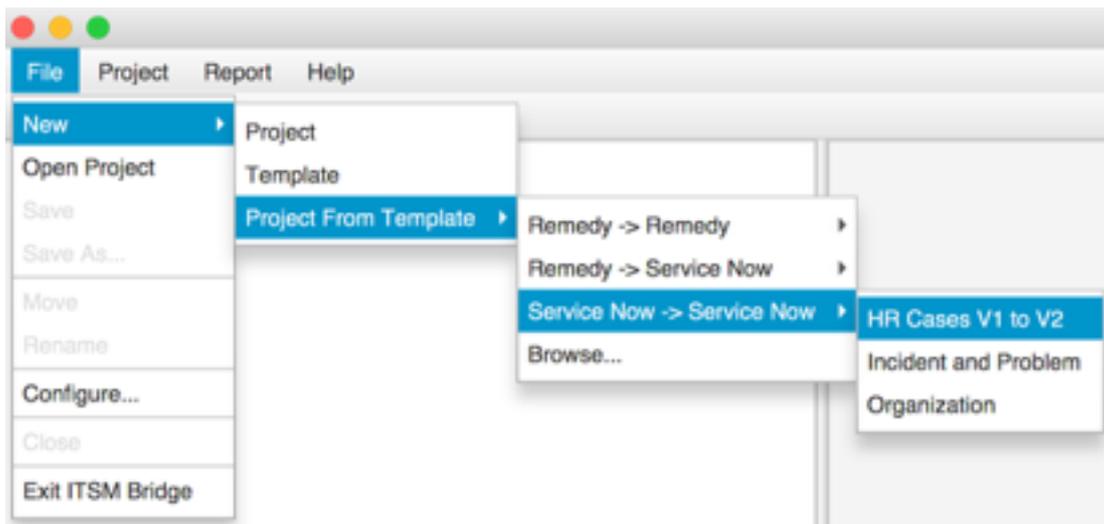
Note: Template projects are displayed in the left pane with a blue 'T' next to the name to identify them. Additionally, when you save a template the project folder is automatically prefixed with **\_TEM\_** to distinguish it from regular projects.

## 9. Creating a Migration Project from a Template

In some cases, it may be preferable to base your project on an existing template rather than creating it from scratch. We provide a range of templates for different types of migration.

**Warning:** The templates provided with ITSM Bridge are examples only and should not be relied upon to provide a complete end-end solution. They can be used as the basis for a project and should be amended and extended as necessary to meet your own particular requirements.

To create a new project from a template select **File->New->Project From Template** then select the template that you want from the list of sub-menus. If you have previously created your own custom template, then use the **Browse...** option to manually select the template file.



After selecting the template, the project properties window is displayed as above. Use the create button to create the new project. All the mappings from the template will then be transferred into the list of mappings for this project ready for use. They can be customised as necessary to suit the needs of individual projects.

## 10. Using File Save, Save As, Move and Rename Options

### *File->Save Option*

Whenever you make changes to a project or template, use the **File-Save** option to save your changes. When the project is saved, the version number is automatically incremented and shown in brackets after the project name and in the header panel. All projects are saved prior to execution.

If there are any unapplied changes detected then you will be prompted to apply those changes as part of the save operation.

### *File->Save-As Option*

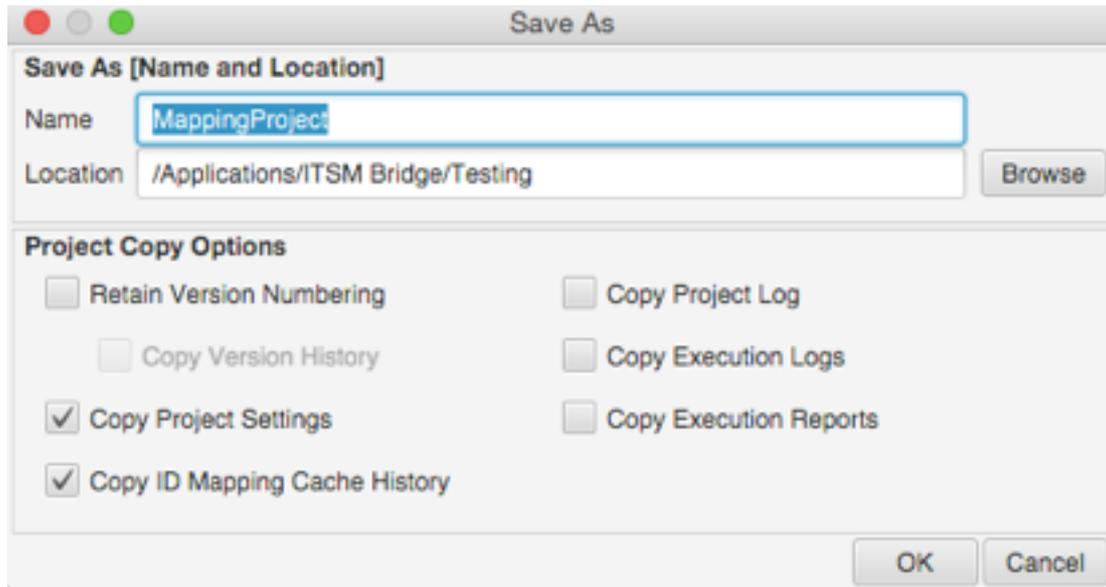
You can use the **File-Save As** option to save the project in a different location (whilst retaining the original copy). When you select this option, the following dialogue window is displayed (see below).

Firstly change the project name (if required) and select a new location for the project using the **Browse button**.

The following **Project Copy Options** are then available for selection:

**Retain Version Numbering:** Keeps the current version number for the copied project. If you don't select this option then the copied project will revert to version 1.

**Copy Version History:** Copies all previous versions of the project to the new project folder, (only applicable if you have selected Retain Version Numbering)



**Copy Project Settings:** Retains all the Execution Settings for the current project in the copied project.

**Copy ID Mapping Cache History:** If you have used **Server Defined Record IDs** as a **Key Mapping** option on any of your Form Mappings then a historical record of these record ID mappings are stored against the project. If you want to make use of these for future migrations with the new project then you should select this option to have the mapping history copied over to the new project.

**Copy Project Log:** Copies the historical log of all project updates to the copied project.

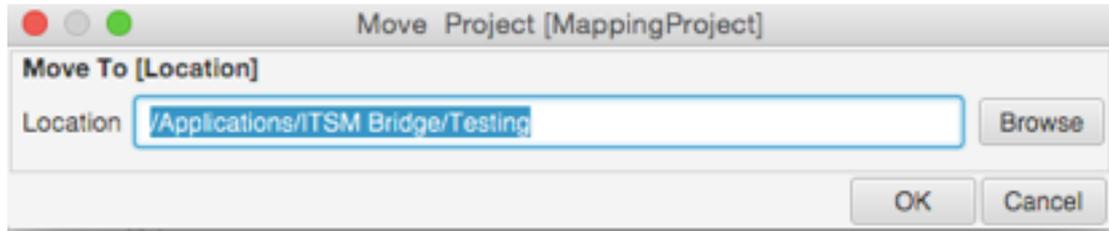
**Copy Execution Logs:** Copies the logs of all migration executions for the current project to the copied project.

**Copy Execution Reports:** Copies the execution reports from all migration executions for the current project to the copied project.

### ***File->Move Option***

If you want to move a project (and its entire folder structure) to a new location, select the **File->Move** option from the menu.

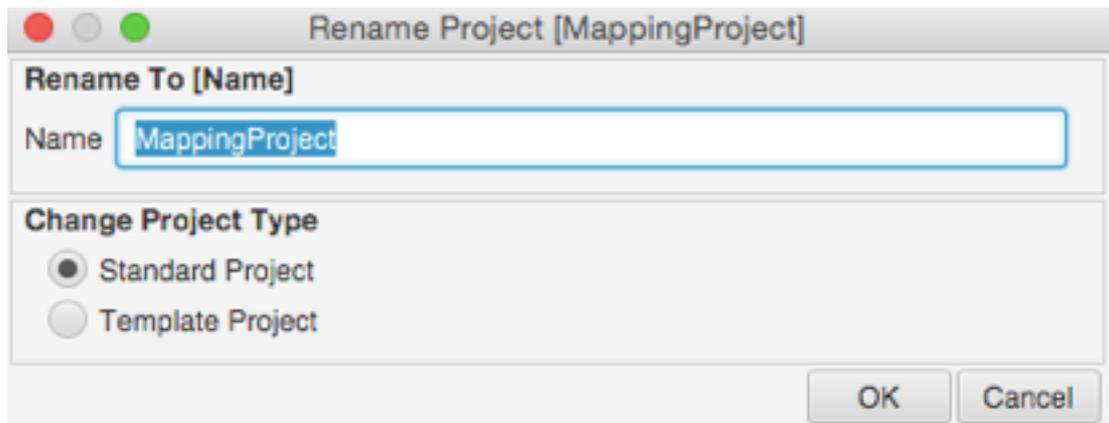
After you select this option, a dialogue window is displayed which allows you to select a new location. Use the **Browse button** to select a new folder location. After selecting a new folder location, the entire project including all previous versions, logs and reports are moved to the new location.



### ***File->Rename Option***

The Rename option is not only used to change the name of a project but can also be used to change the project type (from Standard to Template).

After selecting File-Rename, the following dialogue window is displayed:



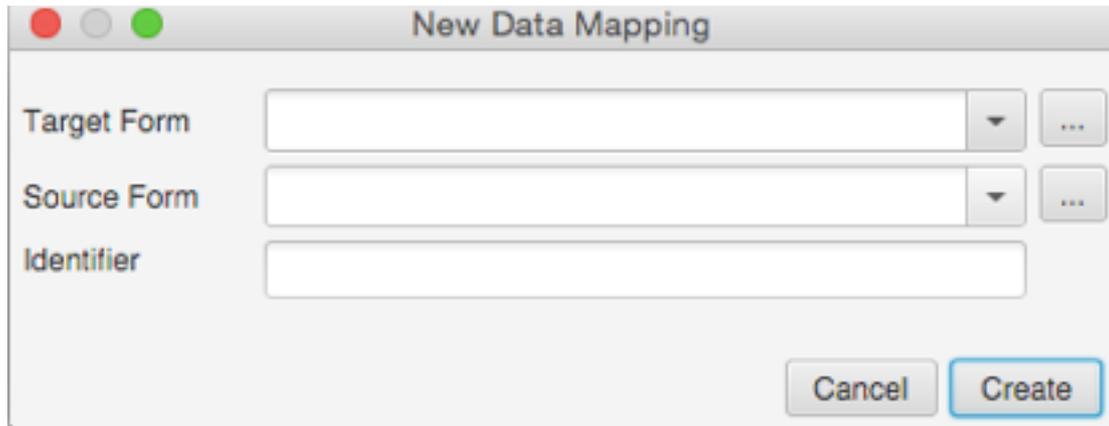
Enter the new name for the project, then optionally change the **Project Type** to Template Project. (See separate section on Template Projects above). After renaming the project, the name of the project folder is updated and the project folder structure is retained.

## 11. Entering Project Notes

To enter notes about a particular project, select the **Notes tab** on the **Project Properties** screen when you create or open the project. Alternatively if the project has already been created/opened, select **Properties** from the **Project menu**, then select the **Notes tab**.

## 12. Creating a New Mapping

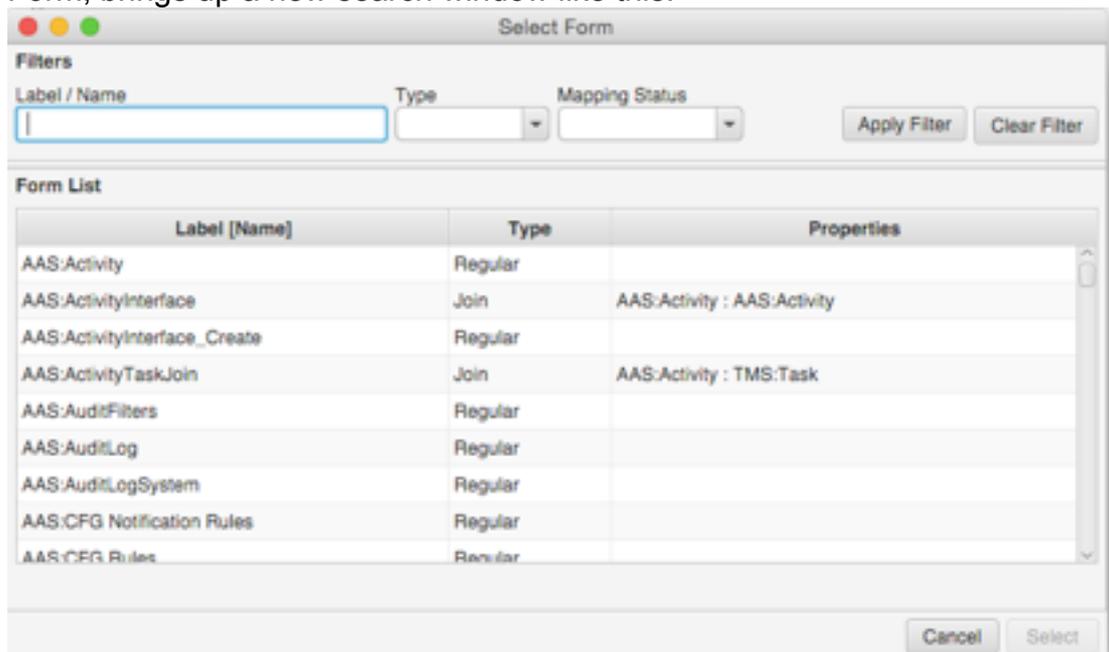
To create a new mapping for an existing project, select **New Mapping** from the **Project** menu or right-click on the project name in the left pane and select **New Mapping**. A new mapping window is then presented like this:



Target and source forms can be selected in two ways:

- using the menus against the form name fields to select from a full list of forms;
- using the buttons to the right of the form fields to search for the form name using full form details and results filtering.

For example, clicking on the button to the right of the Target Form or Source Form, brings up a new search window like this:



Label [Name]	Type	Properties
AAS:Activity	Regular	
AAS:ActivityInterface	Join	AAS:Activity : AAS:Activity
AAS:ActivityInterface_Create	Regular	
AAS:ActivityTaskJoin	Join	AAS:Activity : TMS:Task
AAS:AuditFilters	Regular	
AAS:AuditLog	Regular	
AAS:AuditLogSystem	Regular	
AAS:CFG Notification Rules	Regular	
AAS:CFG Rules	Regular	

By default, a full list of forms sorted by Label / Name is displayed with their form types and properties.

To sort by Form Type instead of by Label, click on the top of the Type column.

To restrict (filter) the list of forms, you can use one or more of the filters at the top of the window.

To restrict the form list by **Label/Name**, enter part or all of the form name then click on the **Apply Filter** button. Only those forms that start with matching label/name text are listed.

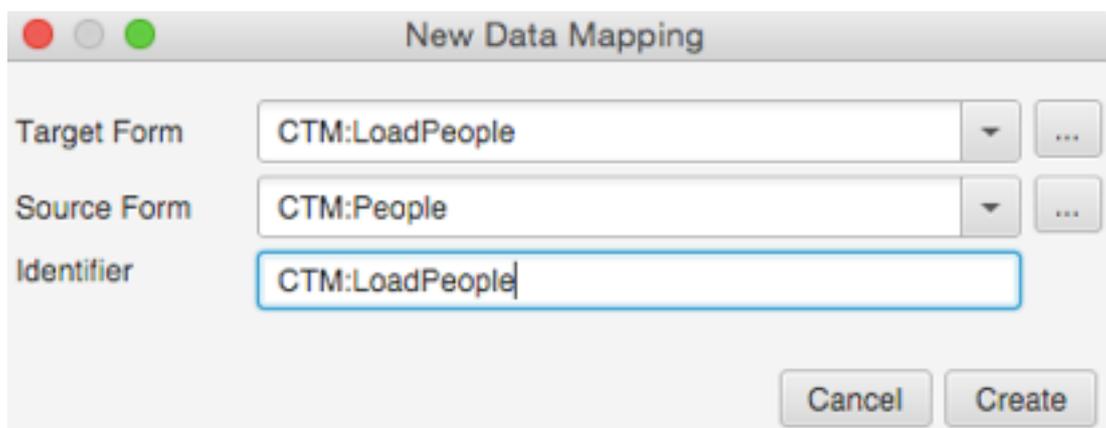
To restrict the form list to a particular **Form Type** (e.g. Regular, Dialog, Join, View or Vendor), select the corresponding type from the Type field and click on the **Apply Filter** button. Only those forms with matching Type are listed.

To restrict the form list to a particular mapping status (mapped or unmapped), select the corresponding mapping status from the Mapping Status field and click on the **Apply Filter** button. Only those forms with matching mapping status are listed.

To restrict the form list to any combination of the above, simply select values from one or more of the filter fields and click on **Apply Filter** button.

To clear an existing filter, click on the **Clear Filter** button.

Once you have identified the form that you want, click on the corresponding row in the table and then click on the **Select** button. The selected form is then displayed as the Source or Target Form for the new data mapping.

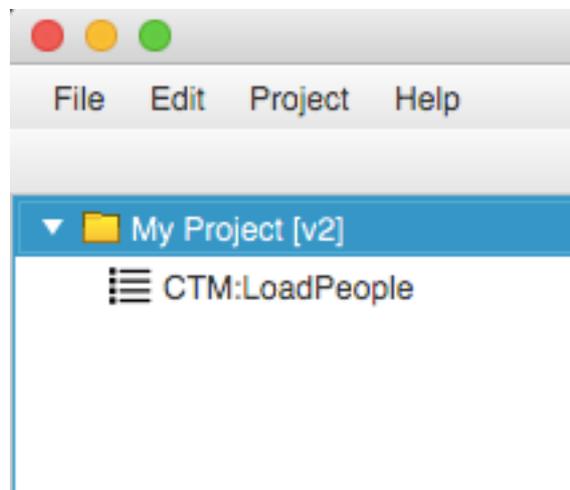


The screenshot shows a window titled "New Data Mapping". It contains three input fields: "Target Form" (CTM:LoadPeople), "Source Form" (CTM:People), and "Identifier" (CTM:LoadPeople). Each field has a dropdown arrow and a three-dot menu icon. At the bottom right, there are "Cancel" and "Create" buttons.

The **Identifier** field is used as a reference for the Form mapping. A default value is automatically provided based on the Target Form Name. You can change the Identifier but it must be unique within this project.

Once both the source and target forms have been selected (with a unique identifier), click on the **Create** button to create the new mapping.

After creation, the mapping becomes part of the project definition and is stored in the project tree in the Navigation Pane under the name of the mapping project. To view the mapping expand the project tree in the left pane by clicking on the arrow next to the project name:



Note that the data mapping in the project tree is given the name of the Mapping **Identifier** (CTM:LoadPeople in this case) for reference purposes. As more mappings are created, they are added to this tree in the order that they are created. The mapping order can be changed if required (see Managing the Mapping List below).

### ***Mapping to Virtual Tables***

Virtual tables are used to run a script on the ServiceNow transform map to perform a migration that cannot be done through a standard table mapping.

When using virtual tables, only the import set migration option is allowed and they can only be used for ServiceNow->ServiceNow migrations. The script itself determines if business rules are run and whether to create or update when the target entry exists or not.

The following virtual tables are provided as targets in the New Mapping List:

```
#!JOURNAL ENTRY MIGRATOR!#
#!WF ACTIVITY VARIABLE VALUE MIGRATOR!#
#!VARIABLE VALUE MIGRATOR!#
```

The **Journal Entry Migrator** virtual table is used to run a script using input from a source Journal Entry table so that the entries are created in the correct order and with the correct usernames and timestamp on the journal entries for comments and work notes.

When mapping to this virtual table the following fields should be set:

Target Field	Mapped Value
Parent ID	the sys id of the parent record (use a reference mapping of the parent record)
Parent Table	the name of the parent table (e.g 'incident', or can map to the 'name' source field)
Field Name	map to the 'element' field
Entry Text	map to the 'value' field
Created On	map to the sys_created_on field
Created By	map to the sys_created_by field
Add Audit Entry	True' (if the journal entries are displayed in an activity field you need audit records created as well)

For example if you want to migrate Journal Entries for the Incident table, first create a mapping from Incident to Incident; ensure that the created field is mapped and that the migration method is set to Import Set (Scripted). This is important as it needs to match the create date on the original incident for the journal entries to be displayed correctly.

Finally create a mapping from the Journal Entry table to the **Journal Entry Migrator** Virtual table using the values defined above.

The above mappings are provided in the **Incident and Problem migration template** for ServiceNow->ServiceNow migrations.

The **Workflow Activity Variable Value Migrator** virtual table is used to run a script to migrate workflow activity variable values from the source to the target instance. It migrates from the source **sys\_variable\_value** table to create the corresponding variable values for the target workflow activity table. Note that

the workflow activity that the variables relate to should be migrated prior to this migration.

When mapping to this virtual table the following fields should be set:

Target Field	Mapped Value
Model Name	the name of the workflow activity definition (use a lookup to retrieve this from the wf_activity_definition table);
Parent ID	the SysID of the target workflow activity definition record (use a reference mapping to retrieve this)
Activity Variable Name	the name of the activity variable (use a lookup to retrieve the element field from the wf_activity_variable table)
Parent Table	map to the 'table' field
Value	map to the 'value' field
Order	map to the 'order' field

An example of this mapping is provided in the Workflow Definitions template for ServiceNow -> ServiceNow migrations.

The **Variable Value Migrator** virtual table is a more general version of the workflow variable value migrator. It can be used to migrate variable values that belong to any parent table. The source table should be the `sys_variable_value` table. Note that the parent table that the variables relate to must be migrated prior to this migration.

When mapping to this virtual table the following fields should be set:

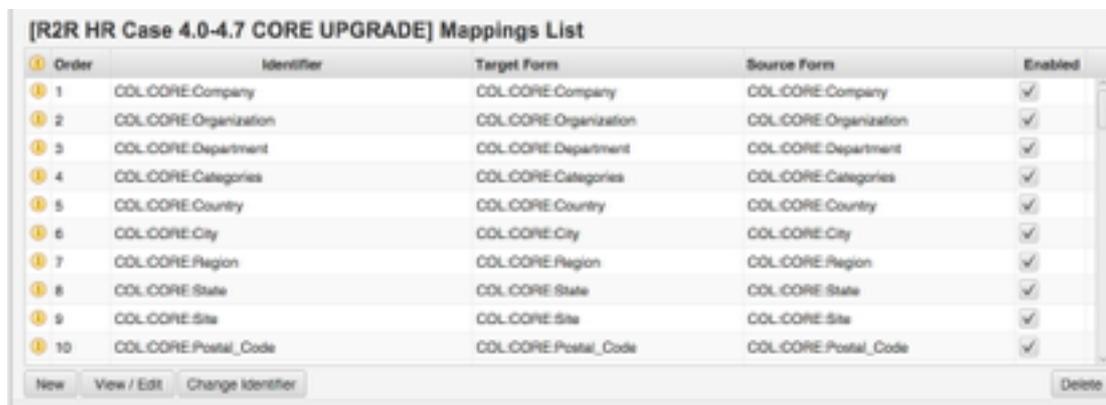
Target Field	Mapped Value
Parent ID	the SysID of the target parent record (use a reference mapping to retrieve this)
Variable ID	the name of the variable (use a lookup to retrieve this from the parent table);
Parent Table	map to the 'table' field
Value	map to the 'value' field
Order	map to the 'order' field

### 13. Managing the Mappings List

Once you have created one or more mappings you can view of the list of mappings in two ways:

- a) by selecting View Mappings List from the Project Menu;
- b) by right-clicking on the project name in the Navigation pane and selecting View Mappings List;

The mappings list for the current project is then displayed in the right pane like this:



Order	Identifier	Target Form	Source Form	Enabled
1	CDL.CORE.Company	CDL.CORE.Company	CDL.CORE.Company	✓
2	CDL.CORE.Organization	CDL.CORE.Organization	CDL.CORE.Organization	✓
3	CDL.CORE.Department	CDL.CORE.Department	CDL.CORE.Department	✓
4	CDL.CORE.Categories	CDL.CORE.Categories	CDL.CORE.Categories	✓
5	CDL.CORE.Country	CDL.CORE.Country	CDL.CORE.Country	✓
6	CDL.CORE.City	CDL.CORE.City	CDL.CORE.City	✓
7	CDL.CORE.Region	CDL.CORE.Region	CDL.CORE.Region	✓
8	CDL.CORE.State	CDL.CORE.State	CDL.CORE.State	✓
9	CDL.CORE.Site	CDL.CORE.Site	CDL.CORE.Site	✓
10	CDL.CORE.Postal_Code	CDL.CORE.Postal_Code	CDL.CORE.Postal_Code	✓

The first column in the Form Mapping List is reserved for highlighting differences between field definitions on source and target forms resulting from the Difference Report. See Reporting section for more information on how to run this report.

#### ***Creating a New Form Mapping from the Mappings List***

In addition to the method of creating a New Form Mapping described above, you can also create new form mappings using the **New** button at the bottom of the Mappings List window. New form mappings automatically get added to the bottom of the list.

#### ***Changing the Order of the Mappings List***

To change the order of any mappings in the list, select the corresponding row then click on the arrows on the right of the Mapping List window to move the mapping up or down in the list. Moving a mapping in this way will automatically update the order number on the left of the window.

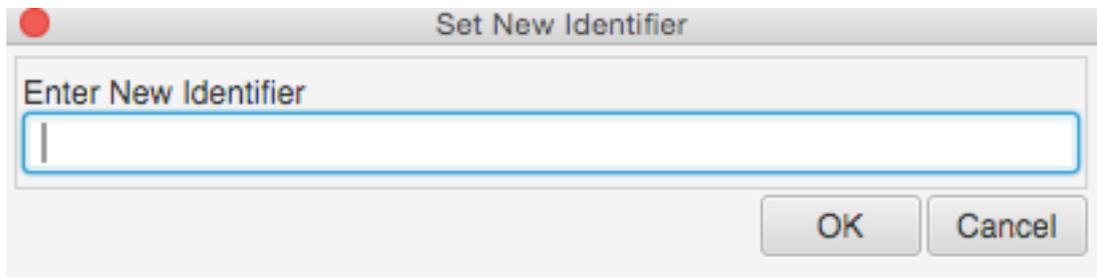
#### ***Deleting a Form Mapping from the Mappings List.***

In order to delete a mapping from the mapping list, select the corresponding row, then click on the **Delete** button at the bottom right of the Mapping List window.

Whenever the Mapping List is updated, the project tree in the Navigation pane is also updated to reflect the changes made.

### ***Changing the Mapping Identifier***

To change the mapping Identifier, select the corresponding Form Mapping from the list then click on the **Change Identifier** button at the bottom of the Form Mapping List.



The image shows a dialog box titled "Set New Identifier". It has a text input field with the placeholder text "Enter New Identifier" and a vertical cursor. Below the input field are two buttons: "OK" and "Cancel".

Enter a new Identifier for this mapping then click on OK to save. Note that the Identifier must be unique within the current project.

### ***Enabling and Disabling Form Mappings***

All form mappings in the mapping list are automatically enabled by default. To disable a form mapping, click on the checkbox in the **Enabled** column for the corresponding form mapping to de-select that form mapping. The form mapping is then greyed-out in the mapping list (and in the navigation pane), and will be excluded from the migration.

The same result can be achieved by de-selecting the Enabled checkbox in the Options tab for the corresponding form mapping, or by right-clicking on the form mapping within the navigation pane and selecting Disable/Enable.

To Enable/Disable more than one form mapping at once, select multiple form mapping rows using the Shift Key, then click on the Enable or Disable buttons on the bottom right of the Mapping List.

On execution, Form Mappings are skipped if disabled, however if a reference mapping refers to a disabled Form Mapping, the ID mapping cache for the disabled Form Mapping is still built, so that the reference can be obtained.

### ***Handling Invalid Form Mappings***

If after opening an existing project, any of the target forms/tables do not exist, the corresponding form/table names are highlighted in red like this:

24	Group Role	Group Role	Group Role	✓
25	Skill	omn_skill	Skill	✓
26	Contained Skills	omn_skill_contains	Contained Skills	✓
27	User Skill	sys_user_has_skill	User Skill	✓
28	Update User Skill	sys_user_has_skill	User Skill	✓
29	Stockroom Type	Stockroom Type	Stockroom Type	✓
30	Stockroom	Stockroom	Stockroom	✓

To remove these mappings, follow the instruction in the section above - Deleting a form mapping from the list.

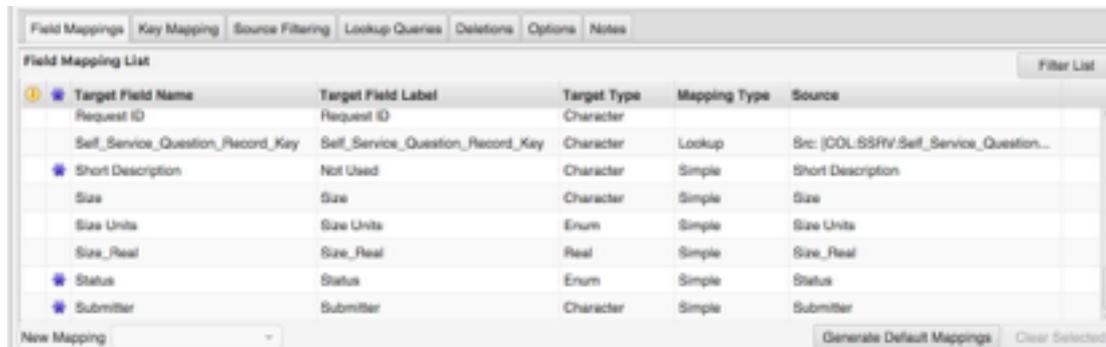
## 14. Defining Field Mappings

In order to view or edit the field mappings for a given Form Mapping you can either:

- Double-click on the corresponding mapping in the Project Tree in the left pane or
- Double-click on the corresponding row in the Mapping List window in the right pane or
- Click on the View/Edit button at the bottom of the Mappings List.

If this is the first time that you have opened this mapping there may be a short delay of a few seconds while the field definitions are cached. A message is displayed in the left corner of the screen to indicate this.

