



GroupID

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Version 10



GroupID
Authenticate



GroupID
Automate



GroupID
Self-Service



GroupID
Synchronize



GroupID
Password Center



GroupID
Insights



GroupID
Mobile App



GroupID
Reports

User Guide

Synchronize

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Contents

Chapter 1 - About GroupID Synchronize	1
Prerequisites for Synchronize.....	1
Connect GroupID Management Console to an identity store.....	2
Supported providers.....	6
Jobs, job templates, job groups, job group templates	9
Getting familiar with Synchronize’s user interface	10
Locating jobs, job groups, job templates and job group templates	13
Job files	13
Chapter 2 - Managing jobs and job templates ...	16
Create a new job.....	16
Sync subscriptions using a Synchronize job	36
Create a job by duplicating an existing job	50
Edit a Job	50
Rename a job or job template.....	51
Create a custom job template	51
Chapter 3 - Running and Scheduling Jobs	54
Preview a job	54
Run a job	57
Preview last job run	59
Export a job.....	60
Import a job.....	62
Rename a job.....	64
Schedule a job run.....	64
Run a job from the Command Line Utility.....	71
Chapter 4 - Managing Job Groups.....	74
Create a job group	74
Create a job group by duplicating an existing one	83
Edit a job in a job group.....	84
Remove a job from a job group.....	85
Run a job group.....	86
Preview a job group.....	87
Review last job group run	88
Export a job group.....	89
Import a job group	90
Rename a job group	92
Delete a job group.....	92
Chapter 5 - Managing Job Group Templates.....	94
Create a job group template from a job group... ..	94
Export a job group template	96
Import a job group template	97
Rename a job group template	99
Create a job group from a template	100
Delete a job group template	101
Chapter 6 - Applying Transformations	103
Static.....	103
Resolve	105
Join.....	105
Left.....	106
Substring.....	107
Script	109
Auto-generate unique, complex passwords	110
Chapter 7 - Synchronize Scripting.....	115
Scripting Environments	116
DTM Object.....	125
Scripting restrictions enforced by Synchronize	132

Contents

Visual Basic options set by Synchronize.....	132
.Net assembly references	132
.Net Namespaces.....	133
Sample Transform Scripts.....	133
Sample Container Scripts.....	136
Visual Basic .NET for GroupID	137

Chapter 1 - About GroupID Synchronize

GroupID Synchronize is a bi-directional synchronization engine for transferring data from one data source to another. The data sources may include directory servers, databases or files. Utilizing a very intuitive GUI, you can create Synchronize jobs to provision, de-provision or synchronize multiple data sources.

Synchronize is also capable of applying transformations to the data being transferred. This allows you to convert data after retrieving it from the source and before it gets saved at the destination.

This chapter provides a brief description about:

- Prerequisites for Synchronize
- Connect GroupID Management Console to an identity store
- Supported providers
- Jobs, job templates, job groups, job group templates
- Getting familiar with Synchronize's user interface
- Locating jobs, job groups, job templates and job group templates
- Job files

Prerequisites for Synchronize

GroupID has been designed to work with any identity store, such as a generic LDAP provider, G Suite, and more.

The following must be defined before you can use Synchronize:

- For performing Synchronize operations using the GroupID Management Console, the logged-in user must be a member of the Administrator group or has Account Operator permissions.



A logged-in user cannot manipulate GroupID Management Console unless it is added in Windows Authorization Manage (AzMan).

- **History**
Synchronize can maintain a complete track of actions performed in a directory through a Synchronize job, provided that an identity store for the

destination provider has been defined in GroupID Management Console and history tracking is enabled for that identity store. The actions to be tracked for Synchronize are also specified in history settings of that identity store.

The logged history can be viewed using the History Summary node in GroupID Management Console and using a Self-Service portal.

- **Notifications**
An SMTP server must be configured for Synchronize in GroupID [Configurations](#). Using that SMTP server email notification can be sent to designated recipients for different actions performed while executing a Synchronize job.
- **Messaging Provider**
A messaging provider must be configured for the connected identity store so that mail-enabled objects can be created through Synchronize job in the destination directory.

Connect GroupID Management Console to an identity store

If an identity store for the connected domain exists, the GroupID Management console automatically connects to it. However, you can connect it to a different identity store.

To connect to another identity store:

1. In GroupID Management Console, right-click the **GroupID (<identity store name>)** node and select **Connect to Identity Store**.