A separate window is then displayed in the right pane (see below) which allows field mappings to be defined or updated. A full list of all fields from the target form are displayed by default, sorted by the Target Field Name. The Target Field Label and Target Field Type are also displayed. All required fields are displayed using a star symbol in the second column.



Target Field Name	Target Field Label	Target Type	Mapping Type	Source
Request ID	Request ID	Character		
Self_Service_Question_Record_Key	Self_Service_Question_Record_Key	Character	Lookup	Src: JCOL55FV Self_Service_Question...
Short Description	Not Used	Character	Simple	Short Description
Size	Size	Character	Simple	Size
Size Units	Size Units	Enum	Simple	Size Units
Size_Real	Size_Real	Real	Simple	Size_Real
Status	Status	Enum	Simple	Status
Submitter	Submitter	Character	Simple	Submitter

If a field has already been mapped to a field on the source form, then the Mapping Type and Source field are also displayed in the list.

To change the sort order of the field list, click on the corresponding column heading to sort by that column. To reverse the sort order, click on the column heading again (the fields are then listed in reverse alphabetical order).

The first column in the Field Mapping List is reserved for highlighting field differences between source and target forms resulting from the Difference Report. (see Reporting section for more information on how to run this report).

To filter the list of fields in the Field Mapping List, click on the **Filter List** button on the top right of the window. A new window is displayed which allows the user to select one of more filters from the following:

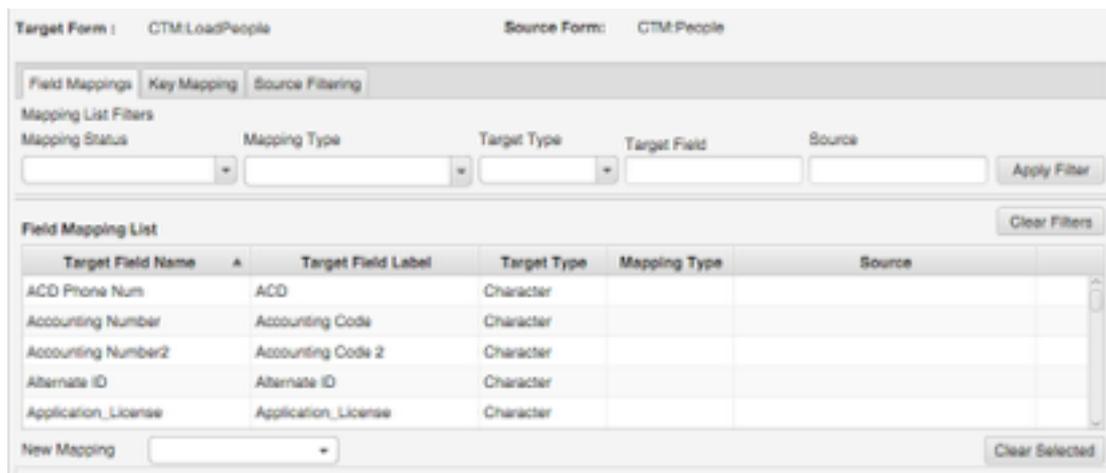
**Mapping Status** (All Unmapped, All Mapped, All Mandatory, Mandatory Mapped, Mandatory Unmapped);

**Mapping Type** (Simple, Assignment, Value Match, Reference, Lookup, ID List, ID Replacement)

**Target Type** (Integer, Real, Character, Diary, Enum, Timestamp, Decimal, Attachment, Currency, Date, Time)

**Target Field** (Free text)

**Source** (Free text)



Target Field Name	Target Field Label	Target Type	Mapping Type	Source
ACD Phone Num	ACD	Character		
Accounting Number	Accounting Code	Character		
Accounting Number2	Accounting Code 2	Character		
Alternate ID	Alternate ID	Character		
Application_License	Application_License	Character		

To apply a filter, enter a value in one or more of the filters above and click on the **Apply Filter** button. The resulting list of fields is displayed below based on the values entered.

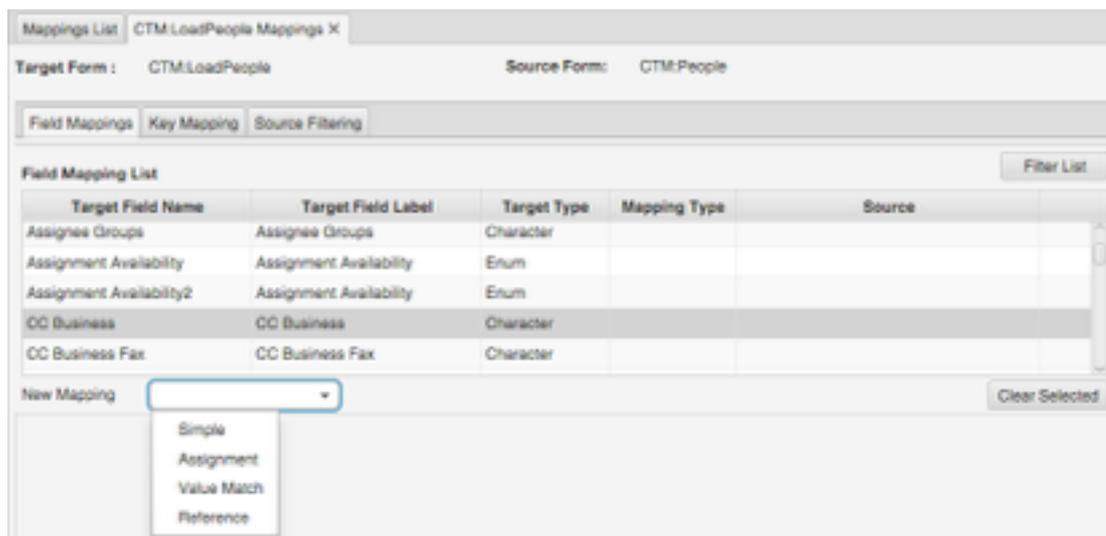
To clear the current filter, click on the **Clear Filters** button. The filter fields pane then disappears and the original unfiltered field list is displayed.

There are seven different types of field mapping that can be created (Simple, Assignment, Value, Reference, Lookup, ID List and ID Replacement). These are described in more detail in the following sections.

### Creating a new Simple Field Mapping

Simple field mappings are used to map a field from the source form to a field on the target form without any manipulation of the field value.

To create a Simple Field Mapping, first select the Target Field from the list of fields in the Field Mapping List, then select **Simple** from the New Mapping field below.

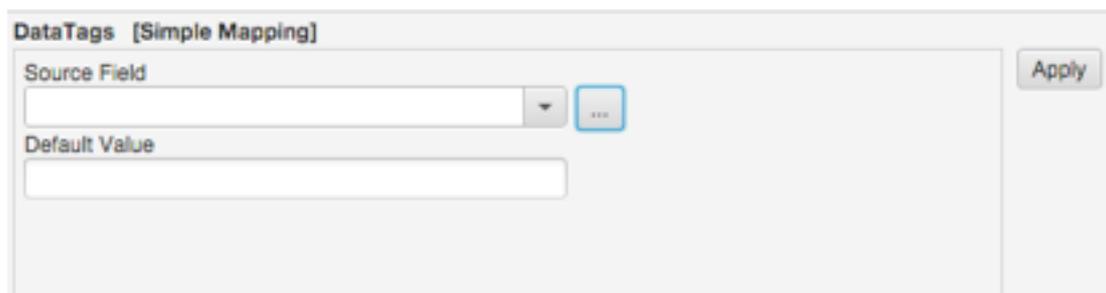


The screenshot shows the 'Field Mapping List' interface. At the top, it indicates 'Target Form: CTM:LoadPeople' and 'Source Form: CTM:People'. Below this, there are tabs for 'Field Mappings', 'Key Mapping', and 'Source Filtering'. The 'Field Mapping List' table contains the following data:

Target Field Name	Target Field Label	Target Type	Mapping Type	Source
Assignee Groups	Assignee Groups	Character		
Assignment Availability	Assignment Availability	Enum		
Assignment Availability2	Assignment Availability	Enum		
CC Business	CC Business	Character		
CC Business Fax	CC Business Fax	Character		

Below the table, the 'New Mapping' dropdown menu is open, showing the following options: Simple, Assignment, Value Match, and Reference. The 'Simple' option is highlighted.

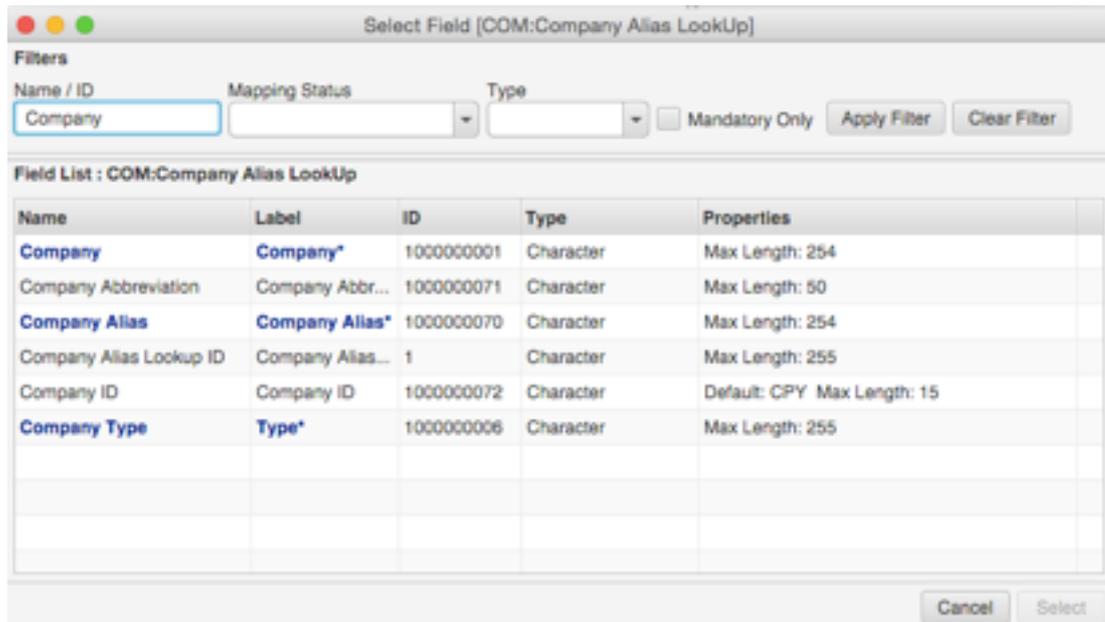
When you select Simple from the New Mapping field, a new screen is presented with the name of the target field displayed at the top in bold. To map a field from the source form, just select from the menu on the Source Field and click the Apply button.



The screenshot shows the 'DataTags [Simple Mapping]' interface. At the top, it displays 'DataTags [Simple Mapping]'. Below this, there is a 'Source Field' dropdown menu with a list of fields. To the right of the dropdown menu is an 'Apply' button. Below the 'Source Field' dropdown menu, there is a 'Default Value' input field.

If necessary, you can also define a **Default value** to use in the event that the source field value is null.

If its not clear which Source Field value to select from the menu, click on the button to the right of the Source Field to reveal a more comprehensive list of fields with filtering options like this:



Filters

Name / ID:  Mapping Status:  Type:   Mandatory Only

Field List : COM:Company Alias LookUp

Name	Label	ID	Type	Properties
Company	Company*	1000000001	Character	Max Length: 254
Company Abbreviation	Company Abbr...	1000000071	Character	Max Length: 50
Company Alias	Company Alias*	1000000070	Character	Max Length: 254
Company Alias Lookup ID	Company Alias...	1	Character	Max Length: 255
Company ID	Company ID	1000000072	Character	Default: CPY Max Length: 15
Company Type	Type*	1000000006	Character	Max Length: 255

Comprehensive List of Source Fields with Filtering

To restrict the list of fields, enter a value in one or more of these Filters:

**Name/ID** (Free text)

**Mapping Status** (Mapped / Unmapped)

**Type** (Integer, Real, Character, Diary, Enum, Timestamp, Decimal, Attachment, Currency, Date, Time)

**Mandatory** (Checkbox)

Then click on the **Apply Filter** button

To clear the filter and display the full list of fields on the Source form, click on the **Clear Filter** button.

Once you have identified the field you want to map, select the corresponding row in the table and click on the **Select** button. The original mapping screen is then displayed with this value populated in the Source Field. Click on the **Apply** button to apply the mapping.

Once the mapping is applied, it appears in the Mapping List table with the Mapping Type (Simple) and the Source Field value.

### ***Creating a new Assignment Field Mapping***

Assignment Field Mappings are used whenever any manipulation or conversion of the Source field value is required. It can also be used to combine one or more Source field values or to set or combine literal values.

To create a new Assignment Field Mapping, first select the Target Field from the list of fields in the Field Mapping List, then select **Assignment** from the New Mapping field below. A new screen is then presented with the name of the target field displayed at the top in bold:

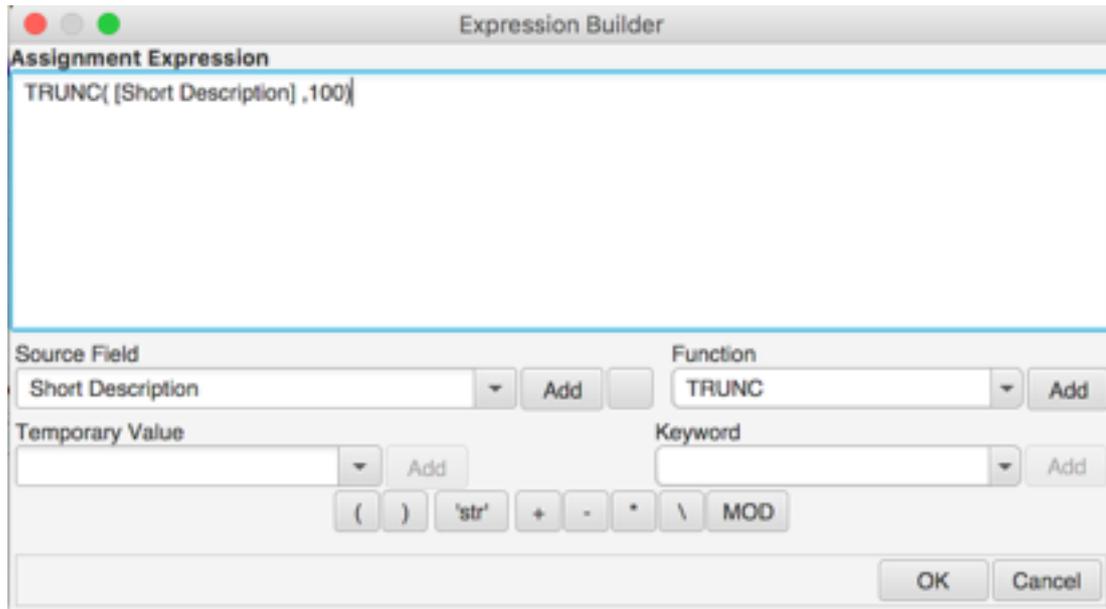


If there is an error during execution of the migration for this mapping, you can define how the error should be handled using the **On Error Action** field. The options available are:

On Error Action	Description
Set Null:	Sets the target field value to Null;
Skip Record:	No target values are set for this record, skips to the next record;
Log Error:	No target value is set but an error is recorded in the log.
Set Default:	The Default value is used to set the target field instead.

If Set Default is selected then the Default value must be provided in the field next to the On Error Action field.

The source field value(s) is/are converted to the target field value using an **Expression Builder**. This allows you to define an expression that determines how the source value(s) should be converted. Click on the **Expression Builder button** to launch the expression builder screen:



To build an expression, first select the Source field using the menu on the Source Field, then click the **Add button** to add it to the Expression. If its not clear which source field to choose, click on the button to the right of the Add button to bring up the comprehensive field list with filtering options. (Refer to the section above on Creating a Simple Field Mapping for more details on how to use the comprehensive field list).

You can use any combination of the following **Keywords** when constructing your expression by selecting them from the Keyword field and clicking the Add button on the right:

NULL: Converts to the NULL string during execution;

DATE: Converts to the current date during execution;

TIMESTAMP: Converts to the current date and time during execution;

TIME: Converts to the current time during execution;

Use the bracket buttons to group different parts of the expression together to avoid any ambiguity.

Use the 'str' button to add a literal value to the expression like '000' or 'COM:' There are five operators that you can use to combine or change the value of an expression as follows:

Operator	Description
+	Used to add two strings together OR to add two integers/decimals/real values together OR to add an offset (in days) to a date value OR add an offset (in seconds) to a date-time or time value.
-	Used to subtract one integer/decimal/real value from another OR to subtract an offset (in days) from a date value OR subtract an offset (in seconds) from a date-time or time value.
*	Used to multiply two integer/decimal/real values together
\	Used to divide one integer/decimal/real value by another
MOD	Used to calculate the remainder when one integer is divided by another.

In addition there are a number of **Functions** that can be used to manipulate Source field values. These can be selected using the Function menu and added to the expression using the **Add button** to the right. *A detailed summary of the Functions available with examples is provided in Appendix A.*

Some example expressions (without functions) are provided here:

#### Example 1:

[Company] + '(' + [Company Abbreviation] + ')'

Adds two Source Field values together, the second of which is enclosed in brackets. Note that the source field names are enclosed by square brackets and literal values are enclosed with single quotes.

#### Example 2:

(TIMESTAMP + ((60 \* 60) \* 24))

Sets the target field to the current time plus 24 hours.

#### Example 3:

'Reserved'

Sets the target field to the literal value 'Reserved'.

You can also supplement your expression with temporary variables. Note that temporary variables must have been defined and mapped in advance. For more information on creating and using temporary variables see the sub-section on temporary variables towards the end of this section.

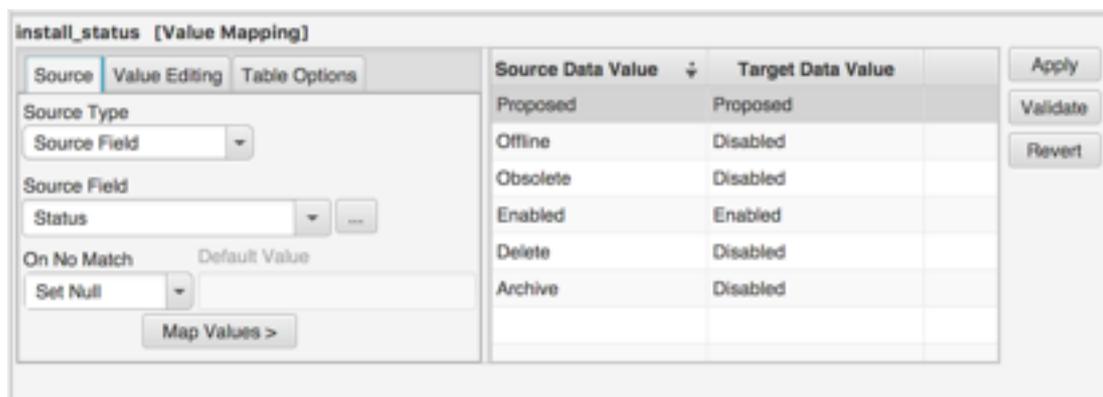
When you have completed entering your expression, use the **Validate button** on the right to check that the expression is valid. If necessary you can use the **Revert button** to return to the last expression entered before you validated or applied any changes.

Once the expression is validated, use the **Apply button** to apply and save the expression which will then be used to set the target field value during execution.

### **Creating a new Value Match Field Mapping**

Value Match Field Mappings should be used whenever the selected source field has a distinct set of values that need to be mapped to different values on the target.

To create a new Value Match Field Mapping, first select the Target Field from the list of fields in the Field Mapping List, then select **Value Match** from the New Mapping field below. A new screen is then presented with the name of the target field displayed at the top in bold:



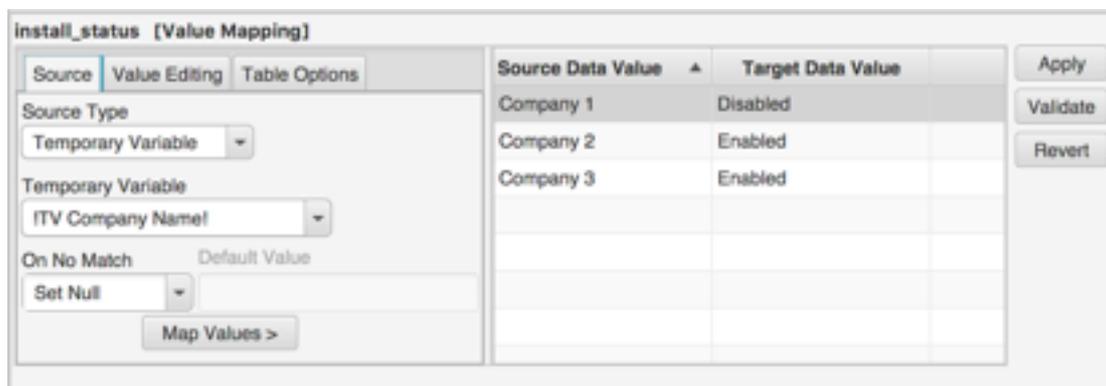
Source Data Value	Target Data Value
Proposed	Proposed
Offline	Disabled
Obsolete	Disabled
Enabled	Enabled
Delete	Disabled
Archive	Disabled

Firstly select the source type (either **Source Field** or **Temporary variable**). If you select Source Field the select the field from the Source Field menu below. If its not clear which source field to choose, click on the button to the right of the Source Field to bring up the comprehensive field list with filtering

options. (Refer to the section above on Creating a Simple Field Mapping for more details on how to use the comprehensive field list).

Once the Source field is selected, if it is an enumerated type, the list of valid values for this field are displayed in the table on the right (in the column called **Source Display Values**). If the source field is not an enumerated type then you can enter the values that you want to map as free text.

If you select **Temporary Variable** for the **Source Type** then you must select one of the temporary variables that you have defined for this Form Mapping, (see separate section on **Creating Temporary Variables**).



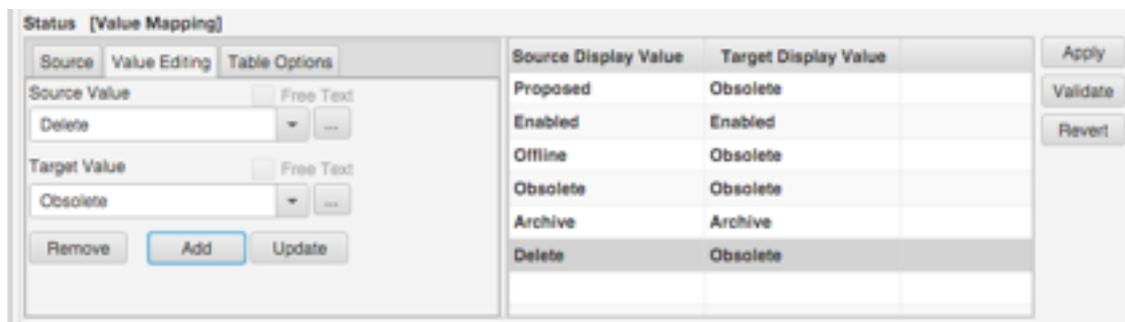
Source Data Value	Target Data Value
Company 1	Disabled
Company 2	Enabled
Company 3	Enabled

In the event that the Source Field value or Temporary Variable value does not match any of the values that you have defined for this mapping, then you can use the '**On No Match**' field to define the behaviour in this case. The options available for the 'On No Match' field are as follows:

On No Match Action	Description
Set Null	Sets the target field value to Null;
Skip Record	No target values are set for this record, skips to the next record;
Log Error	No target value is set but an error is recorded in the log.
Set Default	The Default value is used to set the target field instead.
Use Source	The target field is set to the value of the source field.

Next, click on the **Map Fields button** to navigate to the **Value Editing** tab. This tab allows you to define the target values that you want to map to for each of the source values that the source field or temporary variable can take.

In this example we have selected the Status field which has six pre-defined values, (Proposed, Enabled, Offline, Obsolete, Archive, Delete). For each value, enter a corresponding target value using the Target Field and use the **Add button** to add to the table.



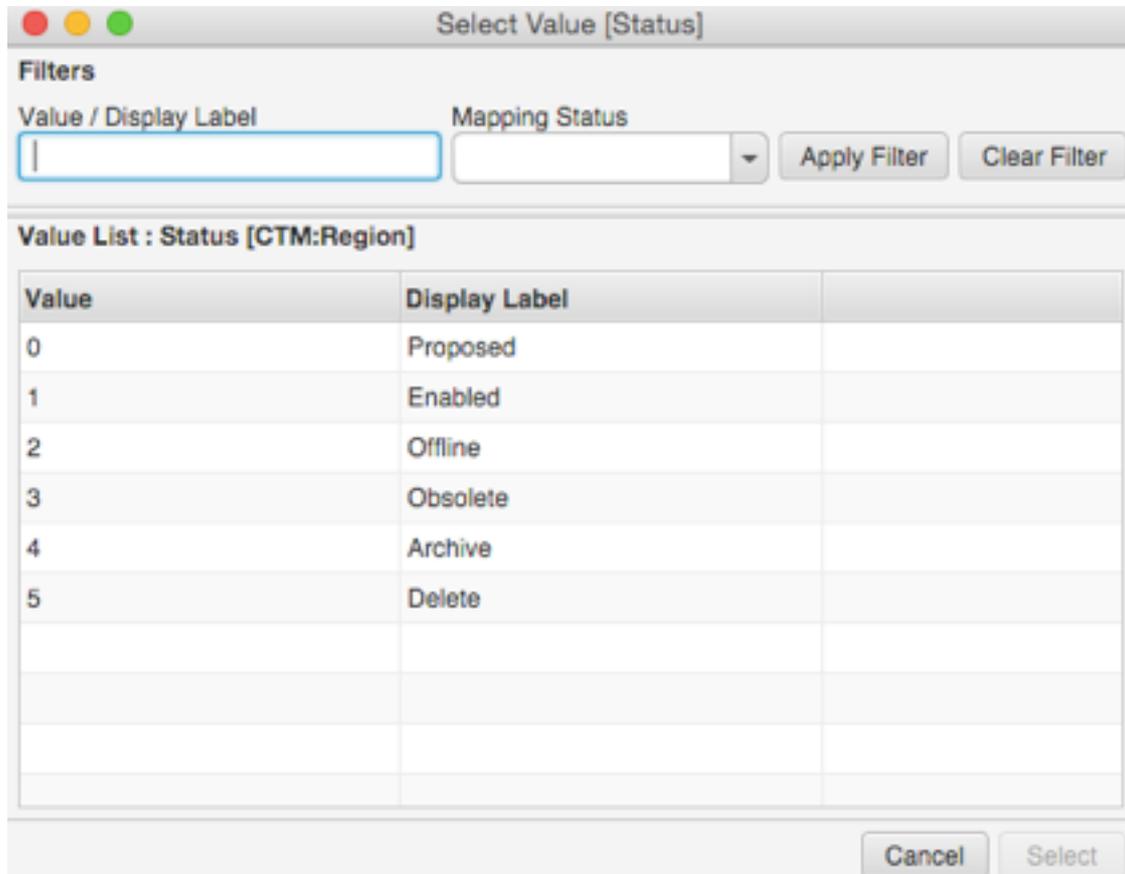
Source Display Value	Target Display Value
Proposed	Obsolete
Enabled	Enabled
Offline	Obsolete
Obsolete	Obsolete
Archive	Archive
Delete	Obsolete

The target values can either be the same as or different to the source values. If you make a mistake, you can use the **Update** or **Remove** buttons to modify the table mappings.

If there are a lot of Source or Target values and you need to search for a specific value to use, click on the button to the right of the Source or Target value menu to bring up the Search window:

To restrict the list of values displayed in this table, enter a Value/Display Label and/or a Mapping Status (Mapped or Unmapped), then click on the **Apply Filter** button. To return to the full list of field values, click on the **Clear Filter** button. Once you have identified which value to use, select the corresponding row from the table and click on the **Select** button. This will then return you to the main value mapping screen.

If you want to map a character field that is not enumerated, you can simply enter the free text values instead. In the example below, the field values both source and target are entered as free text and added to the table using the **Add button**.



**Select Value [Status]**

**Filters**

Value / Display Label:

Mapping Status:

Apply Filter Clear Filter

**Value List : Status [CTM:Region]**

Value	Display Label
0	Proposed
1	Enabled
2	Offline
3	Obsolete
4	Archive
5	Delete

Cancel Select



**Short Description [Value Mapping]**

Source Value:   Free Text

Target Value:   Free Text

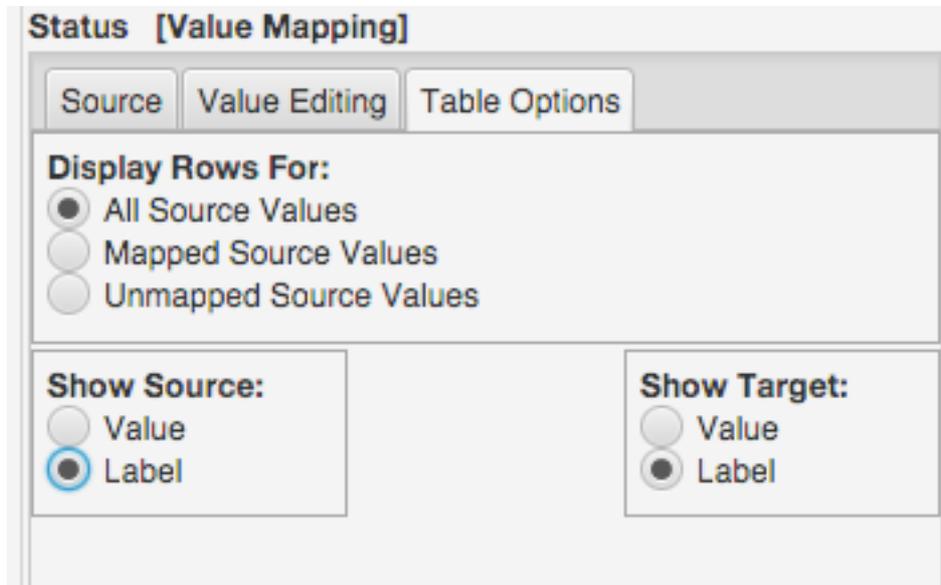
Remove Add Update

Source Data Value	Target Data Value
Asia	ASIA
China	ASIA
Africa	EMEA
Europe	EMEA

Apply Validate Revert

Once you have finished setting up your field value mappings, use the **Validate button** on the right of the table to check that the values provided are all valid without saving the changes. The system will identify any invalid values (for enumerated fields) and give you the opportunity to selectively remove them. Once you are finished, use the **Apply button** to apply and save the field value mappings. To revert to the previous set of value mappings for this field use the **Revert button**.

To restrict the list of values displayed in the mappings table, click on the **Table Options** tab.



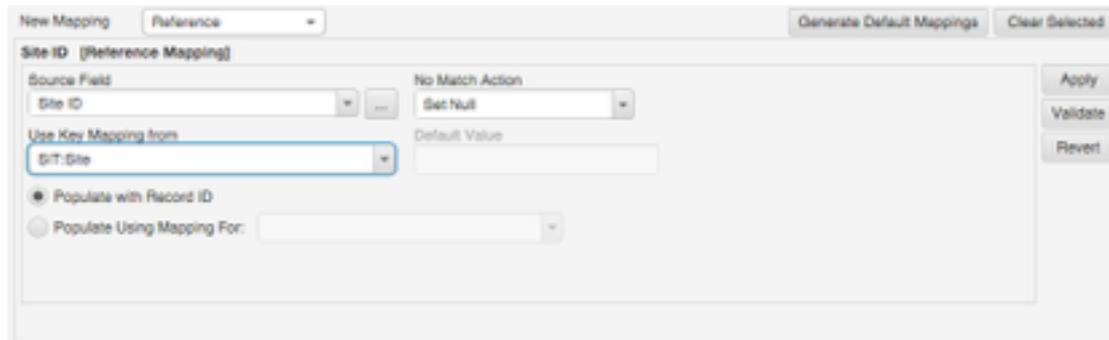
The table options can be changed if the source or target value is an enumerated field type. By default all rows in the mappings table are displayed. To restrict to just mapped or just unmapped values, select the corresponding **Display Rows For** option.

For enumerated fields, you can choose to display either the Display Label or the Value for that field. For example, the Status field might have a Display Label of 'Proposed' with a corresponding stored Value of '0'. After changing the **Show Source** or **Show Target** settings, the Field Mappings table is automatically updated to show the field values using the specified format.

### ***Creating a new Reference Field Mapping***

Reference Field Mappings should be used whenever the Target Field needs to be populated from the primary key field used in a previous mapping. For example, if you are creating a mapping for the **CTM:People** form, the **Site-ID** field should be populated from the Site-ID used in a previous mapping for the **Site** form.

To create a new Reference Field Mapping, first select the Target Field from the list of fields in the Field Mapping List, then select **Reference** from the New Mapping field below. A new screen is then presented with the name of the target field displayed at the top in bold:



Select the **Source Field** value from the drop-down list or use the button to the right of the Source Field menu to search for the Source Field using the comprehensive field list with filtering options. (Refer to the section above on Creating a Simple Field Mapping for more details on how to use the comprehensive field list). In the above example we have selected the **Site-ID** from the Source form for the current mapping.

Next, select the key mapping using the menu on the '**Use Key Mapping from**' field. This provides a list of all previous mappings (with lower execution order than the current mapping). Using the above example, the key mapping would be a mapping with **Identifier SIT:Site**.

By default, the record ID from the Target record is returned (in this case the Site-ID), where the field value on the Source record matches the Source field value selected above.

If you want to return a different field from the Target record, use the option **Populate Using Mapping For** field, then select the field that you want from the drop-down list.

If there is no matching value you can define what action to take using the **No Match Action field**. The options available are summarised in the table below.

If **Set Default** is selected then the default value must be provided in the field below the **No Match Action** field.

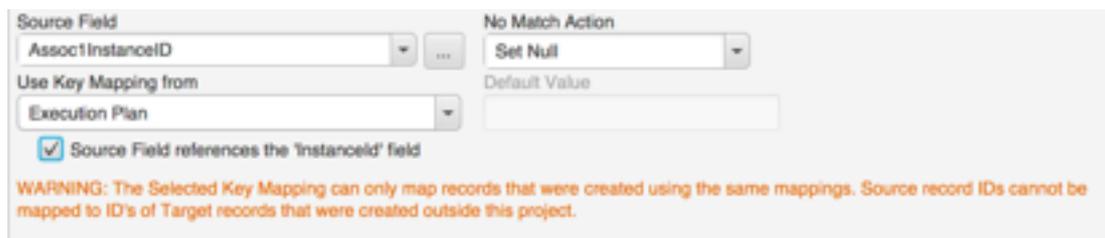
No Match Action	Description
Set Null:	Sets the target field value to Null;
Skip Record:	No target values are set for this record, skips to the next record;
Log Error:	No target value is set but an error is recorded in the log.

No Match Action	Description
Set Default:	The Default value is used to set the target field instead.

Similarly, you can control the behaviour if multiple matches are found using the **Multiple Match Action Field**. These are the same as for the No Match Action field with the additional option of **'Use First'**. If this option is selected then the first matching record is used to set the target value.

Once you have selected the mapping, click on the **Validate button** to validate the selection without saving. Then click on the **Apply button** to apply and save your changes. If necessary, you can use the **Revert button** to revert back to the previous state of this mapping before the last validation.

If the Key Mapping uses **'Server Defined Record ID'** and the option to support use of Instance ID Reference has been selected then you may select the option **'Source Field references the "InstanceID" field'** as shown below.



In this case, the Source Field selected should hold the value of the Instance ID which is then used as a reference to identify the record in the form selected in the 'Use Key Mapping from' field.

### Notes on use of Key Mapping in Reference Field Mappings

1. If the Key mapping uses **'Server Defined Record ID'**, no match will be found UNLESS a source record with the same ID that is referenced was previously successfully migrated (either in this execution or in an earlier execution)
2. If the Key Mapping uses **'Selected Key Mappings'** no match will be found unless all target values match the translated source values. Note that the source field value is not mapped directly, it is the value derived from the source mapping that is used.

**Example:** If you use a value mapping for the status field [New->Assigned] as the key mapping, the target entry with value 'Assigned' will match with the source entry 'New'.

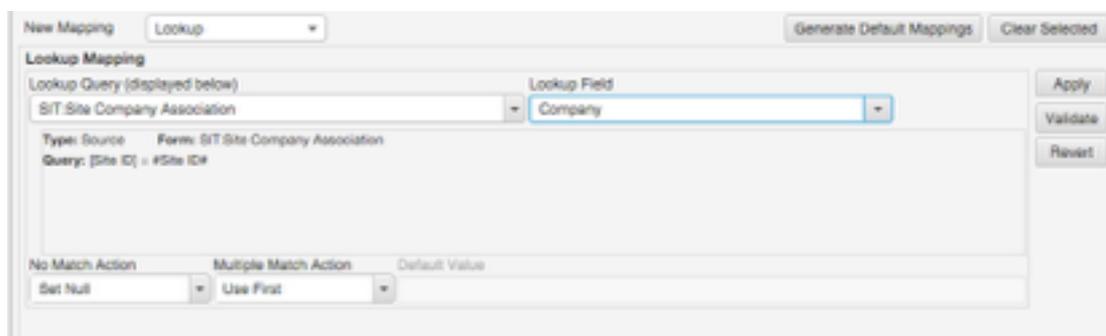
3. Inclusion of reference field mappings in key mappings is not recommended.
4. In most cases, a reference mapping using a Key Mapping defined with 'Selected Key Mappings' will be able to map a source id even if the source record itself was not migrated previously in execution by looking up the source data values and generating an appropriate query to look up the target id. However this will NOT be the case when either of the following applies:
  1. The selected key mappings reference a temporary field value in an assignment expression.
  2. The selected key mappings include a lookup mapping.

In this case, if the source id being mapped was NOT migrated earlier in the execution of this project then no attempt will be made to identify a target id and the 'No Match' action will be applied.

### ***Creating a new Lookup Field Mapping***

Lookup Field Mappings should be used whenever the field value that you want to migrate is not on the Source Form. The Lookup Query is used to select a value from a different form either on the Source or Target server.

To create a new Lookup Mapping, first select the Target Field from the list of fields in the Field Mapping List, then select **Lookup** from the New Mapping field below. A new screen is then presented to allow the Lookup Mapping to be completed:



**Important Note:** Before you can create a new Lookup Mapping you must first create a **Lookup Query** using the Lookup Queries tab on the Form Mapping. For more information on creating Lookup Queries, see Chapter 17.

First select the **Lookup Query Identifier** using the drop-down menu, then select the **Lookup Field** from the corresponding drop-down menu (based on the Lookup Query Form). After selecting the Lookup Query Identifier, the details of the Query are displayed underneath in read-only format.

If no matching records are returned by the Lookup Query then you can define what action to take using the **No Match Action** field:

On No Match Action	Description
Set Null	Sets the target field value to Null;
Skip Record	No target values are set for this record, skips to the next record;
Log Error	No target value is set but an error is recorded in the log.
Set Default	The Default value is used to set the target field instead.

In some cases, more than record is returned by the Lookup Query. In this case, you can use the **Multiple Match Action** field to control the behaviour of the migration as follows:

Multiple Match Action	Description
Set Null	Sets the target field value to Null;
Use First	Sets the target value to the field value returned by the first record in the Query.
Skip Record	No target values are set for this record, skips to the next record;
Log Error	No target value is set but an error is recorded in the log.
Set Default	The Default value is used to set the target field instead.
Concatenate CSV	Sets the target field to a list of comma separated values based on the matched records retrieved from the lookup.

If you choose **Set Default**, then enter the Default value in the Default field next to the above options.

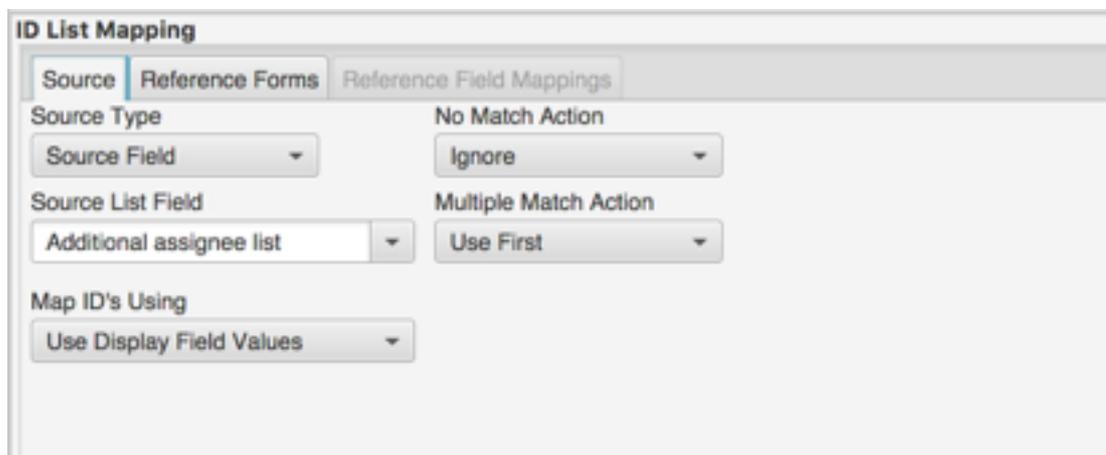
Note that Concatenate CSV delimits all values in the list with double quotes, even if only one value is returned.

Now use the **Validate** button to validate the Lookup mapping details. Then use the **Apply** button to save your changes, or use the **Revert** button to revert back to the last saved version.

### ***Creating a new ID List Mapping***

ID List Mappings can be used for ServiceNow to ServiceNow migrations when the target field type is a ServiceNow List field. The source value can either be another ServiceNow List field, a String field or a temporary variable (of type string).

To create a new ID List Mapping, first select the Target Field from the list of fields in the Field Mapping List, then select **ID List** from the New Mapping field below. A new screen is then presented to allow the ID List Mapping to be completed:

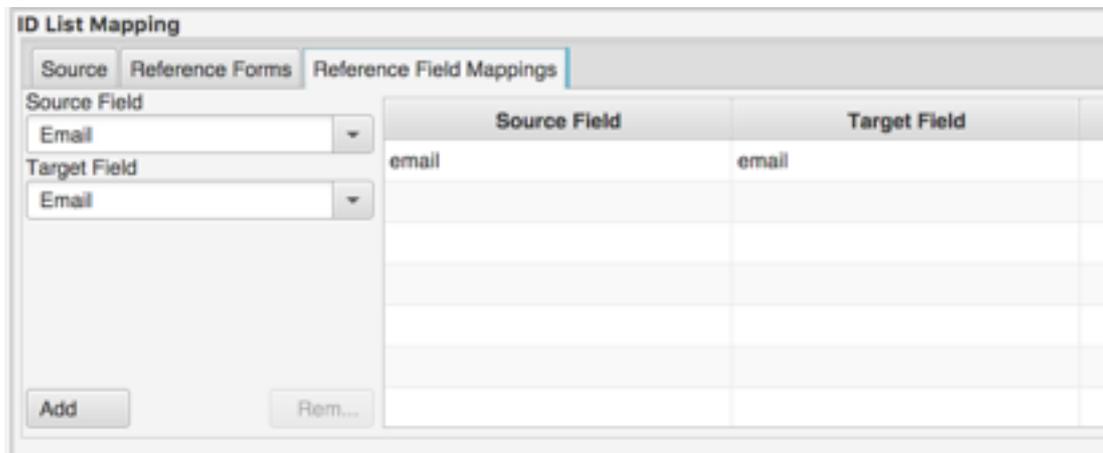


The **Source Type** can be either **Source Field** or **Temporary Variable**. If Source Field is selected then a drop-down list of source fields is provided for selection. The source field selected should be either a ServiceNow List field or a String field.

If **Temporary Variable** is selected, the variable must be set either from another List type field or populated with a comma delimited set of sys\_id values (without any value delimiters). For example, use a lookup mapping with the concatenated values option to obtain a list of sys\_id values, then

strip out the quotes (with an assignment mapping) to leave a list of sys\_id's which could then be mapped to the list field.

In ServiceNow, the List field contains a list of SysIDs, each of which relate to records in a reference table. During execution, the target server is searched for the corresponding list of SysIDs based on the display value of the field. If you want to use something other than the Display Value to identify the list, change the option from **Use Display Field Values** to **Use Selected Field Mappings**. When you select this option, a new tab called **Reference Field Mappings** is displayed like this:



Source Field	Target Field
email	email

This allows the user to enter one or more source and target values that can be used to uniquely identify the target records on the referenced table.

If no matching record is found you can control the behaviour using the No Match Action field on the Source Tab as follows:

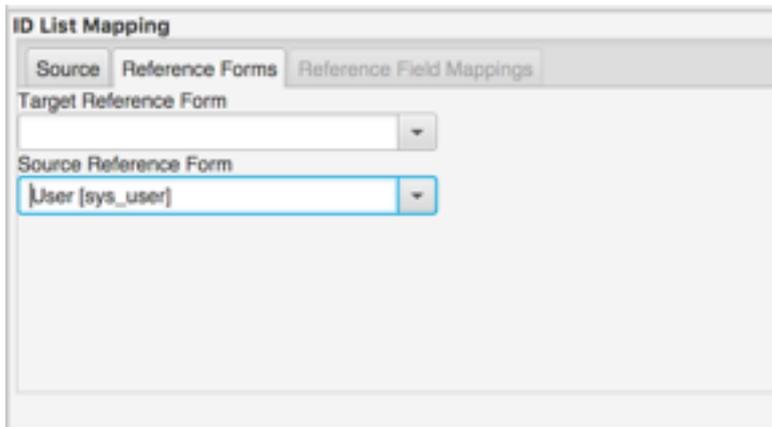
On No Match Action	Description
Ignore	Ignores the mapping and leaves the target unchanged.
Skip Record	No target values are set for this record, skips to the next record;
Log Error	No target value is set but an error is recorded in the log.
Warning	No target value is set but a warning is recorded in the log.

Similarly if multiple matches are found, you can control the behaviour using the Multiple Match Action field as follows:

Multiple Match Action	Description
Use First	Sets the target value to the field value returned by the first record in the Query.
Skip Record	No target values are set for this record, skips to the next record;
Log Error	No target value is set but an error is recorded in the log.
Warning	No target value is set but a warning is recorded in the log..

### ***Creating ID List Field Mappings using String Fields or Temporary Variables***

If the Source Type is Source Field and the source field selected is a String then the **Reference Forms** tab should be used to identify which table the ID values in the source list reference so that their display values can be looked up.



Similarly, if the Source Type is Temporary Variable, the **Source Reference Form** must be selected to identify which table the ID values in the temporary variable reference.

If the target field is of type String or the target is a temporary variable then the **Target Reference Form** must be selected to identify which table the ID values on the target or temporary field relate to.

### Creating a new ID Replacement Mapping

ID Replacement Mappings can be used for ServiceNow to ServiceNow migrations when the source value contains one or more references to records in other tables using the SysID. During execution, ITSM Bridge searches the target instance for the corresponding records and replaces the SysID values with the corresponding SysIDs on the target so that the expression remains valid.

For example the source string could be an encoded query expression like this:

```
assignment_group=1fcde0abdba1d3005b32f2f5ab961902^state=2^assigned_to=56826bf03710200044e0bfc8bcbe5dca^EQ
```

Here the ID values represent a group, state and user on the source instance. The ID Replacement mapping will convert these to the corresponding IDs on the target instance.

The source field can be

- a single SysID value
- a list of SysID values or
- a conditional expression that includes one or more SysID values.

The source value can either be another ServiceNow field or a temporary variable of type string.



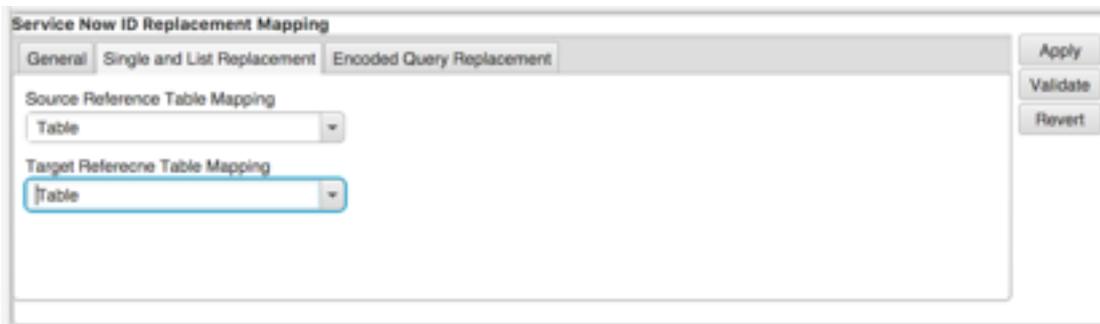
If you specify the **Source Type** to be 'Source Field', then you must select the source field from the drop down list. Similarly if you specify the **Source Type** to be Temporary Variable, you must select the variable name from the drop-down list.

When searching for the corresponding values on the target instance, you can control the behaviour when no match is found by specifying the **No Match Action**. This can be set to either 'Use Source' (replace with the source value), 'Set Null', 'Skip Record' or 'Log Error'.

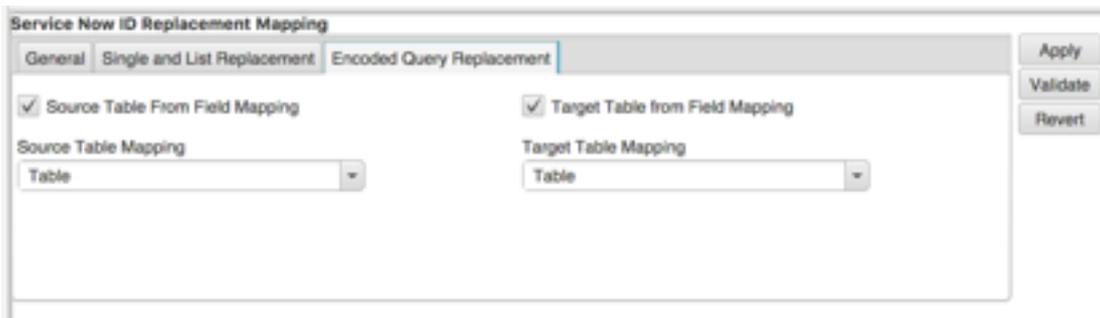
Similarly if multiple matches are found, you can control the behaviour by specifying the **Multiple Match Action**. This can be set to 'Use Source', 'Use First' (use the first record returned), 'Set Null', 'Skip Record' or 'Log Error'.

Next, you need to specify whether to include a single/List of ID values or to include ID's from an encoded query string expression or both.

If you specify a Single/List of ID values then you must also provide the name of the source and target reference tables that the ID value(s) relate to using the Single and List Replacement tab:



If you specify, 'Include IDs from Encoded Query Strings' then you must also specify the source and target tables from which the fields in the query string originate using the Encoded Query Replacement tab:



In this case, you can either select the table names explicitly from the drop-down lists or select '**Source Table from Field Mapping**' and select the field mapping that holds the name of the referenced table in each case.

### **Notes on use of the ID Replacement mapping**

1. When replacing sysIDs using this field mapping, the sysIDs are matched using the field display values. If two records on the target have the same display value, the multi-match option is applied.

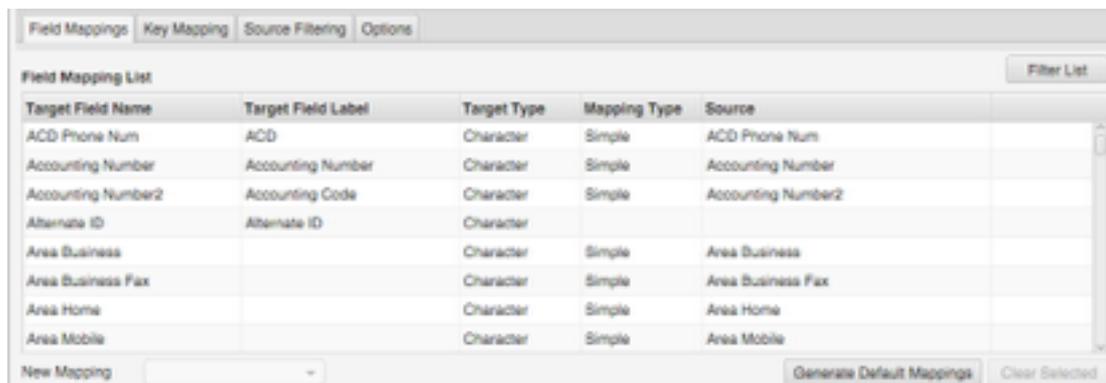
- For Multi-Match or No-Match options the 'Use Source', 'Set NULL' or 'Use First' selections will generate a warning for the target record which can be viewed in the migration report, if configured.
- The ID Replacement mapping cannot currently convert expressions that include 'dot-walking' references to other tables. For example:

```
assignment_group=1fcde0abdba1d3005b32f2f5ab961902^state=2^assigned_to=56826bf03710200044e0bfc8bcbe5dca^closed_by.cost_center=5bc4b4c2db775300a03460535b961976^EQ
```

In this case, the source field `closed_by.cost_center` will not be recognized as it is not on the current table, leading to its value remaining unchanged in the transformed string. In this case, a warning would be shown in the migration report.

### Generating Default Mappings

This feature allows you to automatically map all fields between the source and target forms based on matching field names or field ids. To use this feature, first open the **Form Mapping** from the **Mapping List**, then click on the **Generate Default Mappings** button at the bottom right of the Field List table.



Target Field Name	Target Field Label	Target Type	Mapping Type	Source
ACD Phone Num	ACD	Character	Simple	ACD Phone Num
Accounting Number	Accounting Number	Character	Simple	Accounting Number
Accounting Number2	Accounting Code	Character	Simple	Accounting Number2
Alternate ID	Alternate ID	Character		
Area Business		Character	Simple	Area Business
Area Business Fax		Character	Simple	Area Business Fax
Area Home		Character	Simple	Area Home
Area Mobile		Character	Simple	Area Mobile

After clicking on this button, a new pop-up window is displayed with the following auto-generate options:

#### 1. Match By Field ID or Field Name

If **Field ID** is selected, all fields on the Source form are automatically mapped to fields on the Target form with the same Field ID. If **Field Name** is

selected, all fields on the source form are automatically mapped to fields on the Target form with the same Field Name.

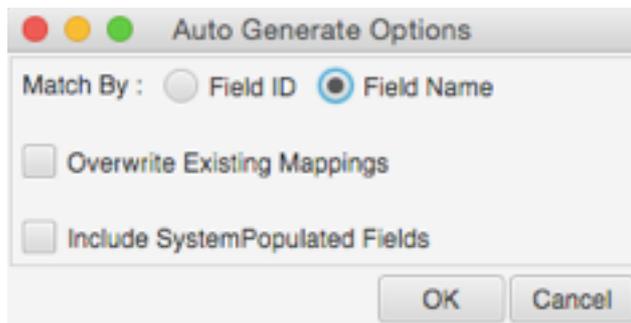
If no matching field id/field name is found then the field is not mapped.

## 2. Overwrite Existing Mappings

If this option is selected then any existing mappings will be overwritten with the new mapped value.

## 3. Include System Populated Fields

If this option is selected then System fields on the Target form that are normally set by the application are also mapped to the corresponding fields on the Source form, (e.g. 'Last Modified By' field in Remedy applications).

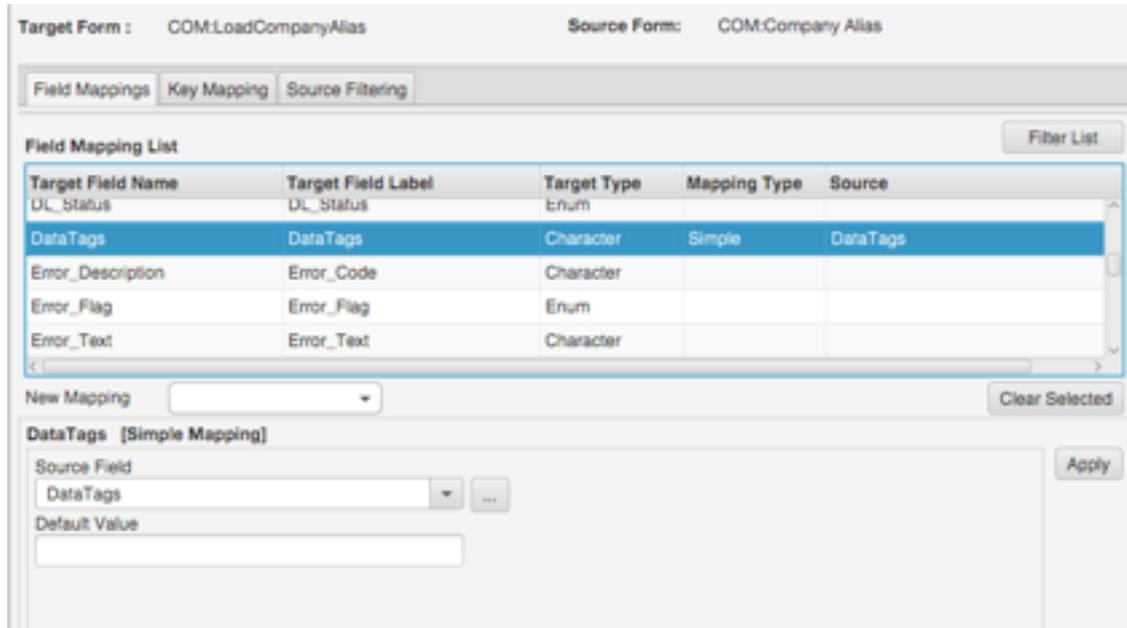


Click on **OK** to start the automatic field mapping generation or **Cancel** to cancel the operation.

All fields that meet the specified criteria are mapped using the **Simple Mapping Type** (see above).

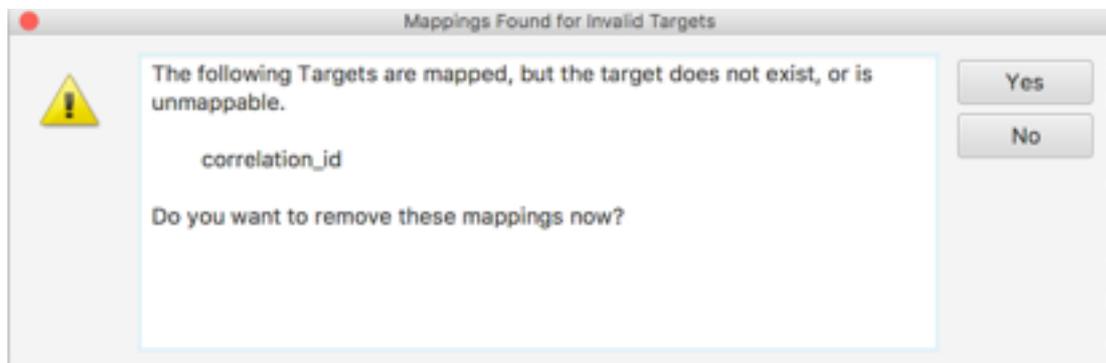
### ***Updating an Existing Field Mapping***

To update an existing Field Mapping, simply select the row in the **Field Mappings List**, update the values in the window below and click on the **Apply button**. Note that the format of the window presented below will depend on the field mapping type (Simple, Assignment, Value Match, Reference, Lookup or ID List).



**Handling Invalid Field Mappings**

After opening a form mapping for an existing project, if any of the mapped fields map to a target field that doesn't exist, a warning will be presented providing the option to remove the corresponding mapping:



Selecting **Yes**, removes all invalid field mappings. Selecting **No**, opens the form mapping and presents the invalid field mappings in red at the top of the field list like this:

Target Name	Target Label	Target Type	Mapping Type	Source
correlation_id			Simple	Correlation ID
city	City	String	Simple	City
company	Company	Reference	Reference	Company [Company->Company]

To clear the invalid field mapping(s), select the field(s), then click on the **Clear Selected** button.