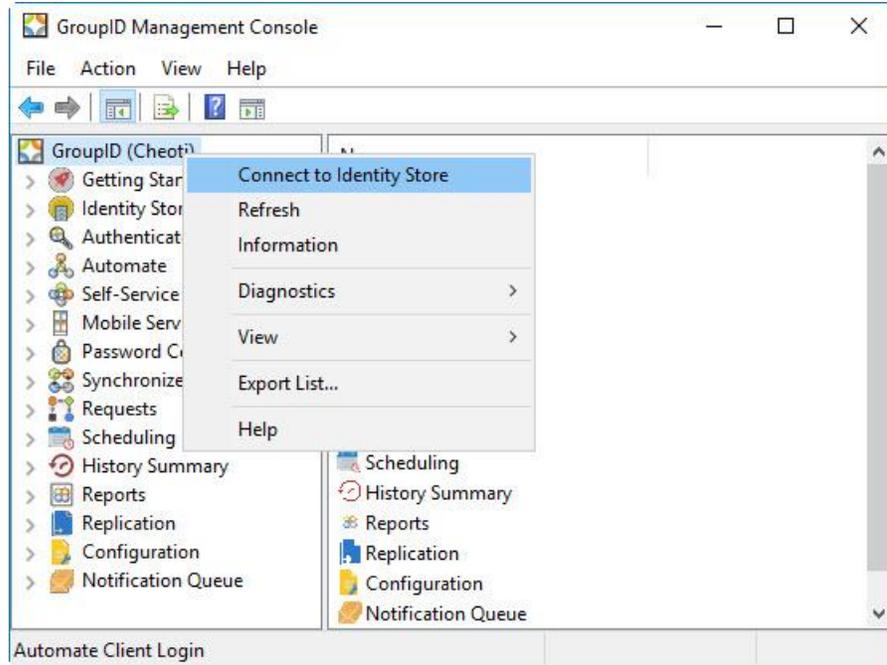


Figure 1: Connect to Identity Store option

The **Login** window is displayed.

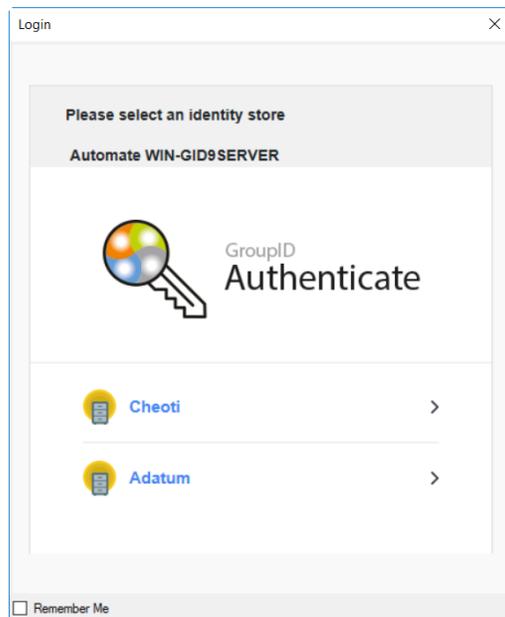


Figure 2: Login window

2. Click an identity store to connect to.
The **Login** window changes to display the login fields.

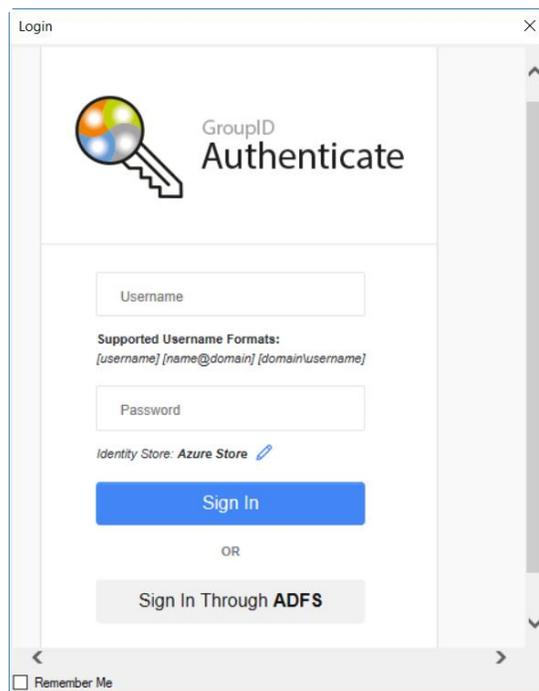


Figure 3: Login window (2)

3. In the **User Name** and **Password** boxes, enter the user name and password of your directory account, or click **Change** to connect to a different identity store.

OR

You can opt for single sign-on across all GroupID modules, provided that a SAML provider is configured with GroupID.

Click the button or image for the provider and proceed to sign in.

4. Select the **Remember Me** check box to save your login ID and password. Next time you launch GroupID Management Console, it will automatically connect to the identity store with the saved credentials.
5. Click **Log in** to connect GroupID Management Console to the identity store.

If second factor authentication is enabled for your role, the following applies:

- If you have not enrolled your identity store account in GroupID, you must enroll using at least one authentication type, in order to connect GroupID Management Console to the identity store. The **Enroll Account** window is displayed as follows:

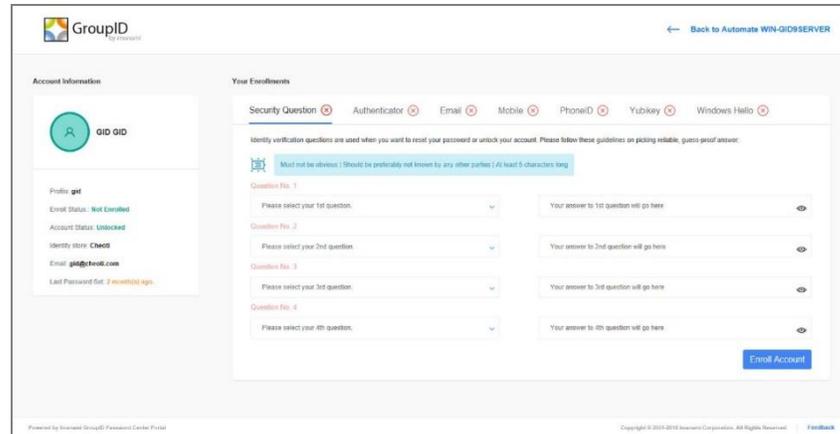


Figure 4: Enroll Account window

Tabs on this window represent the different authentication types that the administrator has enabled for enrollment. You can choose to enroll your account with as many authentication types as you want; however, enrollment with only one authentication type is mandatory.

- If you have already enrolled your account with an authentication type, you will have to authenticate this account in order to connect to the console. The **Authenticate Account** window will be displayed as follows:

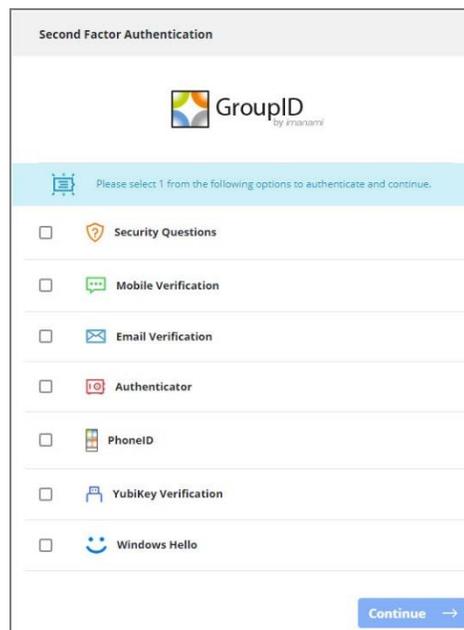


Figure 5: Authenticate Account window

Icons on this window represent the different authentication types that you used to authenticate your account with. You only have to authenticate with one authentication type.



Refer to the Administration Guide for second factor authentication details.

Supported providers

GroupID Synchronize supports the following third-party data sources:

- [3rd Party Switchvox Provider](#)
- [Adacel View500](#)
- [Generic LDAP version 3.0](#)
- [Lotus Notes \(LDAP\)](#)
- [Microsoft Access Driver \(.mdb, .accdb\)](#)
- [Microsoft Active Directory \(LDAP\)](#)
- [Microsoft Excel Driver \(.xls, .xlsx\)](#)
- [Microsoft SQL Server](#)
- [Microsoft Text Driver \(.txt, .csv\)](#)
- [Novell Directory Services \(LDAP\)](#)
- [ODBC Data Source](#)
- [Oracle](#)
- [Sun ONE Directory Server/iPlanet \(LDAP\)](#)



Adacel View500 and Microsoft Text Driver (.txt, csv) data sources are not supported as destination providers.

A brief description of about each supported data source is given below:

- **3rd Party Switchvox Provider:** to connect to a Digium Switchvox phone system. Digium Switchvox can be used both as source and destination data source. This provider supports automatic schema detection.

- **Adacel View500:** to connect to an Adacel View500 server running the LDAP interface. This provider does not support dynamic schema detection. A schema file with the most commonly used fields is included. You can add fields to this schema.
- **Generic LDAP version 3.0:** to connect to any LDAP version 3-compliant directory server. This provider does not support dynamic schema detection. The schema included for this provider mostly contains commonly used fields. You can add fields to the existing schema

Synchronize supports many LDAP-compliant directory servers directly and provides specialized providers for connecting with them. These directories include:

- Active Directory
- Lotus Notes
- Novell Directory Services
- Sun ONE Directory Server

When connecting with any of these, it is recommended that you use their specific provider instead of the generic LDAP provider. The use of specialized providers results in performance gains since they eliminate the extra steps involved in connecting with generic providers.