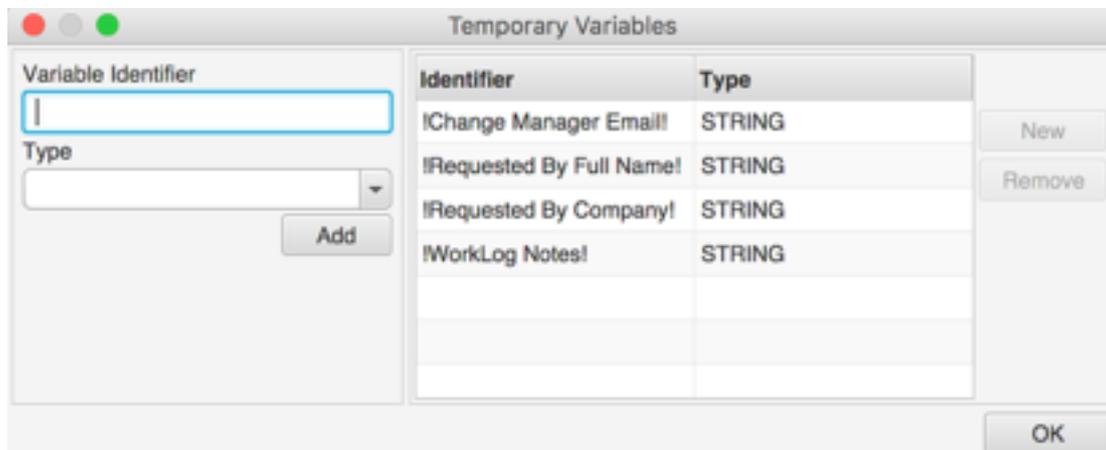
### ***Creating temporary variables***

Temporary variables can be used to store values that you want to use in a field mapping expression. These are typically used when a field mapping assignment cannot be performed in a single step.

To create a temporary variable, click on the **variables** button at the bottom on the field mapping list.



The following pop-up screen is then displayed allowing you to create one or more variables of type boolean, currency, date, decimal, integer, timestamp, time or string:



Once temporary variables have been defined they will appear in green at the top of the field mapping list like this:

Field Mappings	Key Mapping	Source Filtering	Lookup Queries	Deletions	Options	Notes
<b>Field Mapping List</b>						
Target Name	Target Label	Target Type	Mapping Type	Source		
{Change Manager Email}	{Change Manager Email}	TMP [STRING]				
{Requested By Company}	{Requested By Company}	TMP [STRING]				
{Requested By Full Name}	{Requested By Full Name}	TMP [STRING]				
{WorkLog Notes}	{WorkLog Notes}	TMP [STRING]				
active	Active	True/False				
article_type	Article type	String	Simple	"HTML"		

To set the value of a temporary variable, use any of these field mapping types described above, (Simple, Assignment, Lookup, Value Match, Reference or ID List). Once the variable mapping has been defined, it will appear in the field mapping list like this:

Field Mappings	Key Mapping	Source Filtering	Lookup Queries	Deletions	Options	Notes
<b>Field Mapping List</b>						
Target Name	Target Label	Target Type	Mapping Type	Source		
{Change Manager Email}	{Change Manager Email}	TMP [STRING]	Lookup	Src: [CTM:People : Internet E-mail]		
{Requested By Full Name}	{Requested By Full Name}	TMP [STRING]	Lookup	Src: [CTM:People : Full Name]		
{Requested By Company}	{Requested By Company}	TMP [STRING]	Lookup	Tgt: [Company : Sys ID]		
{WorkLog Notes}	{WorkLog Notes}	TMP [STRING]	Lookup	Src: [CHG:WorkLog : Description]		

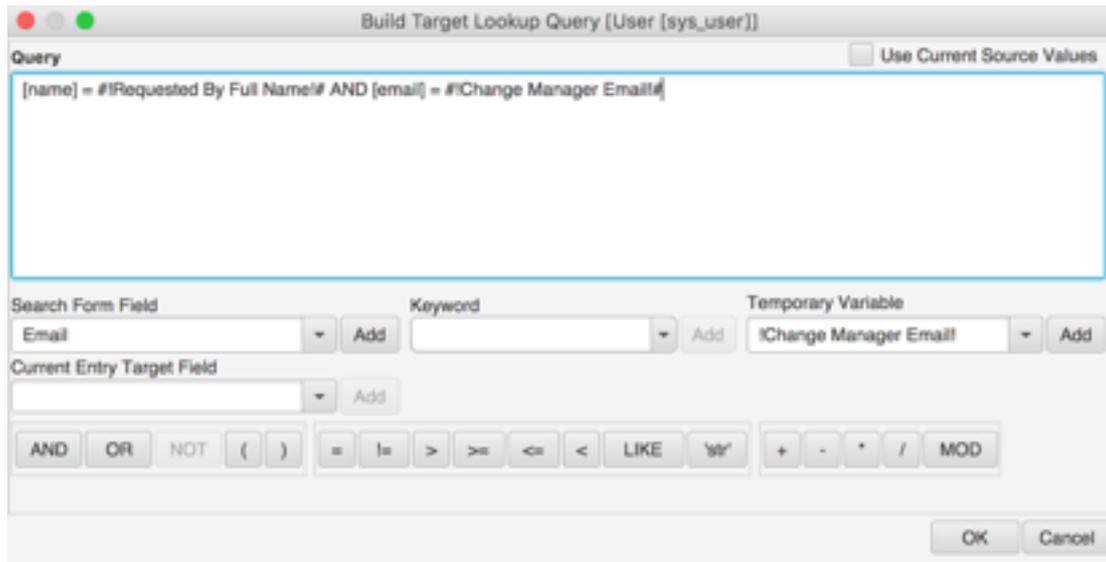
**Using temporary variables in expressions**

Once a temporary variable had been defined, it can then be used in a lookup or assignment expression, or in a Value Mapping. For example it could be used to set the value of a field on the target table using an assignment mapping expression like this:

```
SUBSTRING(#{Change Manager Email}#,0,STRPOS(#{Change Manager Email}#, '@'))
```

Note that the temporary variable is automatically enclosed with #! and !# delimiters.

Temporary variables can also be used in lookup queries like this:



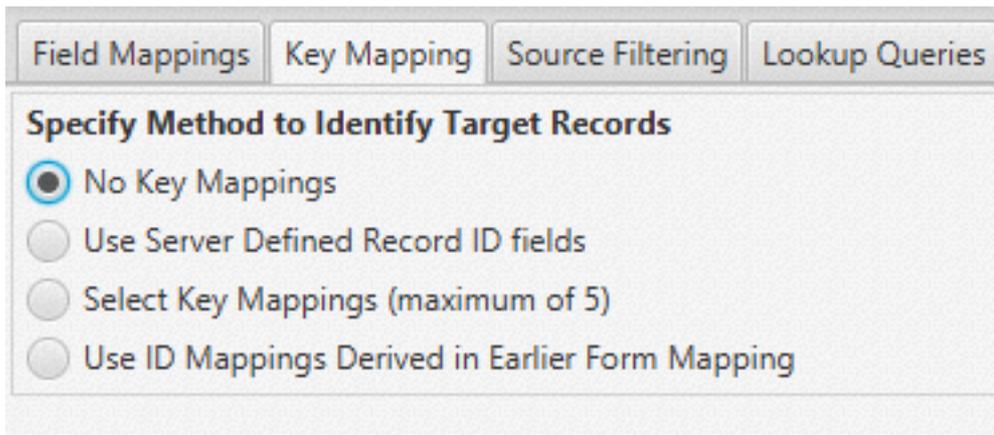
The lookup query can then be used to set another field on the target table.

## 15. Defining Key Mappings

Key Mappings are an attribute of a Form Mapping. They are used to define which fields are primary keys on source and target forms. Primary keys are important because they can be used to affect the behaviour of the migration; In particular whether a new record is created on the Target Form or whether an existing record is updated.

Please note that for ServiceNow -> ServiceNow migrations, the Migration Method '**Import Set (Scripted)**' with the **Migrate SysID's** option always takes precedence over any Key Mappings that you define here. See the **Migration Method** in **Execution Options** for more information on this.

To view the Key Mappings for a Form Mapping click on the Key Mapping tab on the Form Mapping screen.



Field Mappings   Key Mapping   Source Filtering   Lookup Queries

**Specify Method to Identify Target Records**

No Key Mappings

Use Server Defined Record ID fields

Select Key Mappings (maximum of 5)

Use ID Mappings Derived in Earlier Form Mapping

If a key mapping has already been defined for this Form Mapping, it will be displayed here. If not the default (No Key Mappings) will be set.

There are four different types of Key Mappings that can be defined and the behaviour of each type is summarised in the table below.

Key Mapping Option	Behaviour
No Key Mappings	<p>If the Execution Migration Method is <b>'Import Set (Scripted)'</b>, the option to migrate SysIDs is selected and a target record exists with the same Sys ID as the source record, the migration will UPDATE this target record. Otherwise a new record is INSERTED.</p>
Use Server Defined Record ID fields	<p>If the Execution Migration Method is <b>'Import Set (Scripted)'</b>, the option to migrate SysIDs is selected and a target record exists with the same Sys ID as the source record, the migration will UPDATE this target record. Otherwise the following will apply:</p> <p>On the FIRST execution of the migration, ALL source records will be INSERTED (no updates are performed).</p> <p>ITSM Bridge will keep a record of the source to target ID mapping and on subsequent executions will check these records to identify which target record (if any) was previously generated from the source record. If a target record is identified, this record is UPDATED.</p> <p>If the above does not apply then a new record is INSERTED.</p> <p><i>Note: Field Reference Mappings that use this ID Mapping will only be able to return a value for target records that have already been migrated.</i></p> <p><b>Warning: Migrating records to the same target server using a different project will NOT be able to map to the target records created by the first project using this method.</b></p>
Select Key Mappings (maximum of 5)	<p>If the Execution Migration Method is <b>'Import Set (Scripted)'</b>, the option to migrate SysIDs is selected and a target record exists with the same Sys ID as the source record, the migration will UPDATE this target record. Otherwise the following will apply:</p> <p>The set of defined Key Mappings are used to identify a target record. If a target record with the same key mapping is found, it will be UPDATED.</p> <p>If more than one target record matches, the multiple-match option is applied.</p> <p>If none of the above applies then a new record is INSERTED.</p> <p><i>Warning: If the target key values are changed during the execution of the project, the target record may not be mapped correctly which can result in duplicate records being created or execution time failures.</i></p>

Key Mapping Option	Behaviour
Use ID Mappings derived in Earlier Form Mapping	<p>If the Execution Migration Method is <b>'Import Set (Scripted)'</b>, the option to migrate SysIDs is selected and a target record exists with the same Sys ID as the source record, the migration will UPDATE this target record. Otherwise the following will apply:</p> <p>The ID mappings derived during the execution of an earlier form mapping will be used to identify a target record. If the source record was migrated in the earlier form mapping then the same target record will be UPDATED.</p> <p>If the source record was not migrated previously then the No-Match option will apply.</p> <p>If the original form mapping is disabled then the No-Match action will apply to all migrated records.</p>

For migrations from BMC Remedy servers, if the option **'Use Server Defined Record ID Fields'** is selected, the user has the option to define both a **Primary** and **Secondary Source ID** Field. The **Primary Source ID** field is the unique field that determines whether the migration is an update or create operation and should therefore remain unchanged between migrations.

If the **Primary Source ID** is set to the **Request ID**, the user may optionally select the **InstanceID** as a **secondary ID** field.

If the **Primary Source ID** is set to **InstanceID**, the **secondary ID** will automatically be set to the **Request ID**. No other values are permitted for these fields.

The **Target ID** Field is set to the **sys\_id** field on ServiceNow servers and cannot be changed.

Field Mappings	Key Mapping	Source Filtering	Lookup Queries	Deletions	Options	Notes
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**Specify Method to Identify Target Records**

No Key Mappings - Always create new record  
 Use Server Defined Record ID fields  
 Select Key Mappings (maximum of 5)

Primary Source ID Field:   
 Secondary Source ID Field:   
 Target ID Field:

Both the **Primary** and **Secondary Source ID** fields can be used in reference-type field mappings (see above) for Form Mappings that execute after the current mapping (i.e. with a higher execution order).

If the option '**Select Key Mappings**' is selected, the following screen is displayed to allow the selection of up to 5 key fields:

Field Mappings	Key Mapping	Source Filtering	Lookup Queries	Deletions	Options	Notes
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**Specify Method to Identify Target Records**

No Key Mappings - Always create new record  
 Use Server Defined Record ID fields  
 Select Key Mappings (maximum of 5)

Select Mapped Target Field:

Multiple Match Action:   
 Build Target Key Cache Before Use  
 Allow NULL values in key fields

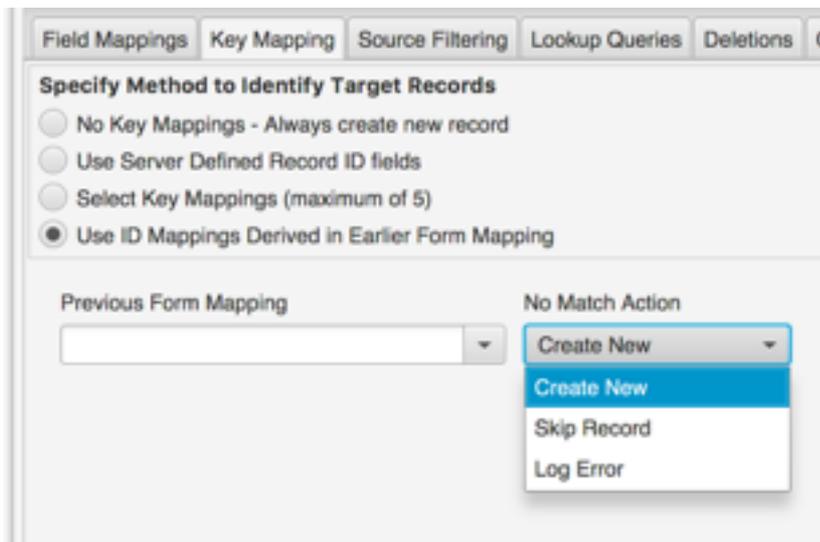
Target Field	Source Mapping
name	Name

Use the menu to select from the list of mapped target fields for this form mapping, then click on the **Add button** to add the field to the key mapping table. Both the target field and the source field from the mapping are displayed in the table.

Note that the mapping is not restricted to simple mappings. As long as the value derived from the mapping matches the current value on the target, the mapping will operate correctly. So you can have assignment, value or reference type mappings selected as key mappings.

If you make a mistake, you can remove a key field from the mapping table by selecting the corresponding row and clicking on the **Remove button**.

If the option **Use ID Mappings Derived in Earlier Form Mapping** is selected, you must select the previous mapping and the No-Match action. The No-Match action is applied if no corresponding record is found on the target based on the previous mapping or the previous mapping is disabled. The No-Match action options are 'Create New Record', 'Skip Record' or 'Log Error'.



The screenshot shows a configuration window with several tabs: 'Field Mappings', 'Key Mapping', 'Source Filtering', 'Lookup Queries', and 'Deletions'. The 'Key Mapping' tab is active. Under the heading 'Specify Method to Identify Target Records', there are four radio button options: 'No Key Mappings - Always create new record', 'Use Server Defined Record ID fields', 'Select Key Mappings (maximum of 5)', and 'Use ID Mappings Derived in Earlier Form Mapping' (which is selected). Below these options, there are two dropdown menus. The first is labeled 'Previous Form Mapping' and is currently empty. The second is labeled 'No Match Action' and has a dropdown menu open showing three options: 'Create New', 'Skip Record', and 'Log Error'.

### ***Controlling Multiple-Match Behaviour***

Once you have selected your key mapping fields, you can also control the behaviour of the migration when multiple records are found on the target server for the specified key.

Depending on the option selected, if multiple target records are identified that match the specified key during execution, then either the first record found is updated, the record is skipped or an error is logged. By default, the 'Use First' option is selected for each Form Mapping.

### ***Additional Key Mapping Options***

When defining a key mapping you also have the following options:

Option	Meaning
Build Target Key Cache Before Use	Builds and stores a target key for each existing target record before migration. This allows the source entries to be mapped to a target without the need to 'look up' the target key individually.
Allow NULL values in key fields	If unchecked, a null in a key value will lead to an error and the entry not being migrated. For reference mappings, if the mapping uses a key with a NULL, the NO Match procedure is followed

When migrating to a ServiceNow server building the cache when the number of records being migrated is > 5% of the number of existing target records is likely to improve overall performance.

When migrating to a BMC Remedy server, building the cache when the number of records being migrated is > 2% of the number of existing target records is likely to improve overall performance.

If there are a large number of reference lookups, that obtain data outside the set of records being migrated, building a cache may also improve performance. Building a cache can however use significant memory resources on your client desktop, which needs to be considered when deciding whether to build the cache or not.

### **Notes on use of Key Mappings**

**Warning:** Changes to the values of source/target fields used in key mappings externally (between executions) can lead to the mapping of the records being 'broken'. Therefore it is important to choose key fields on the source and target server and are unlikely to change. If changes are made externally to these key fields, ensure they are made on both the source and target record.

#### **Example:**

- Use **Company name** field [simple mapping] as the key field
- Execute the project, source company 'ACME' maps to target company 'ACME', which gets updated
- Change the target company name to 'ACME Ltd'
- Subsequent execution will create a new company record 'ACME'

The recommended best practice approach is therefore:

ALWAYS use the **Selected Key Mappings** option if any set of mappings can be found in the source/target records where:

1. Values are consistent (for all migrated records) on the source and target server
2. Values represent a unique entry on the target server
3. Values do not (generally) change over time on the source or target server

Do **not** use the **Server Defined Record ID's** option when:

1. You want to update existing records that were not created in previous executions of this project
2. You use the same project against several source/target servers

For target fields used in key mappings, at least one of the fields should be indexed when there are more than 10,000 records in the table in order to improve performance and reduce the risk of timeout errors.

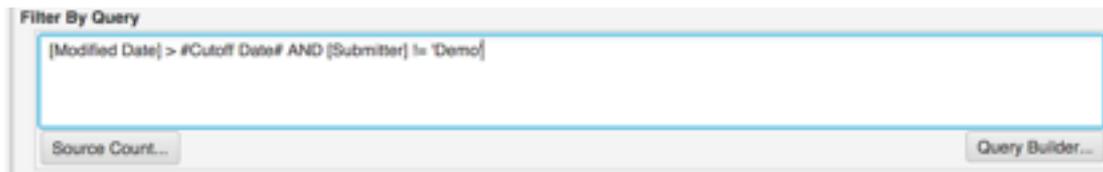
## 16. Restricting Source Records (Source Filtering)

Source Filtering is an attribute of the Form Mapping and is used to restrict the number of records to be included in the migration. For example, you may only want to migrate the records that relate to a particular company.

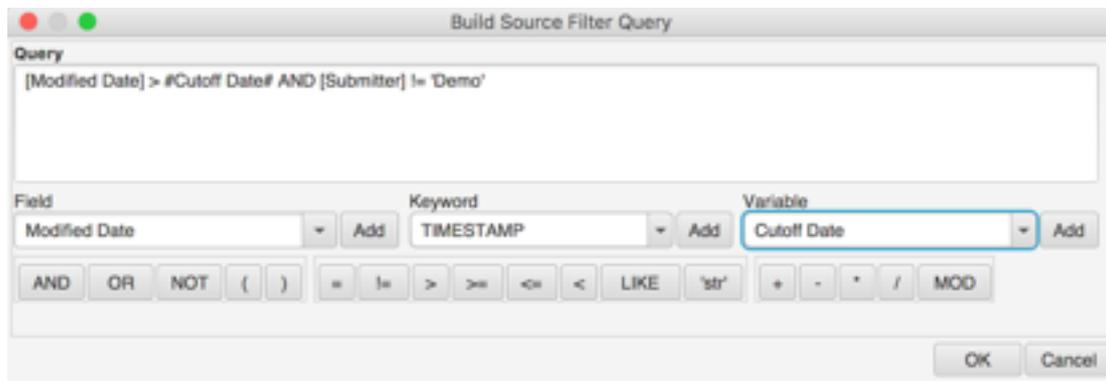
Source Filtering allows you to restrict the records that are migrated either by constructing a query or by defining an Inclusion rule or both. During execution, the query and/or Inclusion rule is evaluated and only the resulting set of records are included in the migration.

### *Filtering Records Using a Query*

In order to define the Source Filtering Query, first navigate to the Source Filtering window by selecting the **Source Filtering tab** on the Form Mapping. Then click on the **Query Builder** button to create or edit the query.



The query can be constructed from a combination of Field values, Keywords, Variables and various operators.



To add a field from the Source Form, a keyword or a variable to the Query, select the value from the corresponding dropdown list, then click on the **Add button** next to the Field/Keyword/Variable.

Note that fields must always be enclosed in square brackets and strings must always be enclosed in single quotes.

The following keywords are available:

NULL: Converts to the NULL string during execution;  
 DATE: Converts to the current date during execution;  
 TIMESTAMP: Converts to the current date and time during execution;  
 TIME: Converts to the current time during execution;

Variables can be used in the Query if the value of the operand is not known until the time of execution. All variables must be created in advance before they can be selected and used in the Query, (see later section on defining variables).

A summary of the operators available and their meaning is provided in the table below:

Operator	Description
AND	Logical AND operator to be used with two expressions within the Query: {Expr 1} AND {Expr 2}
OR	Logical OR operator to be used with two expressions within the Query: {Expr 1} OR {Expr 2}
NOT	Logical NOT operator to be used with one expression within the Query: NOT {Expr}
()	Brackets used to group a logical set of expressions together within the Query.
=	Logical Equivalence between two expressions in the Query: {Expr 1} = {Expr 2}. Note {Expr 1} or {Expr 2} may just be field values or literals in this case.
!=	Logical Unequal comparison of two expressions in the Query: {Expr 1} != {Expr 2}
>, >=	Logical 'Greater than' / 'Greater than or Equal to' comparison of two integer values or date values in the Query.
<, <=	Logical 'Less than' / 'Less than or Equal to' comparison of two integer values or date values in the Query.

Operator	Description
LIKE	Used for partial match of a string. e.g. [Surname] LIKE ('Park' + '%') would match all surnames beginning 'Park'.
Str	Used to generate two single quotes in the Query to enclose a string value.
+	Used to add two strings together OR to add two integers, decimals or real numbers together OR to add an offset (in days) to a date value OR add an offset (in seconds) to a date-time or time value.
-	Used to subtract one integer/decimal/real value from another OR to subtract an offset (in days) from a date value OR to subtract an offset (in seconds) from a date-time or time value.
*	Used to multiply two integer/decimal/real values together
\	Used to divide one integer/decimal/real value by another
MOD	Used to calculate the remainder when one integer is divided by another.

When you have finished entering your query, click OK to validate the query and close the Query Builder window. If you update the query without using the Query Builder, you can use the **Validate button** on the bottom right to validate the syntax. If ok, a message will be displayed to indicate that the query is valid. If not it will indicate that there is an error in the query that needs to be corrected before it can be saved.

Once your query has been validated, use the **Apply button** on the bottom right to apply and save the query.

Some example queries are provided below for reference:

#### Example 1:

[Last Modified Date] > (TIMESTAMP - (((60 \* 60) \* 24) \* 30))

Restricts selection to those records modified within the last 30 days.

#### Example 2:

([Last Modified By] != 'Demo') AND ([Status] = #Status#)

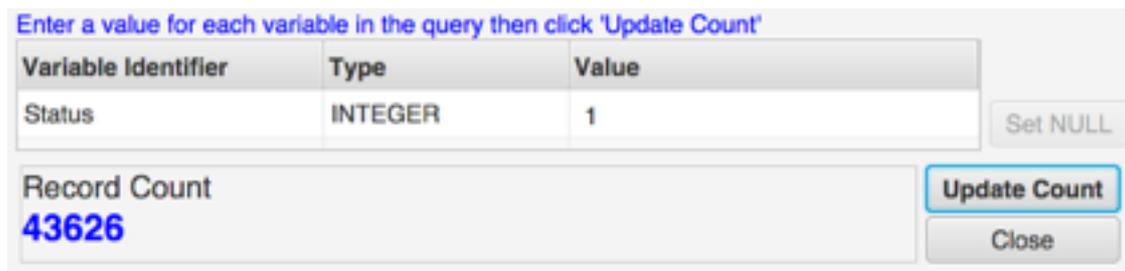
Restricts selection to those records that were not modified by Demo and whose status matches the variable called status (value provided at execution).

### **Using the Source Count button**

The source count button can be used at any time to count the number of records on the source form/table based on the current Source Filter Query.

If no variables are used in the query then the record count is immediately displayed in a pop-up window when the **Source Count** button is clicked.

If one or more variables are used in the query, then a pop-up window is displayed like this:



Variable Identifier	Type	Value
Status	INTEGER	1

Record Count  
**43626**

Enter a value for each variable then click on the **Update Count** button to count the number of records on the source form/table based on the query defined and the values provided for each variable. Variables can also be set to NULL using the Set NULL button.

Whenever the variable values are changed, the user is prompted with the option to save these values as defaults for the next migration execution.

### **Usage of Source Filtering Query when Source Server Type is ServiceNow**

When the source server type is ServiceNow, the following restrictions apply:

- a) For a Relational Operation, the Left Hand Side of the expression must be a field or a project variable, e.g:
  1. [Name] = 'Tom'
  2. [company] = #Company Name#
  3. #Single Company# = TRUE

4. ([company] = #Company Name# AND #Single Company# = TRUE)  
OR #Single Company# = FALSE

The value can be either a fixed value, project variable or another field of the same type.

- b) All arithmetic operations (+ - \* / MOD) are supported for numeric values. The '+' operator can also be used for string concatenation.
- c) If a query contains a string value for a field which has choices (e.g. State field on HR Case), the choice label value will be replaced with the underlying value when the query is run. This should be the case for both string and integer fields. If no underlying value can be found for the choice label given, the choice label will be used in the query (usually resulting in no entries being returned) e.g. **[State]='Draft'** will run as **[State]=1**
- d) If a query contains a display value for a **reference field**, the value will be replaced with the corresponding sys id before the query is run. Again if no matching record is found, the display value is used, generally resulting in no match. e.g. **[assigned\_to]='Abel Tuter'** will run as **[assigned\_to]=<sysid of Abel Tuter user entry>**
- e) Conditions c) and d) above also hold true when using variables. The variable used should be defined as a STRING, even if the field being compared to is actually a non string field. e.g. **[state]=#STATE#**, where #STATE# is a string variable with value 'Ready' will run as **[State]=10**
- f) Date/Time arithmetic is NOT supported. The additional parameterised keywords are available for this purpose.
- g) Only variables and literal values can be used in arithmetical operations. Field references cannot be used.
- h) LIKE operator. This is supported in a limited way (due to limitations in ServiceNow):
- i) Only the '%' (match zero or more characters) wildcard is supported.
  - ii) Field references cannot be used in place of a value.
  - iii) The wildcard must be either at the start and/or end of the string. e.g. **'Bob % Backline'** is **not** a valid search pattern but **'%Bob%'**, **'%Backline'** and **'Bob%'** are all valid.
  - iv) The use of a variable to define a search string is not supported, however arithmetic operations can be used to build a pattern string. e.g. **[Name] LIKE '%'+#searchName# +'%'** is valid.

When using a **project variable** as the left hand side of a relational operation such as <Variable><op><Value>, the following additional restrictions apply:

<Variable> must be a valid project variable

<Value> can be either a constant value, keyword or another variable.

<Value> CANNOT be an arithmetical expression. The type should be consistent to that of the variable.

<op> must be any relational operator that is relevant to the data type. LIKE is also supported for string comparison (case insensitive)

For example the following are supported:

- #Boolean#=TRUE
- #Boolean 1#!=#Boolean 2#
- #DATE TIME#>TIMESTAMP
- #Company Name# LIKE '%bridge%'

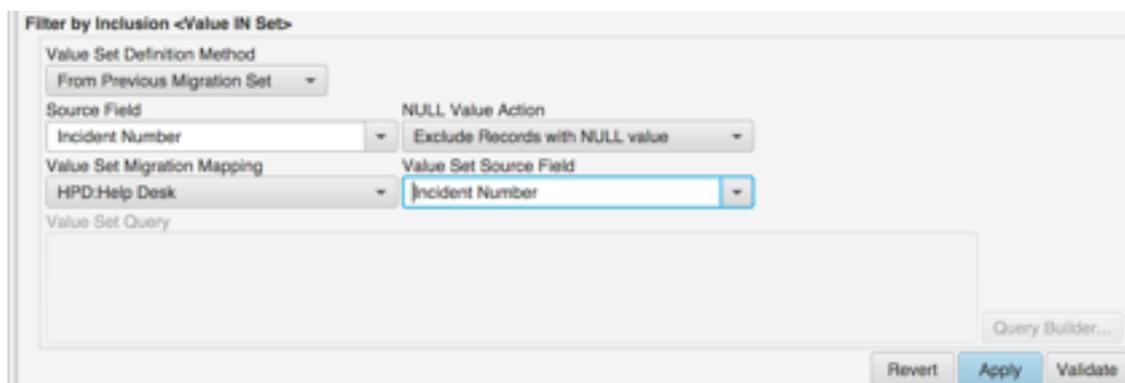
There can be multiple clauses of this type in a single query.

Note that this does NOT apply to lookups. If an attempt is made to add such a clause in a lookup it will result in a design time error.

### **Filtering By Inclusion**

In some situations it may be desirable to filter the records by associating them with another set of records, either from a previous form migration in the same project or by using an Ad-Hoc Query. For example, when migrating the work-logs for an Incident, you may only want to migrate those work-log records for which the corresponding parent Incident records are migrated.

To filter in this way, navigate to the **Filter By Inclusion** section on the **Source Filtering Tab** and select '**From Previous Migration Set**' for the **Value Set Definition Method**. Using the above example, if the current (child) form mapping is for Work-logs, then you must have defined a form mapping for Incident (parent) with a lower execution order.



The fields in this section are defined as follows:

Field Name	Meaning
Source Field	The name of the source field on the current form mapping that is used to match a value in the Value Set (parent) mapping.
NULL Value Action	If set to <b>Include</b> , will ALWAYS include child records for which the source field is NULL (even if there are no NULL values in the value set) If set to <b>Exclude</b> will ALWAYS exclude child records with a NULL source field value.
Value Set Migration Mapping	The name of the previous form mapping which represents the Value Set (parent).
Value Set Source Field	The field on the Value Set to be matched with the source field on the current mapping

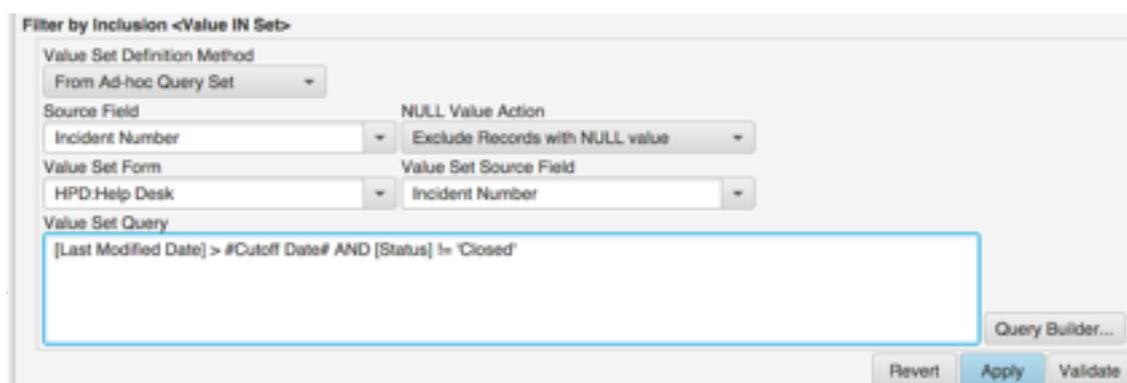
In the above example, the Source Field on the Work Log (child) form is the Incident Number (this is what relates the Work Log to the Incident), the Value Set Migration Mapping is the HPD:Help Desk and the Value Set Source Field is the Incident Number (on the parent Incident).

When the project is executed, only those work-logs which belong to Incidents that have been migrated are themselves migrated.

**Filtering By Inclusion Using an Ad-Hoc Query**

This method of filtering is useful if there is no previous migration set to relate to but you still want to restrict the records by relating them to another set of data.

To use this method, navigate to the **Filter By Inclusion** section on the **Source Filtering Tab** and select **'From Ad-Hoc Query Set'** from the **Value Set Definition Method**.



In this case, instead of selecting a previous migration, select a **Value Set Form** instead using the **Value Set Form** field. This allows you to select any form from the Source server. Then construct a query using the **Query Builder** to define the set of records that the Value Set (parent) is restricted to.

In the example above, only those work-log records are migrated for which the related Incident has a Modified Date greater than the variable cutoff date and are not closed. As with the previous example, the Work-log records are related to the Incident (HPD:Help Desk form) using the Incident Number field on each.

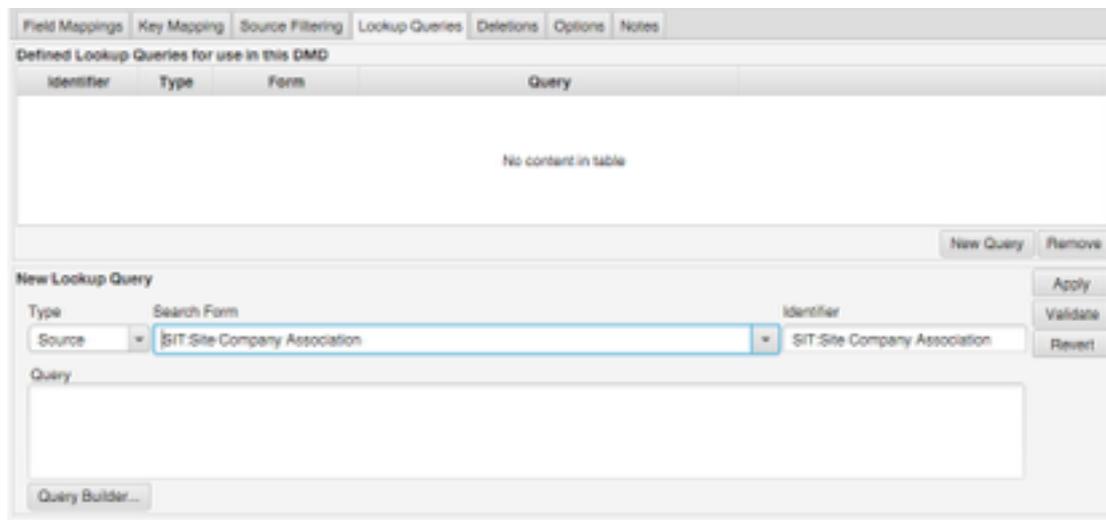
Use the **Validate** button to validate the Ad-Hoc Query and the **Apply** button to save.

## 17. Defining Lookup Queries

Lookup Queries can be used to select field values from any form or table on the source or target server which can then be used as input to your Form Mapping definition. These can be used whenever the value that you want migrate does not reside on the Source Form that you have selected.

Lookup Queries are an attribute of a **Form Mapping** and you can define as many queries as you need for any given mapping.

To create a new Lookup Query, open the Form Mapping from the Mappings List, then navigate to the **Lookup Queries** tab.

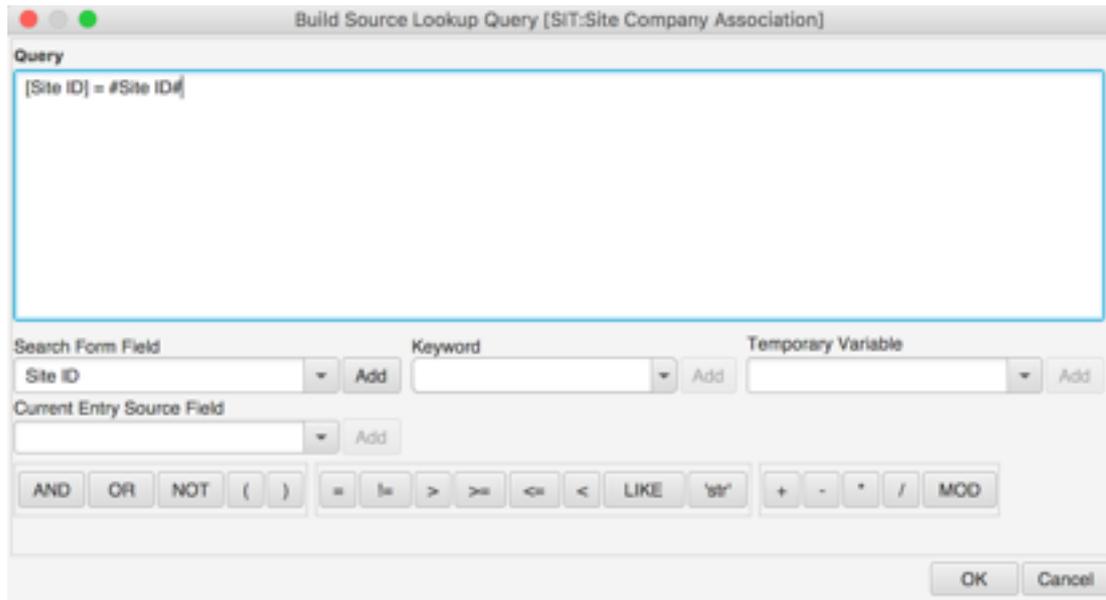


This window is divided into two sections: the top section lists all the existing queries for this Form Mapping, the bottom section is used to create new Lookup Queries. When you first navigate to the Lookup Queries tab the top section will be empty.

### **Defining Source Lookup Queries**

To create a new Source Lookup Query, select the **Type** (Source) and the **Search Form** from the drop-down list. The Identifier field is auto-populated but you can change the value if necessary. The identifier is used to uniquely identify the Lookup Query that you have defined.

Now click on the **Query Builder** button to define your Lookup Query. Note that we are not defining which field value to return here, just the query itself. You can use the same query to select different fields for different field mappings. These are selected as part of the Field Mapping Definition.



The Source Lookup Query window is shown above.

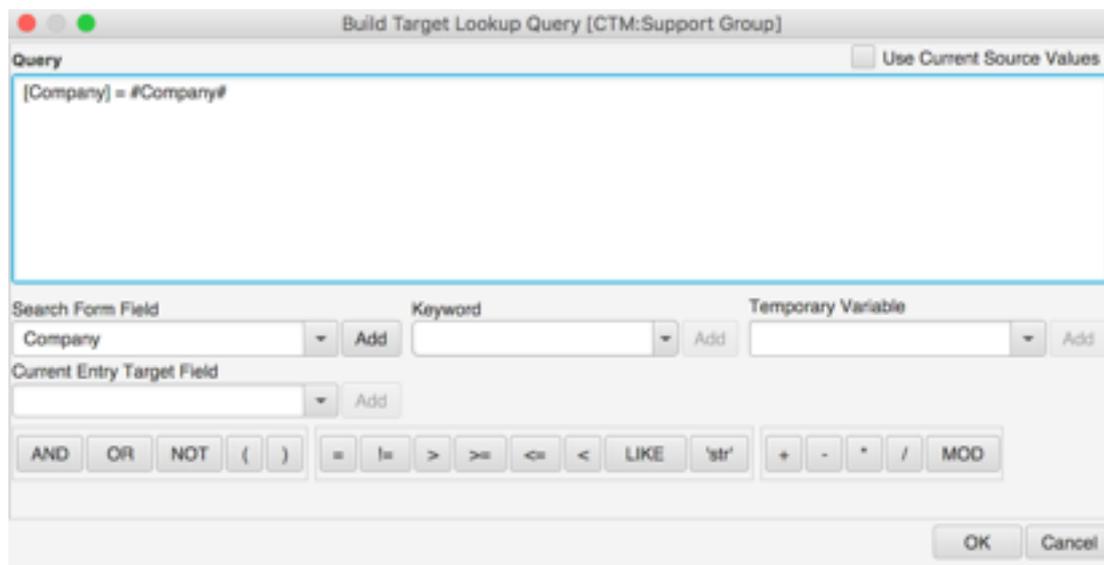
Select the field from the **Search Form Field** menu then enter a condition using any of the operators below (AND, OR, NOT, (, ), =, != etc.), in combination with a **keyword value** (NULL, DATE, TIMESTAMP or TIME) and/or the **Current Entry Value** from the **Form Mapping Source Form** or a **Temporary Variable**.

In the example above, the Site ID is used to identify a record on the SIT:Site Company Association Form based on the Site ID value on the current Form Mapping Source Form. So for example, if the current Form Mapping Source Form is SIT:Site, then we can supplement the values used in this mapping with values from the SIT:Site Company Association form, using this Lookup Query.

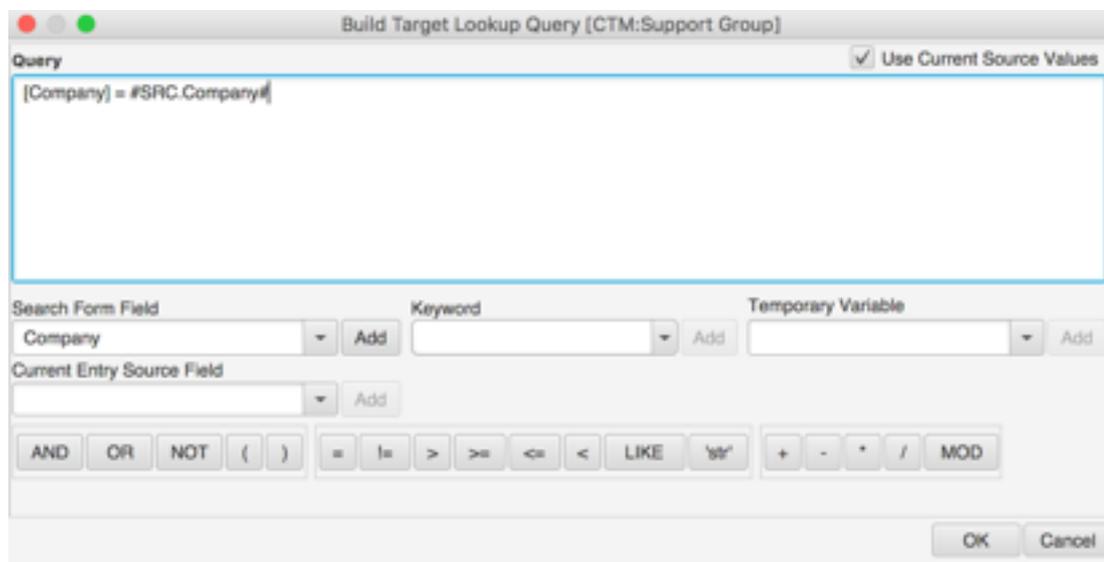
For more information on defining and using temporary variables, see previous section on **Defining Field Mappings**

### **Defining Target Lookup Queries**

To create a new **Target Lookup Query**, navigate to the Lookup Queries tab click on **New Query**, then select the **Type** (Target) and the **Search Form** from the drop-down list. The options for Target Lookup Queries are slightly different. The value that you compare with can either be on the source or target server. To compare with a value on the target server, select the field from the **Current Entry Value (Target) field**. e.g.



To compare with a value on the source server click the checkbox '**Use Current Source Values**'. In this case, the Current Entry Value field changes to 'Current Entry Source Field' and the field value that you select is prefixed with 'SRC.' to indicate that it relates to a source field value. e.g.



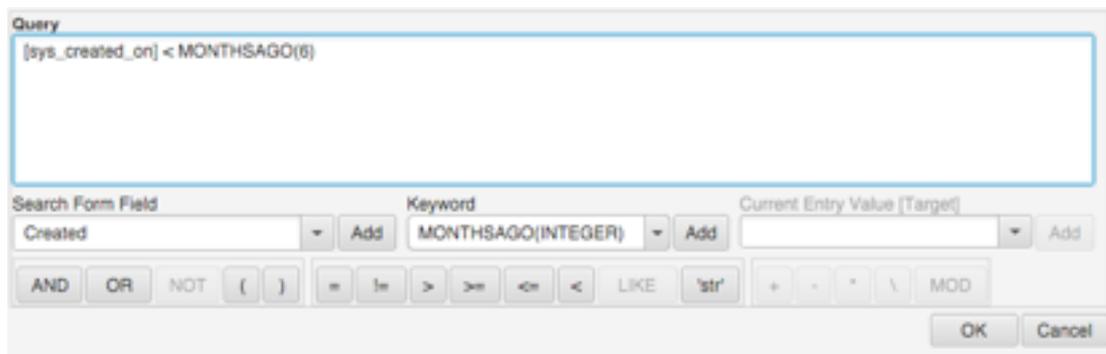
In this example the field on the target server is compared with the current value of the Company field on the source server. The source and target servers can either be of the same type (e.g. ServiceNow), or different types, (e.g. ServiceNow and Remedy).



To modify an existing Lookup Query, simply click on the corresponding row in the list of Lookup Queries, make the necessary changes using the fields in the bottom section (including Query Builder if required), then click on the Apply button to save your changes.

### **Usage of Lookup Queries when Target Server Type is ServiceNow**

If you select the **Target Type** option, then the Query Builder options are a little different when the Target server is **ServiceNow**. The Keywords available in this case are described in the table below:



Example Target Lookup Query

The arithmetic functions, +, -, \* and / as well as the logical operators NOT and LIKE are not allowed in this case (they can only be used with Remedy servers).

Keyword	Meaning
MINUTESAGO(INTEGER)	Used for comparison with date-time fields. e.g. [date-time field] < MINUTESAGO(30) would return all records where the date-time field was more than 30 minutes earlier than the current time.
HOURSAGO(INTEGER)	Used for comparison with date-time fields. e.g. [date-time field] < HOURSAGO(12) would return all records where the date-time field was more than 12 hours earlier than the current time.
TRUE	Logical TRUE condition for comparison with boolean fields.
FALSE	Logical FALSE condition for comparison with boolean fields.
YEARSAGO(INTEGER)	Used for comparison with date fields. e.g. [date field] < YEARSAGO(5) would return all records where the date field was more than 5 years earlier than the current date.

Keyword	Meaning
MONTHSAGO(INTEGER)	Used for comparison with date fields. e.g. [date field] < MONTHSAGO(6) would return all records where the date field was more than 6 months earlier than the current date.
NULL	Logical NULL condition
DATE	Equates to the current DATE
TIMESTAMP	Equates to the current TIME
DAYSAGO(INTEGER)	Used for comparison with date fields. e.g. [date field] < DAYSAGO(7) would return all records where the date field was more than 7 days earlier than the current date.

In this case, the Lookup Query **Current Entry Value** is based on the target result set, (i.e. the value the target field will have once it has been updated). For this reason, only target fields that have been mapped may be used in the query.

### ***Usage of Lookup Queries when Source Server Type is ServiceNow***

When the Source Server Type is ServiceNow, the same restrictions apply as for Source Filtering (see previous section).

Also when both source and target servers are ServiceNow, when you compare a string value with a reference field, then the reference field is converted to the equivalent string value before the query is evaluated. e.g.

**[Title] = #src.category#**

where src.category is a reference field, would convert the category reference to the equivalent string value before the query is evaluated.

### ***Usage of Lookup Queries when Source or Target Server Type is ServiceNow***

For hard coded values **only** (not current entry values), both choice label reference field display values will be converted to their actual values.

e.g. [Company] = 'ACME' would convert to [Company] = <SysID for company ACME>

## ***Optimising Lookup Queries for best performance***

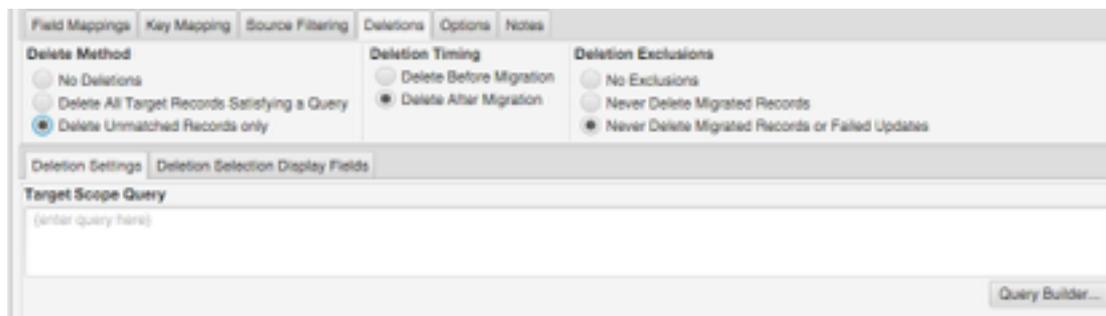
When your lookup query (source or target) is searching a table with more than 10,000 records then it is highly recommended that at least one of the fields in the query is indexed in order to improve performance and reduce the risk of timeouts occurring.

## 18. Defining Record Delete Conditions

*Note: this option is only currently available for Remedy source and target servers.*

In some situations, it may be desirable to delete records from the target server as part of the migration. Typically this is required when records have been deleted from the source server and are therefore no longer required on the target.

Record Deletions are an attribute of a **Form Mapping**. To define record deletion conditions, open the Form Mapping from the Mappings List, then navigate to the **Deletions** tab.



The first set of options on this screen specify the **Delete Method**, the **Delete Timing** and the **Delete Exclusions**. A summary of the meanings for each option is provided in the tables below:

Delete Method	Description
No Deletions	No records are deleted under any conditions.
Delete All Target Records Identified By the Target Scope Query	Deletes all records based on the Query provided in the Target Scope Query below.
Delete Unmatched Records	Deletes all records for which no match can be found on the source server using the matching criteria specified below.

By default, no records are deleted and the Delete Method for all mappings is therefore set to **No Deletions**.

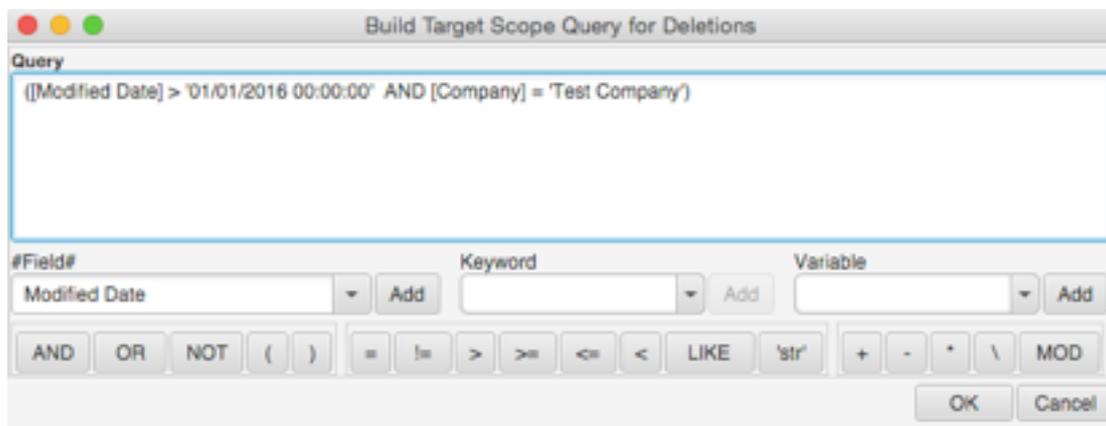
Deletion Timing	Description
Delete Before Migration	All record deletions are scheduled to take place before data migration. In this case the exclusion options below do not apply.
Delete After Migration (Default Option)	All record deletions are scheduled to take place after data migration.

Exclusion Option	Description
No Exclusions	Does not exclude any records from the list of records identified for deletion.
Never Delete Migrated Records	Excludes migrated records (for the current migration project) from the list of records identified for deletion.
Never Delete Migrated Records or Failed Updates	Excludes both migrated records and records that failed to update (for the current migration project) from the list of records identified for deletion.

Note: The Exclusion Options only apply if the Deletion Timing is set to **Delete After Migration**.

### Deleting Records based on Target Scope Query

If the **Target Scope Query** Delete method is selected, then you must enter a valid query in the Target Scope Query box. Click on the **Query Builder** button to launch the **Query Builder dialog window** for constructing your query.

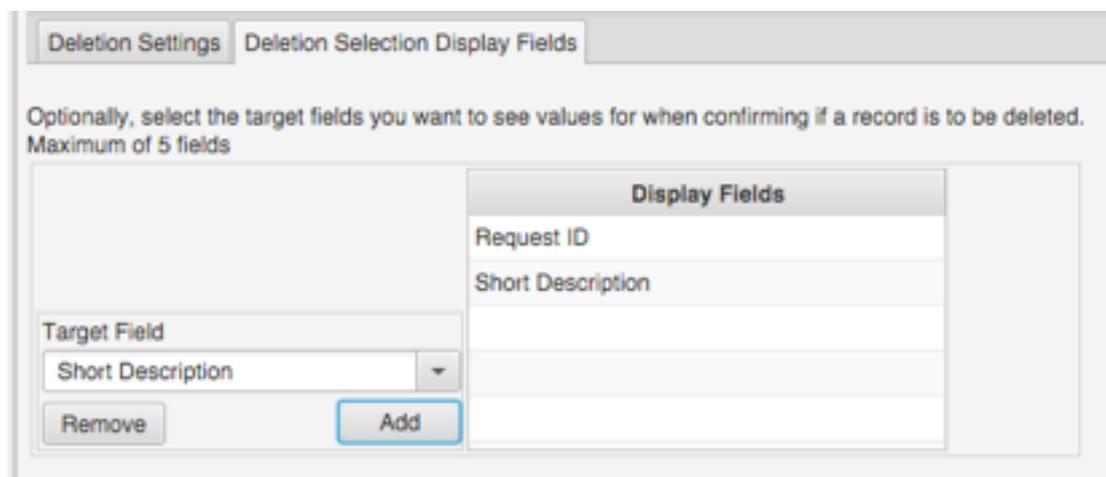


**WARNING: All records that meet the criteria specified by this query will be deleted from the target server unless they have been specifically excluded using the options above.**

Before any records are deleted, a list of those records identified for deletion will be displayed. You can configure which fields to display in this list using the tab called **Deletion Selection Display Fields**.

When you click on this tab a separate table is displayed which allows you to specify up to 5 fields that you want to display when confirming that a record should be deleted.

To add a field to this list, simply select from the drop-down menu against the Target Field, then click on the **Add button**. If you make a mistake, you can always remove a field from the list by highlighting that row and clicking on the **Remove button**.



Target Field	Display Fields
Short Description	Request ID
	Short Description

### ***Deleting Records based on Unmatched Records***

If you select the option to **Delete Unmatched Records** then you must enter the details of how to search for matches on the source server. You can either choose to use the existing **Key Mappings** for this Form Mapping, or manually select the **Defined fields used for matching** from the drop-down list of mapped target fields.



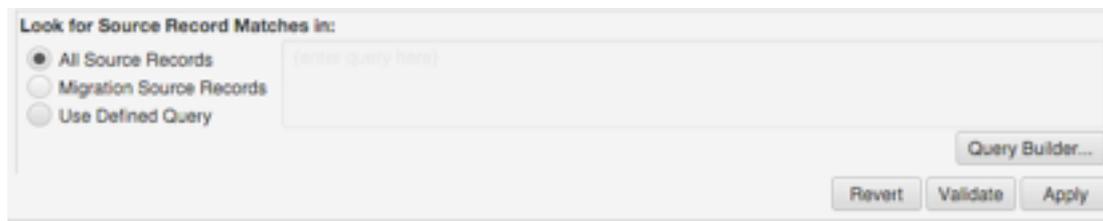
Target Field	Source Mapping
Request ID	Request ID

You can add up to 5 fields as the basis for the match search. Use the **Add button** and **Remove button** to selectively add or remove fields from the match search.

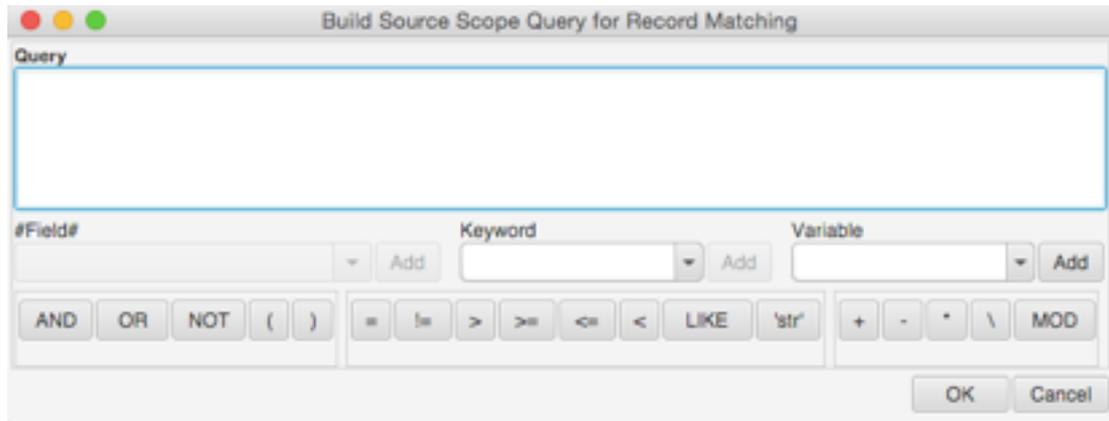
Once you have defined the fields to be used for the match search, you must then define the scope of the source records to search. By default, all source records are searched. The following table summarises the three options available to control the scope of the records to search on the source server.

Search Option	Description
All Source Records	At execution time, all source records are then searched to see if they match each target. In large data sets, this can take some time. For performance reasons, it is better if possible, to define a subset of records to search.
Migration Source Records	The same set of source records that were migrated will be used in the search for a match. In most situations, this is the best way to ensure that the match is found without needing to retrieve the entire source data set.
Use Defined Query	Define a custom query that will be used to identify the set of source records that will be searched for a match.

**WARNING:** When using the **Use Defined Query** option, take care to ensure that the query is defined in such a way as to always find all source entries that need to be replicated on the target. If a source record cannot be found that matches a given target record, the target record will be deleted unless it has been excluded using one of the exclusion options above.

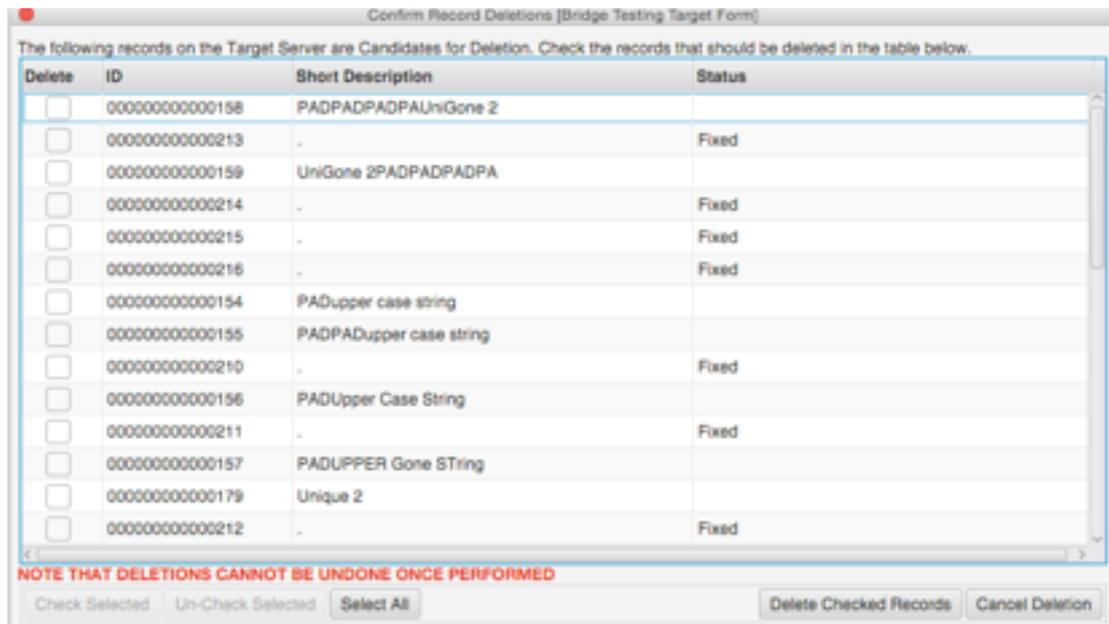


If you select the **Use Defined Query** option then you must define a query using the query builder. Click on the **Query Builder button** to launch the Query Builder Dialog window and enter the required query.



Finally, once you have defined all the options for Record Deletions, click on the **Validate** button to validate the options selected, then click the **Apply** button to confirm your changes. If necessary you can always use the **Revert** button to cancel all Record Deletion settings and start again.

During execution, if one or more records are identified as candidates for deletion then they are displayed in a list like this:



Delete	ID	Short Description	Status
<input type="checkbox"/>	000000000000158	PADPADPADPAUniGone 2	
<input type="checkbox"/>	000000000000213	-	Fixed
<input type="checkbox"/>	000000000000159	UniGone 2PADPADPADPA	
<input type="checkbox"/>	000000000000214	-	Fixed
<input type="checkbox"/>	000000000000215	-	Fixed
<input type="checkbox"/>	000000000000216	-	Fixed
<input type="checkbox"/>	000000000000154	PADupper case string	
<input type="checkbox"/>	000000000000155	PADPADupper case string	
<input type="checkbox"/>	000000000000210	-	Fixed
<input type="checkbox"/>	000000000000156	PADUpper Case String	
<input type="checkbox"/>	000000000000211	-	Fixed
<input type="checkbox"/>	000000000000157	PADUPPER Gone STring	
<input type="checkbox"/>	000000000000179	Unique 2	
<input type="checkbox"/>	000000000000212	-	Fixed

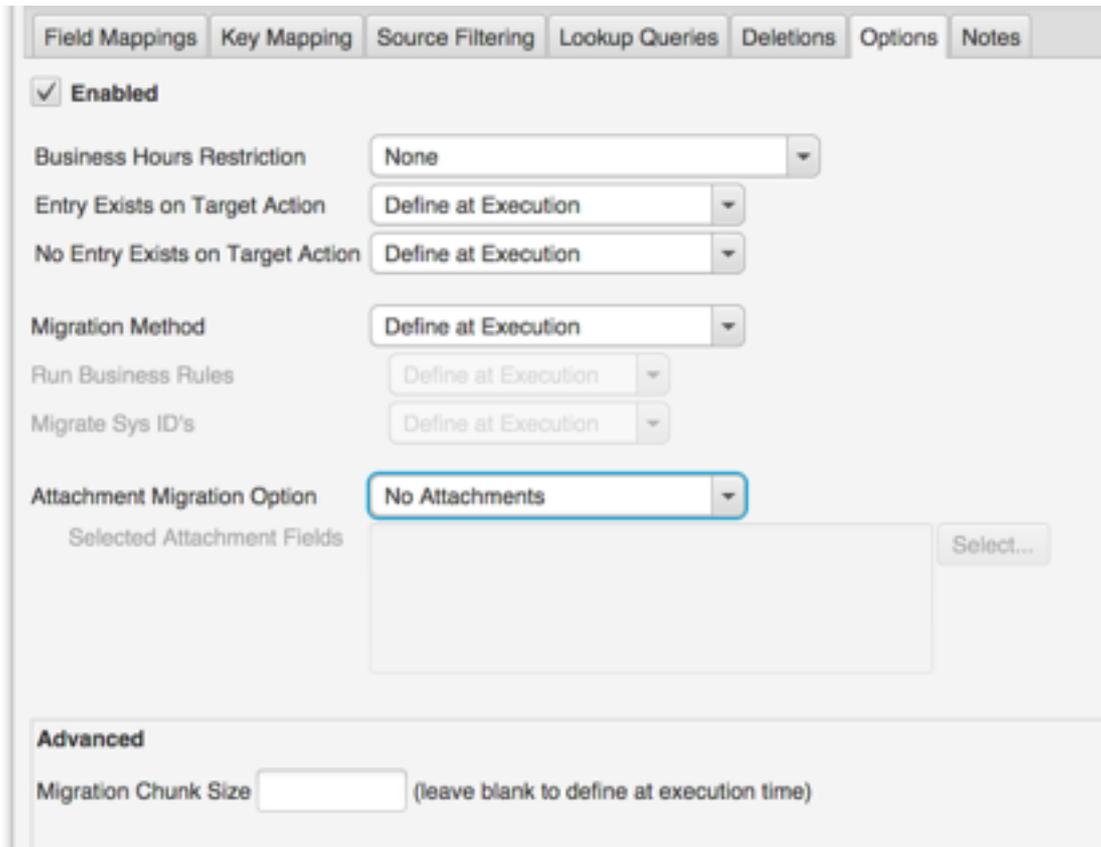
**NOTE THAT DELETIONS CANNOT BE UNDONE ONCE PERFORMED**

Select the records that you want to delete (or use the Select All button to select all records), then click on **Delete Checked Records** to confirm deletion, or select **Cancel Deletion** to cancel.

**NOTE: Once selected, the Delete Checked Records operation cannot be undone. All checked records will be permanently deleted from the Target server.**

## 19. Additional Form Mapping Options

To define additional options for a given Form Mapping, navigate to the **Options** tab for the selected Form Mapping. The following options are presented and explained in more detail in the table below:



Field	Options	Description
Enabled	Checked; Unchecked	If checked the form mapping is migrated otherwise it is skipped during execution.
Business Hours Restriction	None; Migrate Out of Hours Only	If set to migrate out of hours only, then this form mapping will not be migrated during the specified business hours. See later section on defining business hours.

Field	Options	Description
Entry Exists on Target Action	Define at Execution; Error & Continue; Skip Entry; Update Entry;	If Define at Execution is selected, the global execution options for this apply, (see section on Execution Options). Otherwise, the specified option for this form mapping takes precedence over the global setting.
No Entry Exists on Target Action	Define at Execution; Error & Continue; Skip Entry; Create New Entry;	If Define at Execution is selected, the global execution options for this apply, (see section on Execution Options). Otherwise, the specified option for this form mapping takes precedence over the global setting.
Migration Method (Remedy Target Servers)	Define at Execution; Set & Create Merge	If Define at Execution is selected, the global execution options for this apply, (see section on Execution Options). Otherwise, the specified option for this form mapping takes precedence over the global setting. Only applies to target Remedy servers.
Migration Method (ServiceNow Target Servers)	Direct; Import Set (Field Mappings) Import Set (Scripted)	If Define at Execution is selected, the global execution options for this apply, otherwise specified option defined here takes precedence. <b>Direct</b> performs direct inserts/updates on the target tables; No import sets are used. <b>Import Set (Field Mappings)</b> uses import set with mapped fields to migrate the data; If this option is selected then the option to run business rules is also available; <b>Import Set (Scripted)</b> uses a transform map script to migrate the data. If this option is selected then the option to run business rules and the option to migrate Sys Ids are also available. See additional note below.
Run Business Rules (ServiceNow Target Servers)	Define at Execution; Yes; No;	If Define at Execution is selected, the global execution options for this apply, otherwise specified option defined here takes precedence. Only applies when migration method is Import Set (Field Mappings) or Import Set (Scripted).
Migrate Sys ID's (ServiceNow source and target servers)	Define at Execution; Yes; No;	If Define at Execution is selected, the global execution options for this apply, otherwise specified option defined here takes precedence. Only applies when the migration method is Import Set (Scripted).
Attachment Migration Option	No Attachments; Selected Attachments; All Attachments;	Only applies to ServiceNow target servers. See separate chapter below on Migrating Attachments

Field	Options	Description
Migration Chunk Size	Numeric Value	Defines the number of records that should be retrieved and migrated from the source server before the next chunk is retrieved. Leave this field blank to use the default global value defined at execution (see Execution Options section below)

You should provide a value for chunk size < 10,000 if the form mapping includes very large records, i.e. with a lot of very large fields or with a large number of file attachments.

***Important Note on use of Migration Method: Import Set (Scripted)***

Using this method ensures that the Sys ID of the source record is used on the inserted target record thereby maintaining relationships based on reference fields. If a target record is found with a matching Sys ID, this target record is always UPDATED regardless of the Key Mapping settings.

The **Import Set (Scripted)** method should be used if you want to set the Created By, Created On, Updated By, Updated On or Mod Count fields on the target record and have defined field mappings for any of these. It should also be used if you want to update a field with NULL, i.e. clear its current value by using a field mapping with the NULL keyword.

## 20. Defining Project Variables

Project Variables are an attribute of a migration project. They are used in Source Filtering expressions (see section on Source Filtering above) where a value within the expression may change from one execution to the next. They are particularly useful when the same expression is used in multiple Source Filtering Queries within the same project.

Note that Project Variables are completely separate from Temporary Variables which are only used for field mappings. For more information on temporary variables see the previous section on Defining Field Mappings.

Instead of hard-coding a value into the expression, using a project variable allows the user to simply define the value in one place prior to execution. That value is then substituted in all expressions where the variable is used.

For example you might have a Source Filtering Query like this:

```
[Submitter] = 'Fred'
```

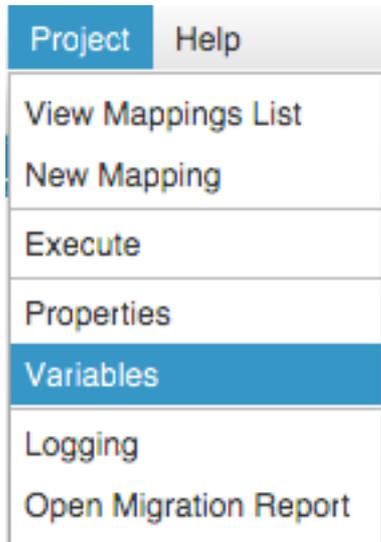
Instead you could use a project variable to achieve the same result like this:

```
[Submitter] = #Submitter#
```

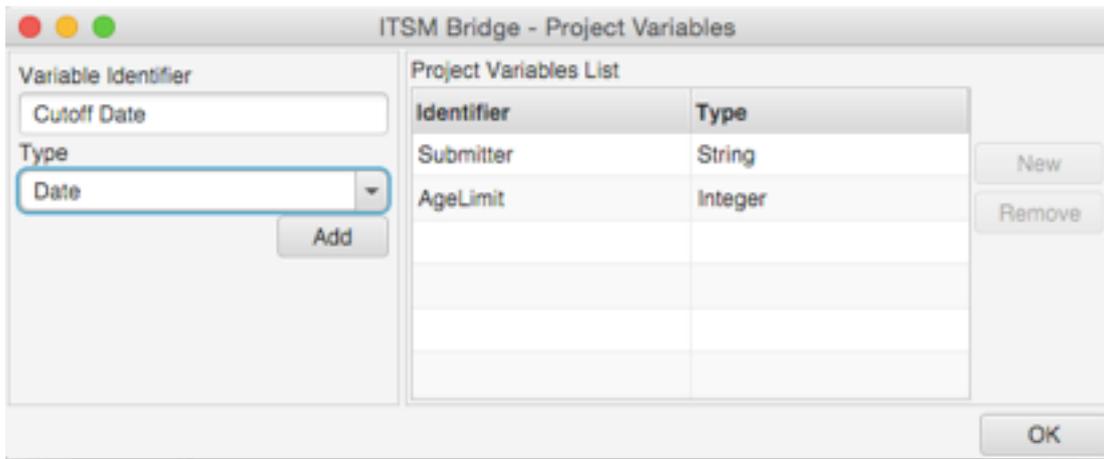
where #Submitter# is the name of the variable.

Then prior to execution you can define the value that you want #Submitter# to take and this value will be substituted in all expressions where #Submitter# is used.

Before you can use a project variable in a Source Filtering expression, you must define that variable for the current project. To define one or more project variables, simply select Variables from the Project menu or right click on the project name in the left pane and select Variables:



The following screen is then presented showing the current list of variables that have been defined for this project.

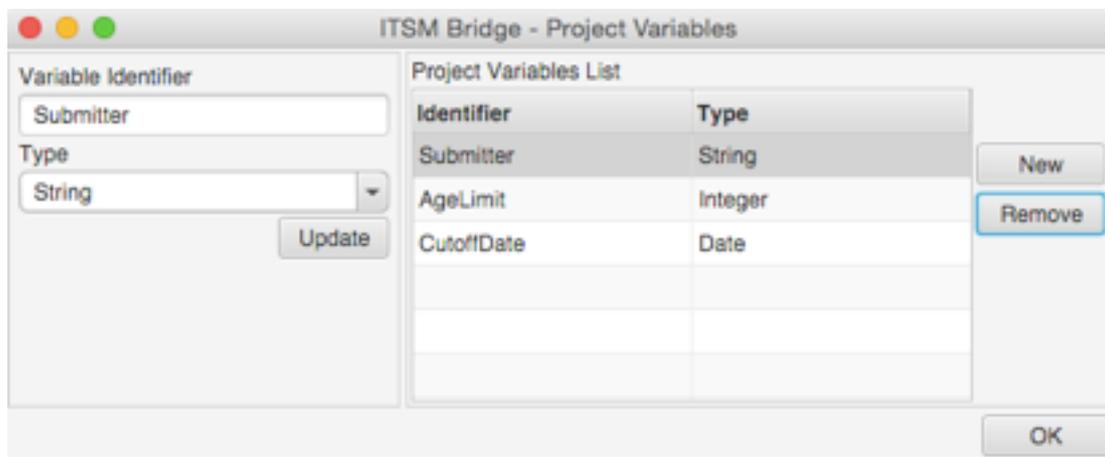


To add a new variable, click on the **New button** on the right of the screen, then enter the variable name and type in the fields on the left and click on the **Add button**.

Note that variables must have unique names and cannot have any spaces in the name. Only alpha-numeric characters and underscores are allowed. The first character cannot be numeric.

The variable type can be String, Integer, Double, Datetime, Date or Time.

To update an existing variable, select the corresponding row from the table, then change the variable name or type using the fields on the left, then click on the **Update button**.



Identifier	Type
Submitter	String
AgeLimit	Integer
CutoffDate	Date

To remove an existing variable, select the corresponding row from the table, then click on the **Remove button** on the right.

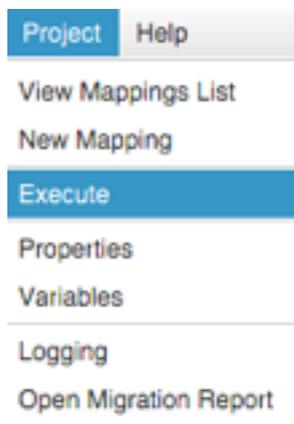
Note that if a variable is currently referenced in an expression, it cannot be renamed or removed.

Variable values can be set for each execution as part of the **Execution Options** (See next section).

## 21. Execution Options

**Warning:** It is recommended that the number of records migrated in any single execution run does not exceed 100,000. If you have more than 100,000 records in your source table, use the Source Filtering option on the corresponding mapping to define a query so that the total record count is reduced. After execution, modify the query so that the next batch of records is selected.

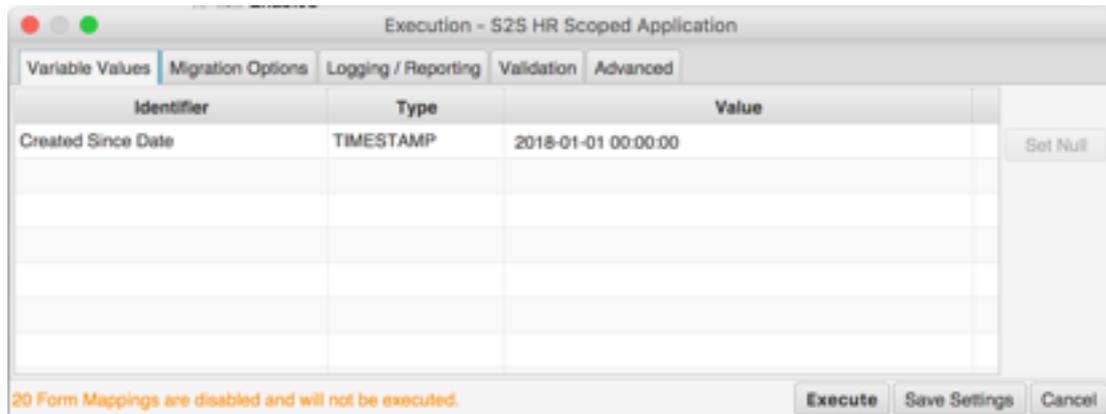
When you are ready to execute your migration project, select **Execute** from the Project menu:



If you have not saved the project since you selected this Execute options then you will be prompted to do so.

The configuration options are presented across five tabs:

**Variable Values,  
Migration Options,  
Logging/Reporting,  
Validation and  
Advanced:**

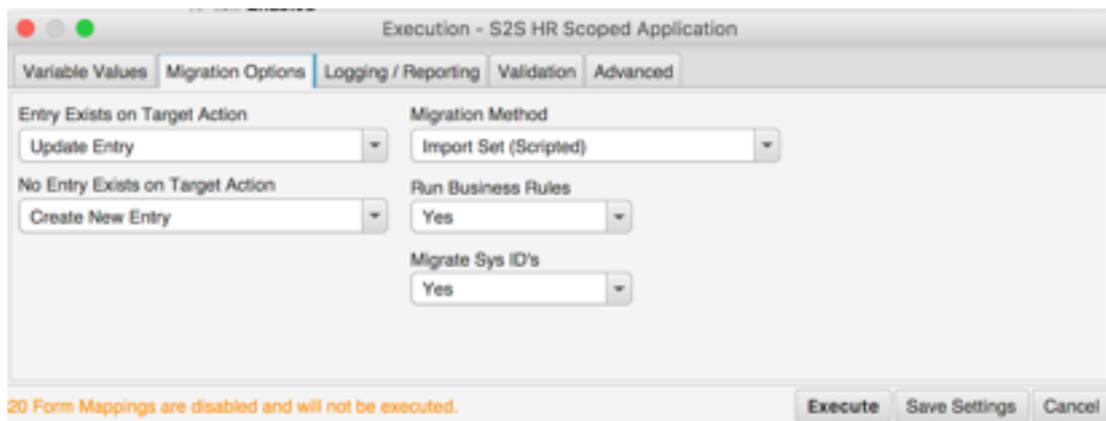


**Defining Variable Values**

To enter a value for a variable, select the corresponding row in the table, then enter the value directly into the Value column. If you want to set the variable to NULL, click on the **Set Null** button. To save the current settings without executing, use the **Save Settings** button. All variables must be defined before the execution can begin.

**Defining Migration Options**

On the second tab, you will see the following configuration options for the execution:



To save the current values without executing, use the **Save Settings** button.

This table describes the options available for each field:

Field	Options	Description
Entry Exists on Target Action	Error & Continue; Skip Entry; Update Entry;	If a matching entry is found on the target form/table based on the key mapping defined for each form mapping then the corresponding action is taken. Note that the Form Mapping Options for this take precedence.
No Entry Exists on Target Action	Error & Continue; Skip Entry; Create New Entry;	If no matching entry is found on the target form/table based on the key mapping defined for each form mapping then the corresponding action is taken. Note that the Form Mapping Options for this take precedence.
Migration Method (ServiceNow Target Servers)	Direct; Import Set (Field Mappings) Import Set (Scripted)	<b>Direct</b> performs direct inserts/updates on the target tables; No import sets are used. <b>Import Set (Field Mappings)</b> uses import set with mapped fields to migrate the data; If this option is selected then the option to run business rules is also available; <b>Import Set (Scripted)</b> uses a transform map script to migrate the data. If this option is selected then the option to run business rules and the option to migrate Sys Ids are also available. See additional options below.
Run Business Rules (ServiceNow Target Servers)	Yes; No;	Only applies when migration method is Import Set (Field Mappings) or Import Set (Scripted).
Migrate Sys ID's (ServiceNow source and target servers)	Yes; No;	Only applies when the migration method is Import Set (Scripted). Sys ID value on source record is migrated to new target record. If matching Sys ID is found on target table, the target record is always UPDATED regardless of Key Mapping Settings. Use this option to set fields: Created, Created By, Updated, Updated By and Mod Count fields. Can also use this option to set fields to NULL using the NULL keyword in field mapping.
Migration Method (Remedy Target Server)	Set & Create; Merge;	When the target application is a Remedy server, Set & Create performs a Modify operation (which triggers workflow), whereas Merge performs an Import operation which is generally faster.

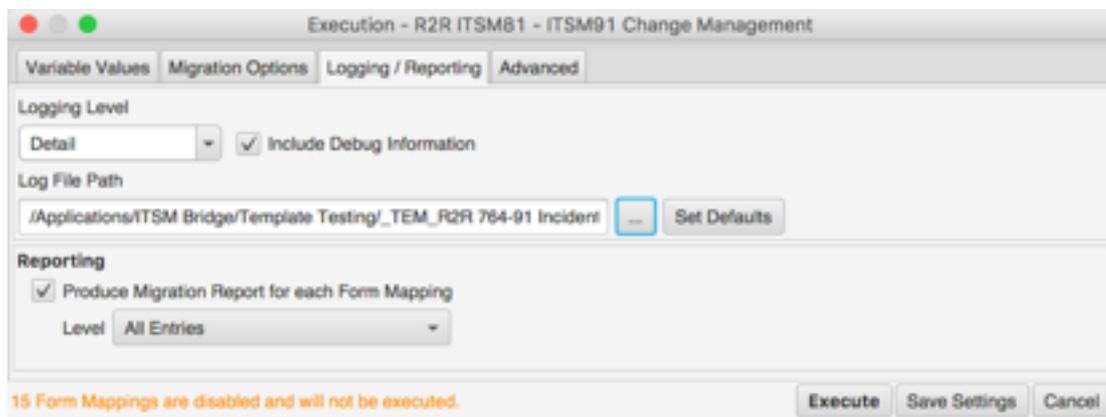
### Defining Logging Options

On the third tab, the **Logging / Reporting** options are presented. Select the Logging Level depending on the level of detail and type of execution logging required from the following options:

**None, Warning, Error, Information or Detail.**

If there is a particular problem for which you need to generate debug information, select the 'Include Debug Information' option as well.

To save the current settings without executing, use the **Save Settings** button.



The screenshot shows a dialog box titled "Execution - R2R ITSM81 - ITSM91 Change Management". It has four tabs: "Variable Values", "Migration Options", "Logging / Reporting", and "Advanced". The "Logging / Reporting" tab is active. Under "Logging Level", there is a dropdown menu set to "Detail" and a checked checkbox for "Include Debug Information". Below that is the "Log File Path" field, which contains the path ".Applications/ITSM Bridge/Template Testing/\_TEM\_R2R 764-91 Incident". To the right of the path field is a button with three dots (a file browser icon) and a "Set Defaults" button. Under the "Reporting" section, there is a checked checkbox for "Produce Migration Report for each Form Mapping" and a dropdown menu for "Level" set to "All Entries". At the bottom of the dialog, there is a status bar that says "15 Form Mappings are disabled and will not be executed." and three buttons: "Execute", "Save Settings", and "Cancel".

To change the **Log File Path**, click on the button to the right of the Log File Path field, then select a folder from the browser window. Alternatively use the **Set Defaults** button to set the Log File Path to the Default for the current project.

### Notes on Execution Logging

1. Including **Debug information** will generate information that can be useful to your support team when troubleshooting issues.
2. All levels of execution logging (other than NONE) will record errors in the log.
3. Logging at the '**Information**' level is recommended for normal use.
4. The log entries displayed in the User Interface during execution will only list entries at or below the level you have set. Note that not all log entries

are displayed in the User Interface, the file log generally shows more information.

- Note that the logging configuration defined above is for execution logs only. For project design-time logging, use the **Project->Logging** menu option.

## Defining Reporting Options

By default, a separate **migration report** is generated for each Form Mapping in the project. If you prefer to have all output for this migration in a single report, then deselect this option.

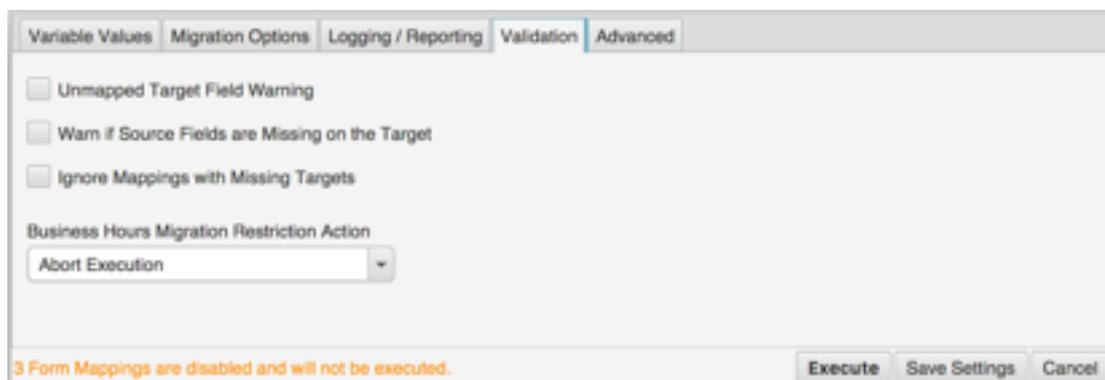
Additionally, you can define the type of records that are included in the reports as follows:

Reporting Option	Description
Errors Only	Generates a report just on any errors found during migration;
Unmigrated Entries	Generates a report just on records that weren't migrated;
Unmigrated Entries and Warnings	Generates a report on records that weren't migrated and any Warnings that were produced as part of the migration;
All Entries	Generates a report on all records in the migration;

Refer to the next section for details of how to view and filter reports after execution.

## Defining Validation Options

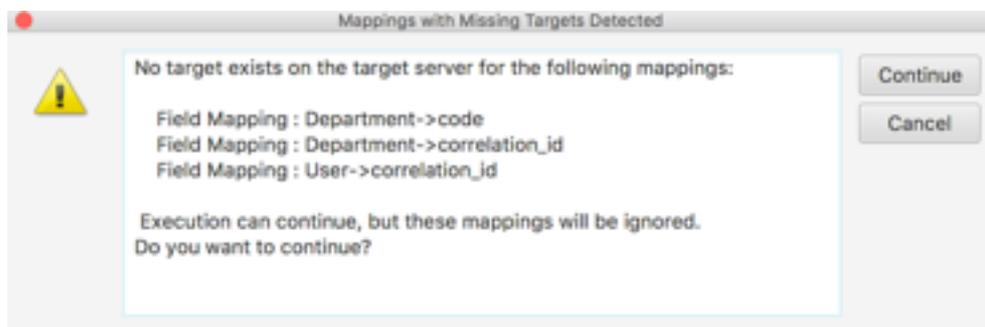
On the fourth tab, the Validation options are presented:



These options are explained in the following table:

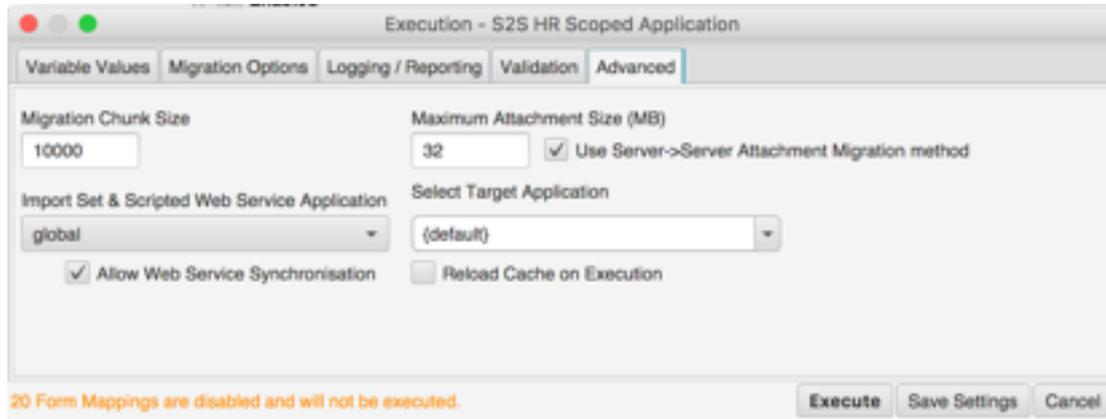
Field	Options	Description
Business Hours Migration Restriction Action	Skip Migration; Abort Execution; Override; Prompt for Action;	If migration is attempted during business hours for form mapping where this is prohibited, either skip the migration for this form, abort the execution, override the restriction or prompt the user to skip, abort, override or retry. If Prompt for Action is selected, the execution is paused until the user selects an option. If Retry is selected the business hours are checked again against the current time to determine if the migration can continue.
Unmapped Target Field Warning	Set or Unset	Only applicable when the source and target server are the same type. Generates a warning during execution for all mappings where source and target form/table are the same and if any fields are not mapped.
Warn if Source Fields are Missing on the Target	Set or Unset	Only applicable when the source and target server are the same type. Generates a warning during execution for all mappings where source and target form/table are the same and one or more fields exist on the source form/table but not on the target.
Ignore Mappings with Missing Targets	Set or Unset	If no target exists for form or field mappings in the project and the mapping is not referenced elsewhere, it will be excluded from the project execution. A warning will be presented following initialisation if any such mappings are found.

If a missing field is identified during execution, a warning message like this is displayed:



## Defining Advanced Migration Options

On the fifth tab, the advanced configuration options are presented:



The **migration chunk size** defines the number of records that should be retrieved from the source server for processing before the next chunk of data is selected. If the chunk size is set too high then there is a possibility that the machine where ITSM Bridge is installed could run out of memory before the chunk processing is completed. This would only occur if the records were especially large (for example if they had a large number of attachments) and the available memory on the host machine was low, (recommended minimum is 8GB RAM). In this case the chunk size should be reduced below the default of 10,000 records.

Note that the chunk size can also be set on individual form mappings where necessary (see Form Mapping Options Tab). The form mapping chunk-size setting takes precedence over the Execution chunk size setting defined here.

### Import Set Application

This is the application where any referenced import sets should reside. If they do not exist, they will be created in this application, provided the 'Allow Import Set Web Service Synchronisation' option is enabled.

### Allow Import Set Web Service Synchronisation

This option applies to ServiceNow target servers only.

If checked, ITSM Bridge will automatically create the required Import Sets, if either the '**Import Set (Field Mappings)**' or '**Import Set (Scripted)**' migration methods are selected (see previous section).

If the Import Set already exists, it will be synchronised with any custom fields added to the corresponding table mapping.

If this option is unchecked and an Import Set is not found at execution time then a fatal error will be reported.

## Maximum Attachment Size (MB)

User can define a limit to the size of attachments to migrate. If this limit is too high, there is a risk of timeouts in the server calls to perform the migration. This limit only applies to ServiceNow target servers.

## Use Server->Server Attachment Migration Method

This gives the user the option of using the generally faster scripted method of migrating attachments between ServiceNow servers. If unchecked then the slower Server->Client->Server method is used. Realistically, the slower method would only be used if there was an issue in connectivity between the source and target servers preventing the script from working or the user did not want to create the attachment migration script on the target server.

To support this faster attachment migration method, a scripted web service called **<app name>\_migrate\_attachments\_<version no.>** is created on the target instance, where **<name>** is the name of the **Import Set Application** above and **version no.** is the version of the script.

This option only applies to ServiceNow -> ServiceNow migrations.

## Select Target Application

Only applicable when the target server type is ServiceNow. Sets the application scope for all records created on the target server. The application scope is set (for the admin user) when the migration starts and is reset to the original value after migration completes.

Note for **Select Target Application**, the Application Scope is set for the login ID being used to connect to the target server. Note that this may impact existing sessions for the same login id, therefore it is recommended to ensure no other user or process is connecting with this login during migration.

## Reload Cache on Execution

If this option is checked, server information such as form/field properties that were retrieved at design time, are re-loaded. This will slow the initialisation

stage of the migration but may be required if changes have been made to form/field definitions on the server since the project was loaded.

## ***Starting the Migration***

When you have finished checking all the migration options, click on the **Execute button** on the bottom right of the current window. This will present a confirmation dialogue with the option to cancel or continue with the migration.

## ***Note on Recoverable Errors***

At all points after the initialisation stage of the execution, errors relating to network connectivity and/or server availability are trapped and treated as 'Recoverable', (i.e. it is possible that the operation can succeed if retried).

Recoverable errors that are found will result in the operation being retried after a short period. After 10 such attempts, execution is halted and user input is required to continue (Retry/Abort).

## 22. Reporting

ITSM Bridge provides three different types of reports which are accessible from the Reporting Menu. These are described in more detail in the following sections.

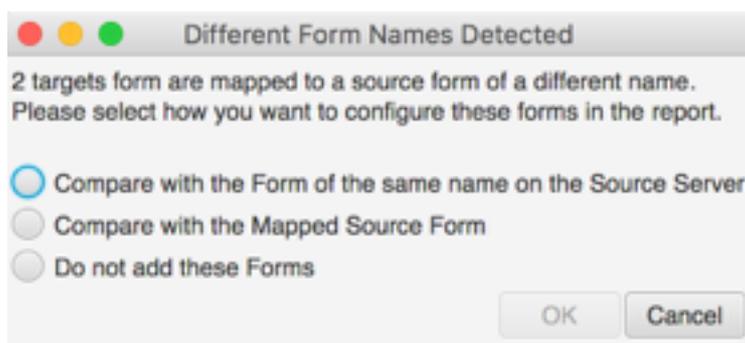
### ***Difference Report (for BMC Remedy servers only)***

The Difference Report can be used to compare the field definitions between forms on Source and Target servers. By default, the target form is compared with the form with the same name (if it exists) on the Source server. The differences identified include:

- missing fields on either target or source server.
- different field lengths
- different field types
- different default values
- different min/max values (for integer fields)
- different mandatory / non mandatory property
- different allowed values for enum fields

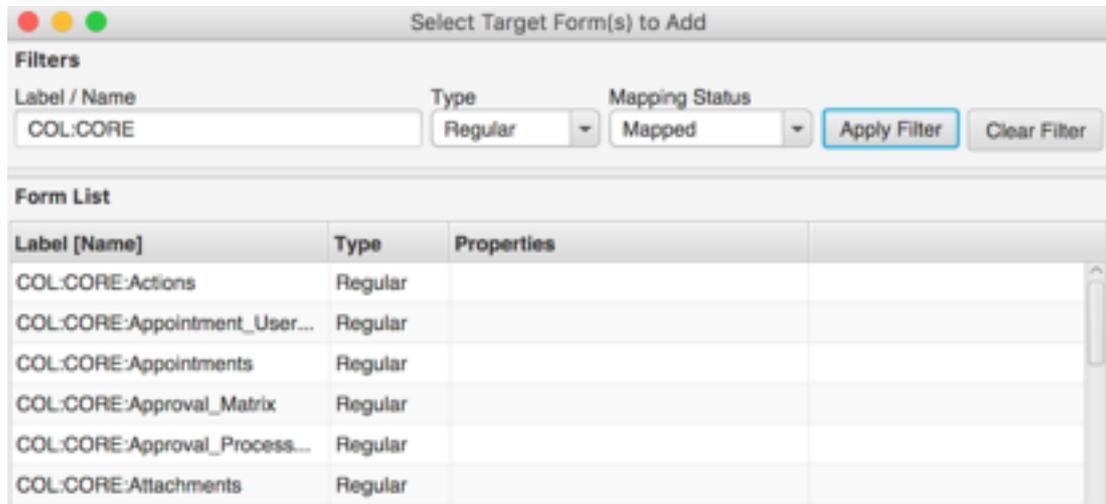
The forms can either be added to the report from the full server list (using the **Add Target Forms** button), OR added from the current project (using **Add All from Project**)

If you choose the **Add All from Project** button and one or more forms are mapped with different names between source and target, then the following dialogue appears:



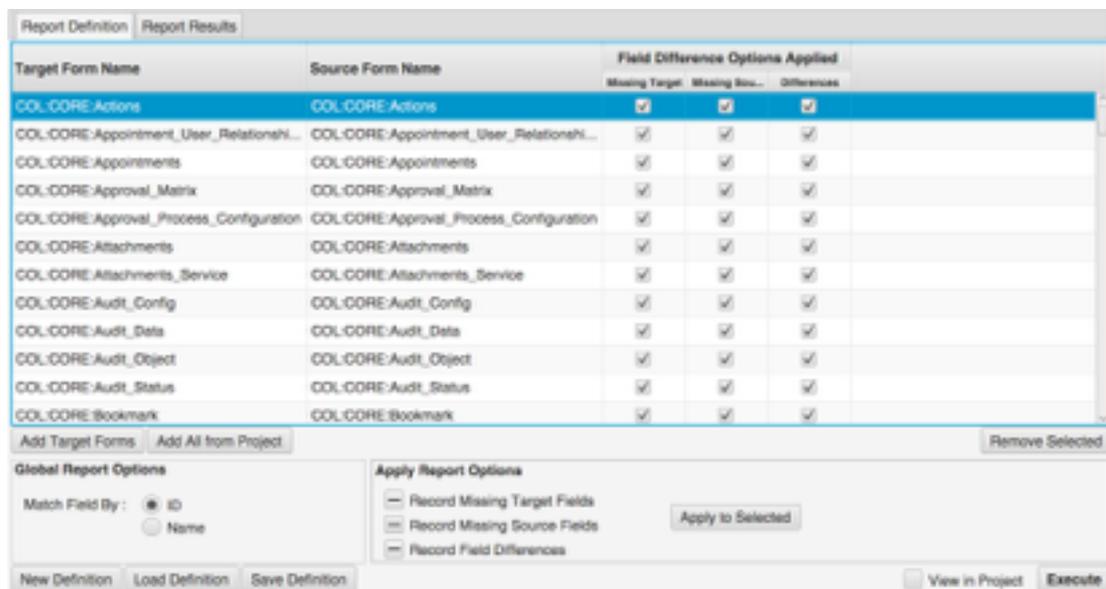
Select the option that best meets your requirements, then click OK to continue. Note, the default option in this case is to only report on differences between matching fields, not fields missing on source/target forms.

If instead you choose the **Add Target Forms** button, use the filter options at the top to restrict the list of forms by name prefix, type or whether they are mapped or not like this:



Label [Name]	Type	Properties
COL:CORE:Actions	Regular	
COL:CORE:Appointment_User...	Regular	
COL:CORE:Appointments	Regular	
COL:CORE:Approval_Matrix	Regular	
COL:CORE:Approval_Process...	Regular	
COL:CORE:Attachments	Regular	

After selecting the required forms, or using the Add All from Project button, the report definition window is displayed like this:



Target Form Name	Source Form Name	Field Difference Options Applied		
		Missing Target	Missing Sou...	Differences
COL:CORE:Actions	COL:CORE:Actions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Appointment_User_RelationSH...	COL:CORE:Appointment_User_RelationSH...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Appointments	COL:CORE:Appointments	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Approval_Matrix	COL:CORE:Approval_Matrix	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Approval_Process_Configuration	COL:CORE:Approval_Process_Configuration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Attachments	COL:CORE:Attachments	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Attachments_Service	COL:CORE:Attachments_Service	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Audit_Config	COL:CORE:Audit_Config	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Audit_Data	COL:CORE:Audit_Data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Audit_Object	COL:CORE:Audit_Object	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Audit_Status	COL:CORE:Audit_Status	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
COL:CORE:Bookmark	COL:CORE:Bookmark	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Use the **Global Report Options** to select whether you want to compare fields by matching field name or by matching field ID.

By default the **Field Difference Options** are all applied. These include fields that are on the source form but missing from the target, fields that are on the

target form but missing from the source and fields where differences in field properties are identified between source and target.

To make changes to the Field Difference Options, select one or more forms from the list then use the **Apply Report Option** settings to modify each value as follows:

- A dash (-) leaves that option unchanged
- A tick sets the option on
- A blank sets the option off.

Use the **Apply to Selected** button to apply the changes to the selected records.

To Save the current Report Definition, use the **Save Definition** button.  
 To Load a previously saved definition, use the **Load Definition** button.  
 To create a new definition from scratch, use the **New Definition** button (current definition will be overwritten).

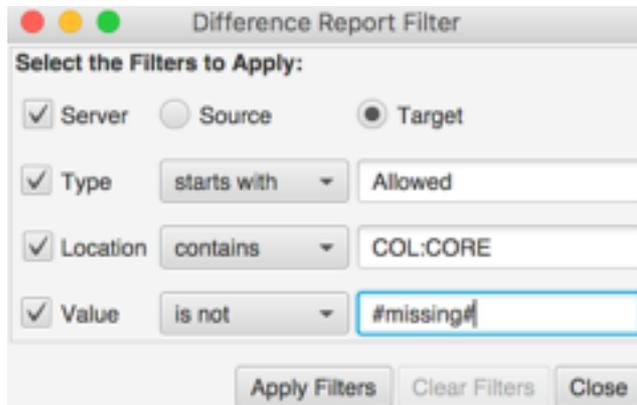
Once you have finished selecting the options you want for your report, click on the **Execute** button to generate the report output.

The report output is displayed in a separate tab like this:

Report Definition		Report Results		
Server	Type	Location	Values	
			Target	Source
SOURCE	Missing Field	COL:CORE:Actions	301600300 [DataTags]	#missing#
SOURCE	Missing Field	COL:CORE:Actions	875038011 [Form_Mode]	#missing#
SOURCE	Missing Field	COL:CORE:Actions	875038010 [HTML_Summary]	#missing#
SOURCE	Missing Field	COL:CORE:Actions	875038009 [Image]	#missing#
SOURCE	Missing Field	COL:CORE:Actions	179 [Instanceid]	#missing#
SOURCE	Missing Field	COL:CORE:Actions	875038012 [Modify_View_Only]	#missing#
SOURCE	Missing Field	COL:CORE:Actions	775100000 [Parent_Instanceid]	#missing#
TARGET	Missing Field	COL:CORE:Actions	#missing#	Actions_Record_Key_old [875013...
TARGET	Missing Field	COL:CORE:Actions	#missing#	Hierarchy_Key [875000000]
SOURCE	Missing Field	COL:CORE:Appointment_User_Relationships	875114010 [ATT_Invite/Cancel_...	#missing#
SOURCE	Missing Field	COL:CORE:Appointment_User_Relationships	875114009 [ATT_Invite/Invite_For_...	#missing#
SOURCE	Missing Field	COL:CORE:Appointment_User_Relationships	875113015 [Appointment_Attend...	#missing#
SOURCE	Missing Field	COL:CORE:Appointment_User_Relationships	301600300 [DataTags]	#missing#
SOURCE	Missing Field	COL:CORE:Appointment_User_Relationships	179 [Instanceid]	#missing#
SOURCE	Missing Field	COL:CORE:Appointment_User_Relationships	775100000 [Parent_Instanceid]	#missing#
SOURCE	Missing Field	COL:CORE:Appointment_User_Relationships	875047000 [People_Key]	#missing#
TARGET	Missing Field	COL:CORE:Appointment_User_Relationships	#missing#	Appointment_Membership_Key [875...

Processing Completed  View in Project

A separate row is displayed for every field where a difference is identified. To Filter the results, use the **Filter Results** button. The filtering options are displayed like this:



You can use the **Difference Report Filter** to filter the output by server (source or target), Difference Type (missing, Allowed Values etc), Location (form name and field) or Value (the value relating to the difference).

Additionally you can enter a text value for the Type, Location or Value to restrict the output to records that either contain, start with, are equal to, or are not equal to the text entered in each case.

To Save the results to a CSV file for future reference, use the **Save Results** button. By default, the output is saved in the Reports/Difference Reports folder under the current project. The CSV output file includes the following information:

- Server (Source or Target)
- Difference Type (Missing Field, Allowed Values etc)
- Location Description
- Target Value
- Source Value
- Related Target Form
- Related Source Form
- Related Field

To load a previously saved Difference Report CSV file, use the **Load Results** button.

To view the results on the current project, select the **View in Project** checkbox. Forms and Target Fields that are different to the corresponding Form/Field on the Source Form will be identified with the (!) icon in the Form Mapping and Field Mapping lists. The (!) icon is shown on the left of the Form Mapping Lists like this:

Order	Identifier	Target Form	Source Form	Enabled
1	COL:CORE:Company	COL:CORE:Company	COL:CORE:Company	<input checked="" type="checkbox"/>
2	COL:CORE:Organization	COL:CORE:Organization	COL:CORE:Organization	<input checked="" type="checkbox"/>
3	COL:CORE:Department	COL:CORE:Department	COL:CORE:Department	<input checked="" type="checkbox"/>
4	COL:CORE:Categories	COL:CORE:Categories	COL:CORE:Categories	<input checked="" type="checkbox"/>

Clicking on any of the (!) icons displays details of the differences for that form mapping like this:

Field	Type	Target Value	Source Value
DataTags	Missing Field	301600300 [DataTags]	#missing#
InstanceId	Missing Field	179 [InstanceId]	#missing#
Parent_InstanceId	Missing Field	775100000 [Parent_InstanceId]	#missing#
Hierarchy_Key	Missing Field	#missing#	Hierarchy_Key [87...

The (!) icon is shown and on the Field Mapping List like this:

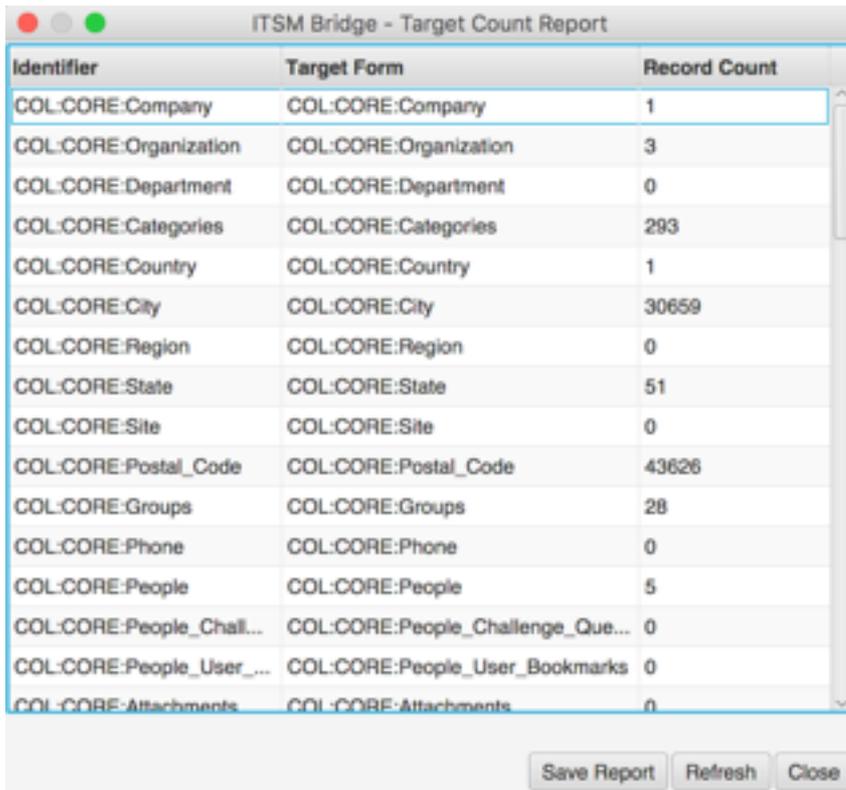
Field Name	Field Label	Field Type	Mapping Type	Source
Create Date	Create Date	Timestamp		
DataTags	DataTags	Character		
Description	Description	Character	Simple	Description

Clicking on the (!) icon displays more information on the difference identified for that field like this:

Field	Type	Target Value	Source Value
DataTags	Missing Field	301600300 [DataTags]	#missing#

### Target Count Report

The Target Count Report generates a real-time total count of all records for each form specified as a target form in the project mapping list. This can be run at any time but is generally run both before and after a migration. The output of the report looks like this:



Identifier	Target Form	Record Count
COL:CORE:Company	COL:CORE:Company	1
COL:CORE:Organization	COL:CORE:Organization	3
COL:CORE:Department	COL:CORE:Department	0
COL:CORE:Categories	COL:CORE:Categories	293
COL:CORE:Country	COL:CORE:Country	1
COL:CORE:City	COL:CORE:City	30659
COL:CORE:Region	COL:CORE:Region	0
COL:CORE:State	COL:CORE:State	51
COL:CORE:Site	COL:CORE:Site	0
COL:CORE:Postal_Code	COL:CORE:Postal_Code	43626
COL:CORE:Groups	COL:CORE:Groups	28
COL:CORE:Phone	COL:CORE:Phone	0
COL:CORE:People	COL:CORE:People	5
COL:CORE:People_Chall...	COL:CORE:People_Challenge_Que...	0
COL:CORE:People_User_...	COL:CORE:People_User_Bookmarks	0
COL:CORE:Attachments	COL:CORE:Attachments	0

Buttons: Save Report, Refresh, Close

Use the **Save Report** button to save the report output to a CSV file for future reference. By default the report is saved in the **Reports/TargetCountReports** folder for the current project.

Use the Refresh button to re-run the report at any time.

### Migration Reports

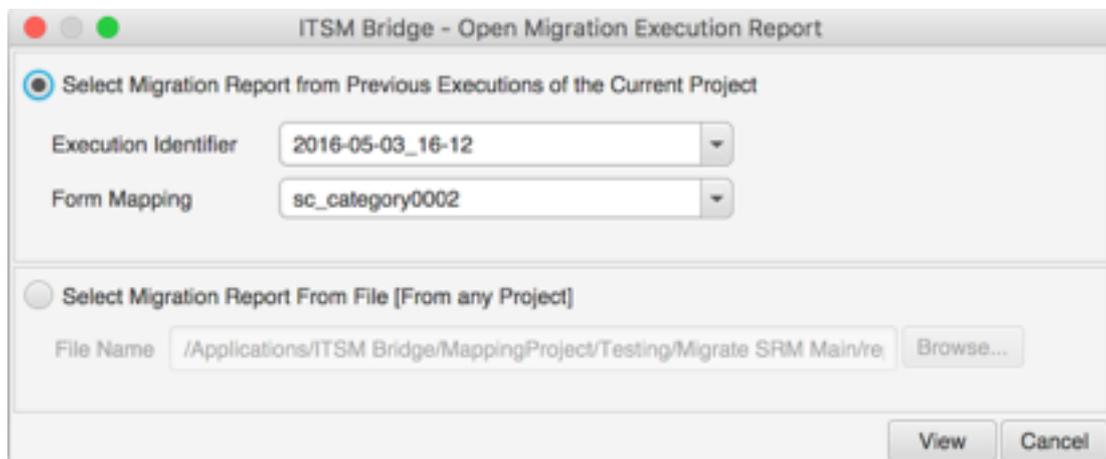
ITSM Bridge provides comprehensive reporting on all migration runs based on the options selected in the Logging/Reporting configuration for each execution (see previous section).

It is possible to view reports either for the current project or for any other project for which reports have been generated without having to open each project separately.

To open the report selection window, select **Open Migration Report** from the **Report menu** or right-click on the project name in the left navigation pane and select **Open Migration Report**.

After selecting this option, a new window is presented (see below), which allows you to either select a migration report from previous executions of the current project OR to select a migration report from a File (from any project).

If you select the first option, then you must first select the **Execution Identifier**. This is simply the date and time that the last execution was run for the current project. If you want to view reports from an earlier execution, simply select the corresponding execution identifier from the drop-down menu.



Next, select the name of the **Form Mapping** for which you want to view the migration report. Note that separate reports are generated for each Form Mapping in the migration project to make it easier to view and identify errors.

Finally click on the View button to view the corresponding report.

Alternatively, you can use the '**Select Migration Report from File (From any Project)**' option to view a report from a different project. Enter the folder directly or use the **Browse button** on the right to open a folder browsing window to select and open the report.

After selecting the **View button** to open the report, a new tab is opened in the right pane. This pane displays the name of the report file at the top, then beneath a list of filtering options and beneath that the report output.

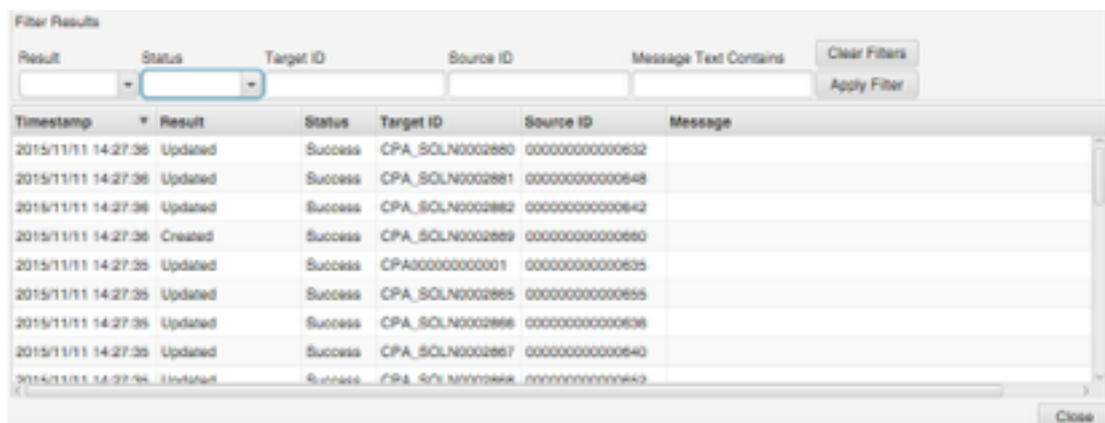
By default, the full report output is displayed with a number of column headings (see table below). To sort by a particular column, simply click on the column heading. To reverse the sort order, click on the same column heading again.

To restrict the report to a particular set of records, use the filtering section at the top. Enter one or more values in the Filter fields, then click on the **Apply Filters** button to filter the report output to match the criteria specified. For example, to just view those records where the migration was not completed, select **“Not Completed”** from the Result Field and click on **Apply Filters**.

To return to the full list of records in this report, click on the **Clear Filters** button.

Report Column Heading	Description
Timestamp	The date and time that the migration of this record took place
Result	Either Created, Updated or Not Completed
Status	Either Success, Warning, Skip or Error
Target ID	The unique ID of the Target record used to identify which record to create/update.
Source ID	The unique ID of the Source record used to identify which record to migrate.
Message	Any associated message text for the migration of this record.

## Report Output Column Headings



Timestamp	Result	Status	Target ID	Source ID	Message
2015/11/11 14:27:36	Updated	Success	CPA_SQLN000280	000000000000632	
2015/11/11 14:27:36	Updated	Success	CPA_SQLN000281	000000000000648	
2015/11/11 14:27:36	Updated	Success	CPA_SQLN000282	000000000000642	
2015/11/11 14:27:36	Created	Success	CPA_SQLN000289	000000000000660	
2015/11/11 14:27:35	Updated	Success	CPA000000000001	000000000000635	
2015/11/11 14:27:35	Updated	Success	CPA_SQLN000285	000000000000655	
2015/11/11 14:27:35	Updated	Success	CPA_SQLN000286	000000000000638	
2015/11/11 14:27:35	Updated	Success	CPA_SQLN000287	000000000000640	
2015/11/11 14:27:34	Initiated	Success	CPA_SQLN000288	000000000000643	

## Sample report output (unfiltered):

## Note on Reports:

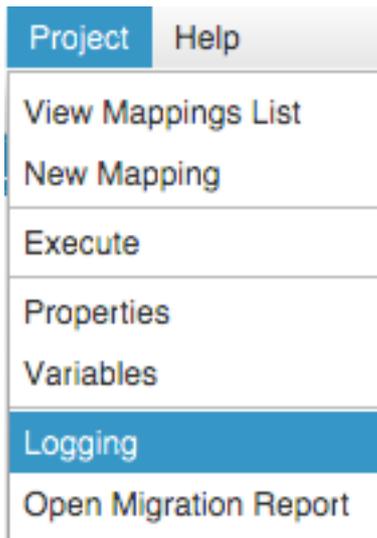
Every report generated is stored as a **CSV** file in the following location:

**<project root>\reports\Execution<Execution ID>\<form mapping>**

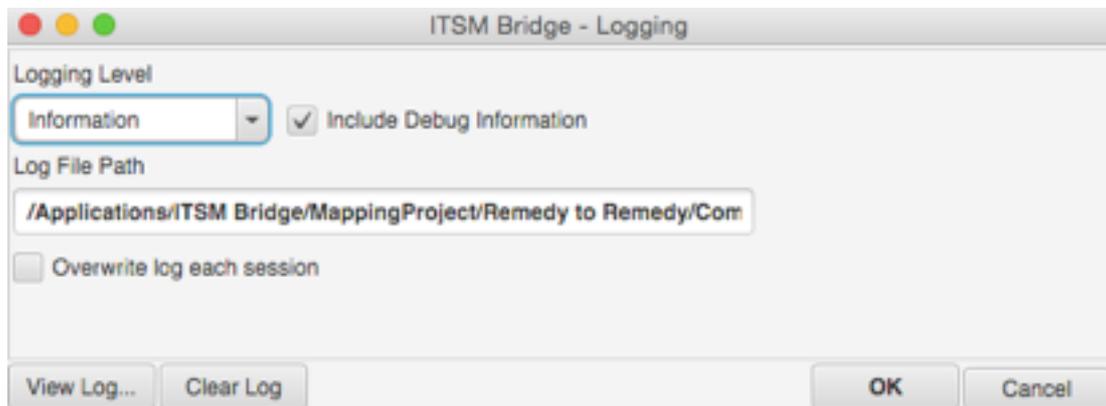
These report files can be opened in a spreadsheet application for more in depth interrogation.

## 23. Project Logging

In addition to Execution Logging (see previous section on Execution Options), ITSM Bridge provides logging of key design-time activity for troubleshooting purposes. To view the project logging configuration settings, select **Logging** from the Project menu, or right-click on the project name in the left navigation pane and select Logging.



After selecting this option, the following window is displayed:



To overwrite the log with each execution, select the checkbox '**Overwrite log each session**'

To view the log by opening in a separate window, click on the **View Log button**. To clear the log at any time, click on the **Clear Log button**.

If you make changes to any of the logging configuration settings in this window, use the **OK button** to save your changes or click on the **Cancel button** to discard your changes.

## 24. Restricting Migrations to Non-Business Hours

### *Defining Restrictions for Form Mappings*

It may be desirable in some circumstances to restrict one or more form migrations to non-business hours. ITSM Bridge allows you to define which Form Mappings within a migration project are allowed to run during normal business hours and which are not.

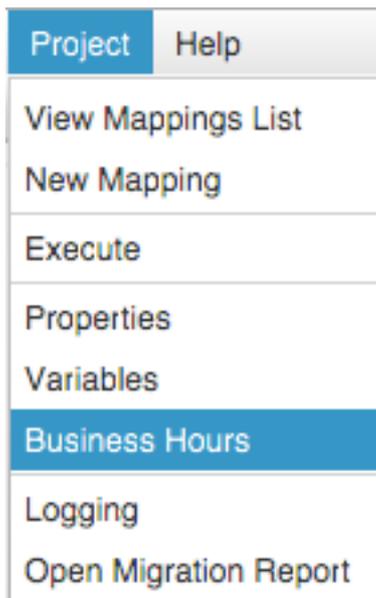
To restrict a Form Mapping to Non-Business Hours, open the Form Mapping from the Mapping List, then click on the **Options Tab**.

To prevent the Form Mapping from running during business hours, select **Migrate Out of Hours Only** from the Business Hours Restriction menu.

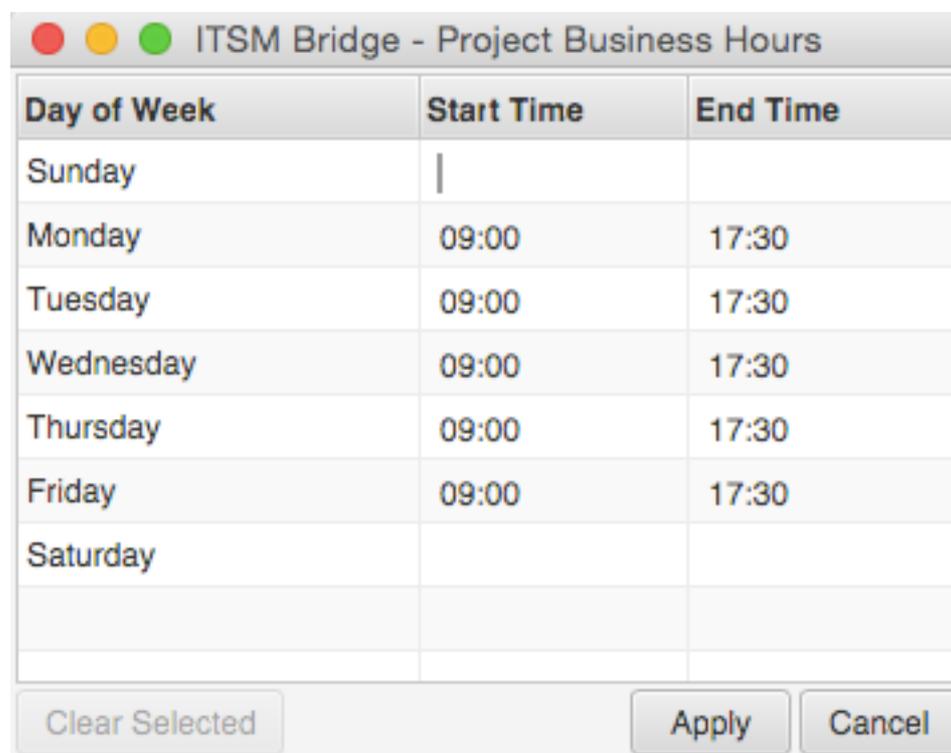
To allow the Form Mapping to run during business hours, select **None (default)** from the Business Hours Restriction menu.

### *Defining Business Hours for the Project*

The business hours are defined for the project as a whole. To define the business hours for the current project, select **Business Hours** from the **Project menu**.



After selecting Business Hours, the following window is displayed:



Day of Week	Start Time	End Time
Sunday		
Monday	09:00	17:30
Tuesday	09:00	17:30
Wednesday	09:00	17:30
Thursday	09:00	17:30
Friday	09:00	17:30
Saturday		

Clear Selected      Apply      Cancel

To enter the business hours for a particular day, simply select the corresponding row then enter the **Start time** and **End Time**. If a row is left blank (like Saturday and Sunday in the example above), then the migration will effectively run with no business hours during those days. All times during those days will be treated as non-business hours. When you have finished entering business hours for each day, click on the **Apply button** to save your changes.

## 25. Migrating Attachments

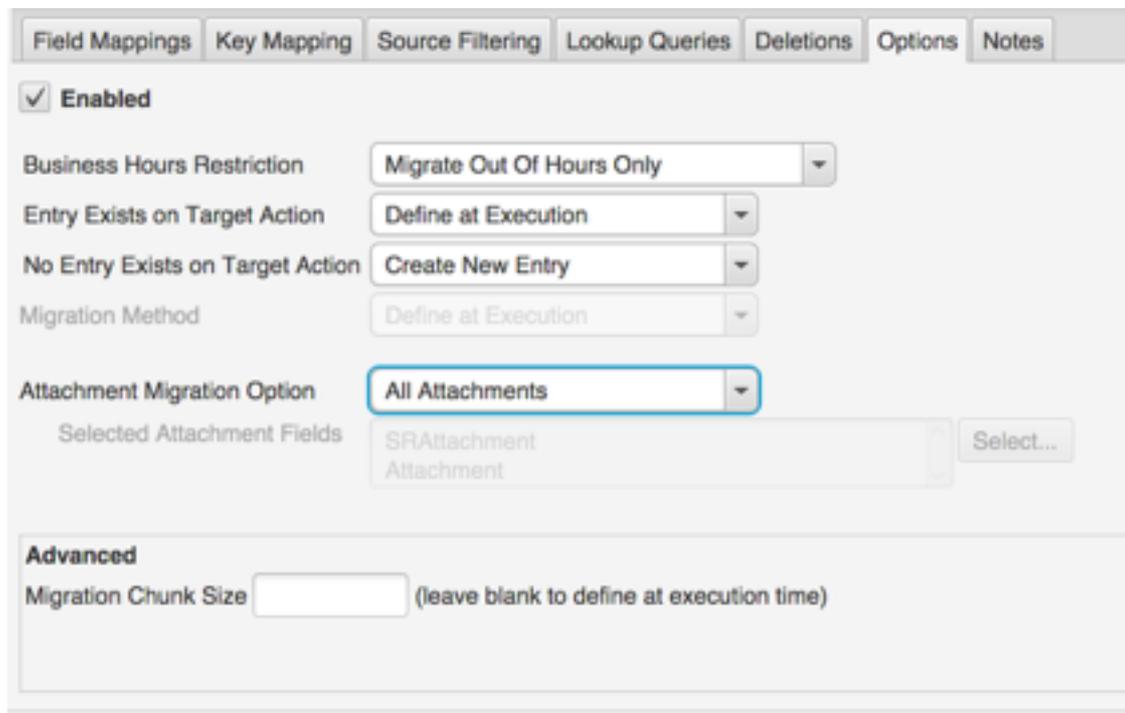
The method for migrating attachments is different depending on whether you are migrating to/from a BMC Remedy server or to/from a ServiceNow instance. Migrating attachments from an Oracle or SQL Server data source is not currently supported.

### *Migrating BMC Remedy Attachments to another BMC Remedy server*

All BMC Remedy attachment fields are listed in the field-list for the corresponding form mapping. To migrate an attachment field, create a **simple** or **lookup** field-mapping for the target attachment field and select the source attachment field that you want to migrate. No further configuration is required.

### *Migrating ServiceNow Attachments to another ServiceNow instance*

To migrate all the attachments for a given table, select the Options tab for the corresponding Form Mapping and select the **All Attachments** option.



The screenshot shows the 'Options' tab of a configuration interface. At the top, there are tabs for 'Field Mappings', 'Key Mapping', 'Source Filtering', 'Lookup Queries', 'Deletions', 'Options', and 'Notes'. The 'Options' tab is active. Below the tabs, there is a section with a checked 'Enabled' checkbox. The configuration options include:

- Business Hours Restriction:** A dropdown menu set to 'Migrate Out Of Hours Only'.
- Entry Exists on Target Action:** A dropdown menu set to 'Define at Execution'.
- No Entry Exists on Target Action:** A dropdown menu set to 'Create New Entry'.
- Migration Method:** A dropdown menu set to 'Define at Execution'.
- Attachment Migration Option:** A dropdown menu set to 'All Attachments', which is highlighted with a blue border.
- Selected Attachment Fields:** A text input field containing 'SRAttachment' and 'Attachment', with a 'Select...' button to the right.

Below these options is an 'Advanced' section with a 'Migration Chunk Size' input field and the text '(leave blank to define at execution time)'.

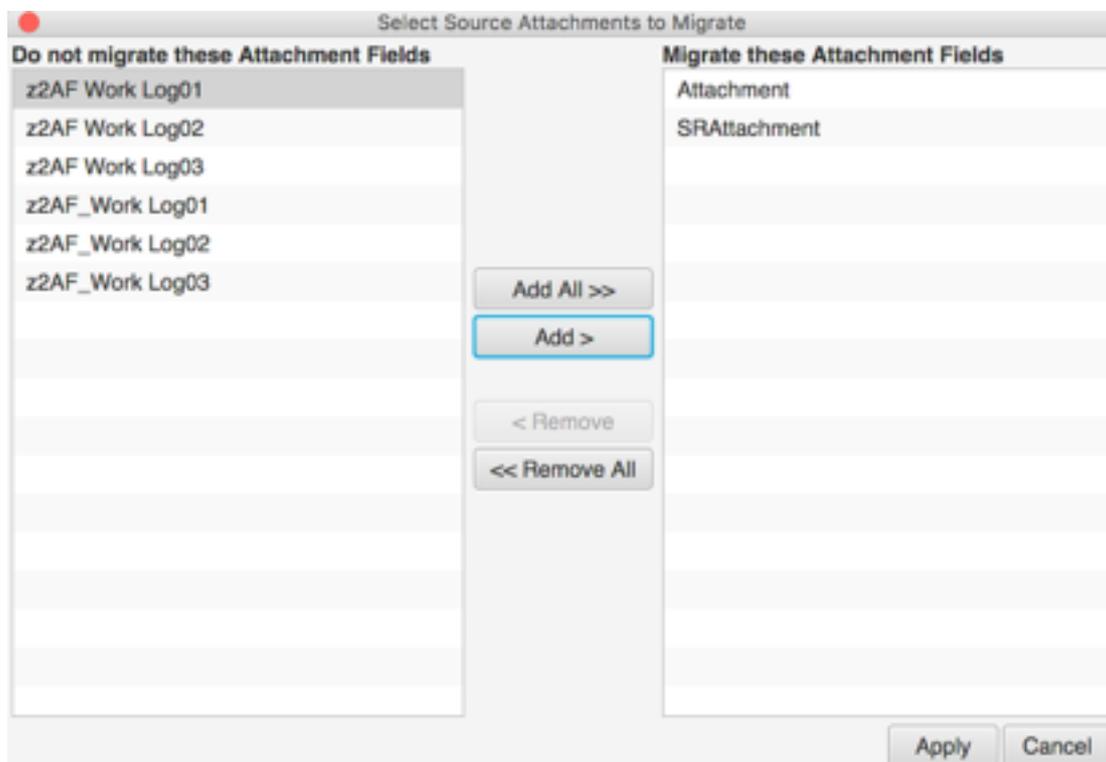
When this option is selected, all attachments for records that are themselves migrated are also migrated.

**Note:** A scripted web service called `ITSMBridge_Get_Attachments_3.x.x` is created on the source instance to support this functionality.

### ***Migrating BMC Remedy Attachments to a ServiceNow instance***

To migrate **all** attachments from a Remedy source form to a ServiceNow table, the configuration required is identical to the configuration for migrating ServiceNow attachments to another ServiceNow instance (see previous section).

To migrate **selected** attachments from a Remedy source form to a ServiceNow instance, select the Options tab for the corresponding Form Mapping, select the **Selected Attachments** option, then click on the **Select** button. The following screen is then presented:



Select the attachments that you want to migrate using the **Add/Add All buttons** then click on **Apply** button to save.

## ***Notes on migrating attachments to a ServiceNow instance***

If an attachment already exists on the target record with the same name and size then the attachment is NOT migrated. If an attachment already exists on the target record with the same name but different size then the attachment is migrated and replaces the original.

## ***Notes on migrating large attachments to a ServiceNow instance***

**Warning:** It is recommended that the maximum size of any attachment does not exceed 32MB and that the attachment size limit be set to a value less than or equal to this.

When migrating to a ServiceNow instance, the attachment size is limited to the value defined in the **Advanced Execution Options**. Any attachments larger than this are excluded from the migration but included in the migration report.

When migrating large attachments to a ServiceNow instance, if the migration takes more than 60 seconds then a time-out will occur. The following message may appear in the log and the migration report for the corresponding table mapping: **Failed to Post Attachment Data: Failure during REST Call.**

If this occurs, you can increase the timeout on the target ServiceNow instance by selecting **System Definition -> Transaction Quota Rules** from the menu (requires administrator permissions). Update this record by increasing the default limit (60 seconds) to a suitable limit based on the size of your attachments and the speed of your network connection.

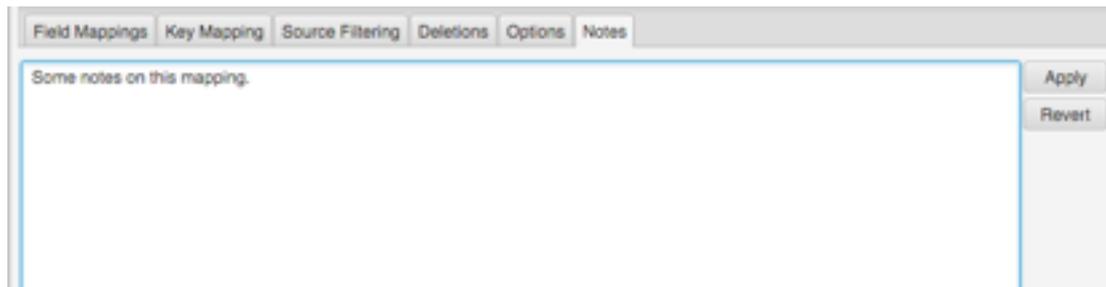
In some situations when migrating large attachments, the migration may indicate a failure to connect to the target server after 60 seconds. If the target server is still accessible using a web browser on the same desktop client then it may be necessary to increase `request_processing_timeout` for soap. To do this, navigate to the **sys\_properties** table (requires administrator permissions), and search for the entry called:

**`glide.soap.request_processing_timeout`**

Update this record by increasing the default timeout (60 seconds) to a suitable limit based on the size of your attachments and the speed of your network connection

## 26. Adding Notes to Form Mappings

To add or update notes to/on a form mapping simply open the Form Mapping from the Mapping List and select the Notes tab:



After entering or changing the notes for this mapping, click on the **Apply button** to save your changes, or click on the **Revert button** to reverse your changes and revert back to the original text.

## Appendix A: Functions available for building Expressions in Assignment Mappings

**BUILD\_CONDITION (String, String, String);**  
**Returns: String;**

Function to build a condition expression based on a set of fields and values. Conditions generated are intended for use on a ServiceNow target server ONLY.

The first parameter is a comma separated list of field names.  
The second parameter is a comma separated list of field values.  
The third parameter is the ServiceNow conditional operator to be used.  
The values in the lists may be delimited using a double quote (") character.  
The lists of fields should have the same length as the list of values, or be a single value (which will be repeated).  
Empty values will be shown as an empty string.  
A maximum of 100 values are supported.

Example:

```
BUILD_CONDITION("field1","field2","field3","value1","","value3","^"
```

Result:

```
field1=value1^field2=^field3=value3
```

**DATEDIFF (Timestamp, Timestamp, Integer);**  
**Returns: Integer;**

Function to obtain the difference between two dates.

The first parameter is the first date.  
The second parameter is the second date.  
The third parameter is an integer indicating the type of unit to return.  
4 = Days  
3 = Hours  
2 = Minutes  
1 = Seconds

If date 1 is greater than date 2, the result will be negative.  
Only whole units are returned.

Example 1: `DATEDIFF('2015-07-15 12:00:00','2015-07-19 11:00:00',4) = 3`

Example 2: `DATEDIFF('2015-07-15 12:00:00','2015-07-15 11:54:10',2) = -5`

## **DATEFORMAT (Timestamp, String);**

**Returns: String;**

Outputs a string representing a date/time value formatted to a given pattern.

The first parameter is the date/time to be formatted.

The second parameter is the format pattern.

The examples below show the characters that can be used in the pattern.

Example 1: DATEFORMAT('2015-07-15 12:10:05','dd/MM/yyyy') = 15/7/2015

Example 2: DATEFORMAT('2015-07-15 17:10:05','HH:mm:ss') = '17:10:05'

Example 3: DATEFORMAT('2015-07-15 13:10:05','hh:mm a') = '17:10:05'

Example 4: DATEFORMAT('2015-07-15 13:10:05','MMM d, yyyy h:mm a zz')  
= 'Jul 7, 2015 1:10:05 PM EST'

## **LOWER (String);**

**Returns: String;**

Function to change a string to lower case.

The parameter is the source string.

All upper case characters will be changed to lower case.

Example: LOWER('HamBurger') = 'hamburger'

## **LPAD (String);**

**Returns: String;**

Function to pad a string to a minimum length by adding characters to the start

The first parameter is the source string.

The second parameter is the string that will be used as padding.

The third parameter is the minimum length of the returned string.

If the string is longer than <length> it will be returned unchanged.

If the string NULL it will be returned unchanged.

Example: LPAD('Hello','- ',8) = '---Hello'

**PROPER (String);****Returns: String;**

Function to change a string to proper (title) case.

The parameter is the source string

The first character of each word will be changed to upper case.

Words separated by either spaces or '-' characters are supported.

Example: `PROPER('peter hodson-bridge')` = 'Peter Hodson-Bridge'

**REPLACE (String, String, String);****Returns: String;**

Function to replace all instances of a character sequence with another sequence in a source string.

The first parameter is the source string.

The second parameter is the character sequence to be replaced.

The third parameter is the character sequence used in replacement.

Example: `REPLACE('IT_System','_',' ')` = 'IT System'

**RPAD (String, String, Integer);****Returns: String;**

Function to pad a string to a minimum length by adding characters to the end.

The first parameter is the source string.

The second parameter is the string that will be used as padding.

The third parameter is the minimum length of the returned string.

If the string is longer than <length> it will be returned unchanged.

If the string NULL it will be returned unchanged.

Example: `RPAD('Hello','- ',8)` = 'Hello---'

## **SNOW\_REPLACE\_ARS\_IMG\_TAG (String, String, String, String);**

**Returns: String;**

Function to change the image tabs in html originating from BMC Remedy so that they reference the migrated ServiceNow attachments. This advanced function is intended when migrating BMC Remedy Source HTML strings to ServiceNow ONLY.

It relies on the arattid attributes for the image tag containing the name of the image file attachment on the source server. The attachments referenced in the HTML must already have been migrated in an earlier form mapping.

The first parameter is the BMC Remedy HTML string to be migrated

The second parameter is a comma separated list of previously migrated target attachment file names.

The third parameter is a comma separated list of previously migrated target attachment sys\_id's.

The fourth parameter is a comma separated list of source attachment field names, and should include the names of any attachment fields that could be referenced in the source HTML string.

The values in the lists may be delimited using a double quote (") character. The lists of target file names should have the same length as the list of target attachment sys id's. The function will search the HTML looking for image <IMG> tags. For each one found:

- Record the 'src and 'arattid' attribute values;
- Use the arattid value to obtain the source file name of the attachment it references;
- Identify the position of the source file name value in the file names csv;
- Look up the attachment sys\_id in the attachments ids csv, using the position found in the previous step;
- Build the new src attribute  
(src="sys\_attachment.do>sys\_id=<attachment\_sys\_id>";
- Replace the existing src attribute;
- Remove the ARS specific attributes (arattid, arschema, arentryid) as well as any attributes that are not well formed xml;

All other tags remain unchanged.

The updated HTML string is returned.

## **STRPOS (String, String);**

**Returns: Integer;**

Gives the position of a character sequence within a string.

The first parameter is the source string.

The second parameter is the character sequence.

If the sequence is found, the zero based index of the first instance of the character string is returned. If not found, NULL is returned.

Example: STRPOS('Hello World','or') = 7

## **SUBSTRING (String, Integer, Integer);**

**Returns: String;**

Function to obtain a part of a given source string.

The first parameter is the source string.

The second parameter is the index of the start character (zero based, inclusive).

The third parameter is the index of the end character (zero based, exclusive).

If the third parameter is 0, the start character to the end of the string will be included.

Example: SUBSTRING('Hamburger',4,8) = 'urge'

Example: SUBSTRING('Hamburger',3,0) = 'burger'

## **TEXT\_AFTER (String, String);**

**Returns: STRING**

Function to return all characters following the last instance of the search string.

The first parameter is the source string.

The second parameter is search string.

If the first parameter is NULL, NULL is returned.

If the second parameter is NULL, the first parameter is returned.

Example: TEXT\_AFTER('C:\Users\Tony','\') = 'Tony'

Example: TEXT\_AFTER('Hamburger','m') = 'burger'

Example: TEXT\_AFTER('Hamburger','i') = 'Hamburger'

## **TODATE (String, String);**

**Returns: Timestamp;**

Outputs the date/time created by formatting the given string to the given pattern.

The first parameter is the string from which the date/time will be created.

The second parameter is the format pattern to be used.

The examples below show the characters that can be used in the pattern.

Example 1: `TODATE('20150101','yyyyMMdd')` = 2015-07-15 00:00:00

Example 2: `TODATE('07/11/15 17:10','dd/MM/yy HH:mm')` = 2015-11-07 17:10:00

Example 3: `TODATE('23 Apr, 2018','dd MMM,yyyy')` = 2018-04-21 00:00:00

Example 4: `TODATE('20150609T100000','yyyyMMdd"T"hhmmss')` = 2015-06-09 10:00:00

Example 5: `TODATE('Jul 7, 2015 1:10:05 PM EST','MMM d, yyyy h:mm a zz')` = 2015-07-15 13:10:05

## **TRUNC (String, Integer);**

**Returns: String;**

Function to truncate a string to a maximum length.

The first parameter is the source string.

The second parameter is maximum length of the returned string.

If the string is not longer than <length> it will be returned unchanged.

If the string NULL it will be returned unchanged.

Example: `TRUNC('Hello World',8)` = 'Hello Wo'

## **UPPER (String);**

**Returns: String;**

Function to change a string to upper case.

The parameter is the source string

All lower case characters will be changed to upper case.

Example `UPPER('Hamburger')` = 'HAMBURGER'

## **VALUE\_MATCH\_REPLACE (String, String, String);**

**Returns: String;**

Function to replace all instances of set of character sequences with another sequence in a source string.

The first parameter is the source string.

The second parameter is the csv list of one or more character sequences to be found and replaced.

The third parameter is the csv list of one or more character sequences to be used in replacement.

The second and third parameters must have the same number of entries or an error will occur. Instances of the first value in the search list will be replaced with the first value in the replace list and so on for all value pairs.

Empty string search values are ignored.

Example:

```
VALUE_MATCH_REPLACE('The cat flew over the hill', "cat", "hill", "over",  
"dog", "river", "into")
```

Result: 'The dog flew into the river'

## Appendix B: Unsupported Field Types

The following field types are unsupported with the current version of the product:

On ServiceNow Servers:

- Audio Fields
- Video Fields
- Encrypted Fields

Other field types may require use of assignment mappings to translate data into the correct format.

## Appendix C: Migration of Currency Fields

Only the following currency codes are currently supported: USD, GBP, EUR, JPY, CHF

**Update via a simple mapping to a BMC Remedy currency field:** The ServiceNow value will retain the currency code and value from the remedy value. If the currency code is not supported by ServiceNow, the USD functional currency from the BMC Remedy value will be used. If the BMC Remedy value does not have a USD functional currency value, the ServiceNow value will not be updated.

**Update via a simple mapping to a BMC Remedy int/float/decimal field:** The ServiceNow value will be set to the numeric BMC Remedy value using the USD currency code

**Update via a simple mapping to a BMC Remedy field of any other type:** A run time error occurs resulting in the record being skipped.

**Update using default value (simple mapping with a default value):** The value should be suffixed with a currency code(e.g 250 GBP) If not suffixed, USD will be assumed. If the currency code is not supported, a design time error will occur.

**Update using an assignment:** Arithmetical operations are not supported and no functions currently use currency fields. If the currency field is used alone, the simple mapping case will be used. If a numeric field or value is used, the USD currency code will be assumed. String values in the format <decimal> <currency code> are supported. Currency code must be supported, otherwise a run time exception occurs.

**Update using a source lookup query:** The BMC Remedy field being looked up must be castable to a ServiceNow currency value (i.e Integer, Float, Decimal or Currency) otherwise a run time error occurs resulting in the record being skipped.

**Update using a target query:** If the target value has a currency code, it will be used. If not, the USD code will be used.

**Use in target lookup queries:** Arithmetical operations are not permitted and result in a design time error. Comparison with a 'current' currency or price field will use the currency code associated with the target value to calculate the default currency (USD) value. All comparisons are performed in the default currency.

If the current value uses an unsupported currency code, the query will not match any entries, and the 'No Match' instruction will apply. Comparison with a numeric 'current' field or numeric value will assume the default (USD) currency. Comparison with a string value is not currently permitted, even if it is formatted as a currency value.

**Use in source lookup queries:** As for target queries, except that all currency codes supported both by the search field and the 'current' field.

## Appendix D: Migration of Journal and Diary Fields

### ServiceNow -> ServiceNow Migrations:

To migrate journal entries between ServiceNow instances, create a mapping to the Journal Entry Virtual table (see section on Virtual Tables). This uses a script to ensure that all entries are created in the correct sequence using the source timestamps and user-ids. It also creates the required audit records so that the journal entries are visible in the ServiceNow activity fields.

### BMC Remedy -> ServiceNow Migrations:

To migrate work-log or other records from BMC Remedy into ServiceNow journal fields, create a mapping from the BMC Remedy Work-Log form to the Journal Entry Virtual table (see section on Virtual Tables). This uses a script to ensure that all entries are created in the correct sequence using the source timestamps and user-ids. It also creates the required audit records so that the journal entries are visible in the ServiceNow activity fields.

### ServiceNow -> BMC Remedy Migrations (to BMC Remedy Diary Fields):

The behaviour of this migration is determined by the **Update Method**, either **Set/Create** or **Merge** (set in the Execution Options Dialog). If Set/Create is used, the BMC Remedy server expects a string value, which is appended to the diary entry list. For this reason only String fields are migrated to BMC Remedy Diary fields when Set/Create method is set.

To Migrate Journal fields to BMC Remedy Diary fields, set the Update Method to Merge. (The default method when target server is BMC Remedy).

Below is a summary of how diary field migrations work for ServiceNow -> BMC Remedy Migrations:

Update Method	Source Field Type	Target Field Type	Result
MERGE	Journal	Diary	Target diary entry list replaced with a list of the journal entries. Submitter and timestamp from the source journal entries is also migrated.
SET / CREATE	Journal	Diary	<b>Field not updated</b>

Update Method	Source Field Type	Target Field Type	Result
MERGE	String	Diary	<b>Field not updated</b>
SET / CREATE	String	Diary	New entry will be appended to the diary. Diary entry submitter will be the current user and the timestamp will be the current date.

### BMC Remedy -> BMC Remedy Migrations:

The behaviour of this migration is determined by the **Update Method**, either **Set/Create** or **Merge** (set in the Execution Options Dialog). If Set/Create is used, the BMC Remedy server expects a string value, which is appended to the diary entry list. For this reason only String fields are migrated to BMC Remedy Diary fields when Set/Create method is set.

Below is a summary of how diary field migrations work for BMC Remedy -> BMC Remedy Migrations:

Update Method	Source Field Type	Target Field Type	Result
MERGE	Diary	Diary	Target diary entry list replaced with source list
SET / CREATE	Diary	Diary	<b>Field not updated</b>
MERGE	String	Diary	<b>Field not updated</b>
SET / CREATE	String	Diary	New entry will be appended to the diary. Diary entry submitter will be the current user and the timestamp will be the current date.

## Appendix E: Migration of ServiceNow Duration Fields

The following restrictions apply to the migration of Duration Fields:

### BMC Remedy->ServiceNow, Simple Mapping:

- A string source field is accepted, values should have the following format 'd hh:mm:ss' otherwise an error will occur;
- An integer source field is accepted and is interpreted as the total number of seconds of the duration
- A string default is accepted if it has the correct format 'd hh:mm:ss'

### ServiceNow->ServiceNow, Simple Mapping

- A duration source field is accepted
- A string default is accepted if it has the correct format 'd hh:mm:ss'
- Duration fields can also be migrated to a string field

### ServiceNow-> BMC Remedy, Simple mapping

- Duration source fields can be migrated to an integer. The integer is given the value of the total number of seconds in the duration

### Assignments:

A duration target can be set using an assignment mapping to construct a duration string in the correct format. e.g.

```
(((((([u_days] + ' ') + LPAD([u_hours], '0', 2)) + ':') + LPAD([u_mins], '0', 2)) + ':') + LPAD([u_seconds], '0', 2))
```

The use of duration fields in assignment strings is not supported

### Queries:

The use of the duration field in queries is not supported.

## Appendix F: Migration of Images

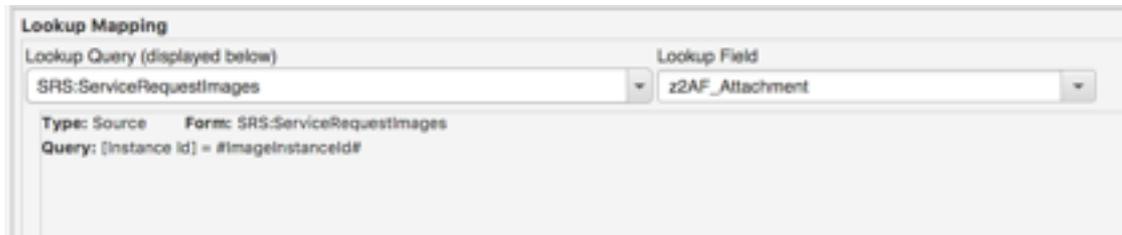
### *Migrating images between BMC Remedy servers*

Images in BMC Remedy applications are stored as file attachments. To migrate an image between two Remedy servers, simply map the corresponding attachment fields using a Simple mapping. If the source image is on a different form, use a Lookup mapping instead.

### *Migrating images from BMC Remedy to ServiceNow*

Images in BMC Remedy applications are stored as file attachments and in ServiceNow they are stored using a separate 'image' field type. To migrate an image from a BMC Remedy Server to a ServiceNow instance, use a **Simple** mapping from the BMC Remedy attachment field to the ServiceNow image field.

If the image attachment is not on the current source form, use a **Lookup** mapping to map the required attachment. For example:



Lookup Mapping	
Lookup Query (displayed below)	Lookup Field
SRS:ServiceRequestImages	z2AF_Attachment
Type: Source	Form: SRS:ServiceRequestImages
Query: [Instance Id] = #ImageInstanceId#	

Note that if the image in BMC Remedy is embedded in HTML text then special handling is required using the SNOW\_REPLACE\_ARS\_IMG\_TAG in addition to the attachment migration. Contact ITSM Bridge support if you need to make use of this advanced function.

Note that in addition to populating the image field in ServiceNow, the image is also attached to the target record.

### *Migrating images between ServiceNow instances*

To migrate images between ServiceNow instances, use a Simple mapping to map the corresponding fields. No additional configuration is required in this case.

## Appendix G: Restrictions on use of Oracle DB data source

All functionality described in the body of this document applies to ITSM Bridge when used with an Oracle DB source unless specifically excluded in this appendix.

The following restrictions apply to the use of an Oracle DB data source:

Only the following data-types are supported for field mappings:

- VARCHAR2
- CLOB
- NUMBER
- INTEGER
- DATE
- TIMESTAMP
- INTERVAL
- DECIMAL (Number with scale >0)
- BINARY DOUBLE
- NCLOB

These can be used in Simple, Assignment, Value Mappings and Lookups

The use of reference type field mappings is not supported (not to be confused with mapping to ServiceNow Reference fields which is supported). In most cases the same result can be achieved using a Lookup mapping.

The migration of attachments and images is not supported from Oracle.