- **Lotus Notes (LDAP):** to connect to a Lotus Notes directory. This provider does not support dynamic schema detection. A schema file is included with the most commonly used fields. You may add fields to this schema.
- **Microsoft Access Driver (.mdb, .accdb):** to connect to a Microsoft Access (.mdb | .accdb) database. This provider supports automatic schema detection.

For communicating with this provider, Synchronize requires data connectivity components to be installed on your machine. You can download a compatible version of the required components from either of the following links:

[Microsoft Access Database Engine 2010 Redistributable](#)
[2007 Office System Driver: Data Connectivity Components](#)

- **Microsoft Active Directory (LDAP):** The Active Directory provider can serve as both a source and destination provider. This provider supports dynamic schema detection.

- **Microsoft Excel Driver (.xls, .xlsx):** serves as both a source and destination data source. When used as a destination, you can export source data to a new Excel worksheet, where the schema of the new Excel worksheet is automatically built according to fields that you select from the source to map to the destination.

To use Microsoft Excel as provider, you must install these software components on your machine:

- Microsoft Office 2007/2010
- Data connectivity components found at these sites:
[Microsoft Access Database Engine 2010 Redistributable](#)
[2007 Office System Driver: Data Connectivity Components](#)

You may encounter the following issues while using Excel provider in a Synchronize job:

In case of Excel as destination (with Replace file-discard existing content option selected on the Destination Provider page of the Job wizard), if any sheet name of the Excel file is of two or less character the Synchronize job corrupts all the sheets in that Excel file.

In case of Excel as destination (with Delete option selected on the Create Object page of the Job wizard), If the Excel file schema is of more than 127 columns the job fails.

- **Microsoft SQL Server:** to connect to Microsoft SQL Server 2005, 2008, 2008 R2, 2012, 2014 and 2016. It can be selected both as a source and destination. This provider supports dynamic schema detection.
- **Microsoft Text Driver (.txt, .csv):** to connect to comma-separated value (CSV) text files or tab-separated value (TSV) text files. This provider supports automatic schema detection if a header row is included in the file. If no header row exists, you can create your schema manually.
- **Novell Directory Services (LDAP):** to connect to a Novell directory. This provider does not support dynamic schema detection. A schema file with the most commonly used fields is included. You can add fields to this schema.
- **ODBC Data Source:** to connect to any ODBC-compatible data source including databases, directories, and files.
- **Oracle:** It can be selected both as a source and destination. This provider supports dynamic schema detection.
- **Sun ONE Directory Server/iPlanet (LDAP):** to connect to a Sun ONE directory. This provider does not support dynamic schema detection. A schema file with the most commonly used fields is included. You can add fields to this schema.

Jobs, job templates, job groups, job group templates

Here is a brief description of:

- Jobs
- Job Groups
- Job Templates
- Job Group Templates

Jobs

Synchronize enables you to move data from one data source to another using a set of sequential commands. The set of these commands is called a job. You can create a job from scratch, from a predefined template, or from a template that you create yourself.

Job Templates

Synchronize comes with a set of pre-defined job templates that represent some of the most common business scenarios in use. You can use these templates as is, modify them to suit your needs, or create your own custom templates.

Creating a custom template involves saving a job as a template. Therefore, you must first create a job with commonly used settings before you can save it as a template. For details, see Chapter 2 - Managing jobs and job templates.

Job Groups

A job group is a collection of individual jobs that you want to run in a particular order. For details see Chapter 4 - Managing Job Groups.

Job Group Templates

You can create a job group template either by converting an existing job group into a job group template or by importing a job group template. For details see Chapter 5 - Managing Job Group Templates.

Getting familiar with Synchronize's user interface

In GroupID Management Console, the **Synchronize** node appears as shown below:

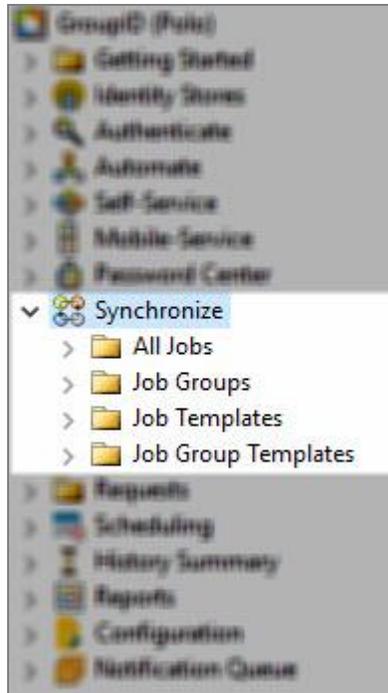


Figure 6: GroupID Management Console - Synchronize node

On selecting the **Synchronize** node, the adjacent pane shows a bar chart of the recently executed jobs.

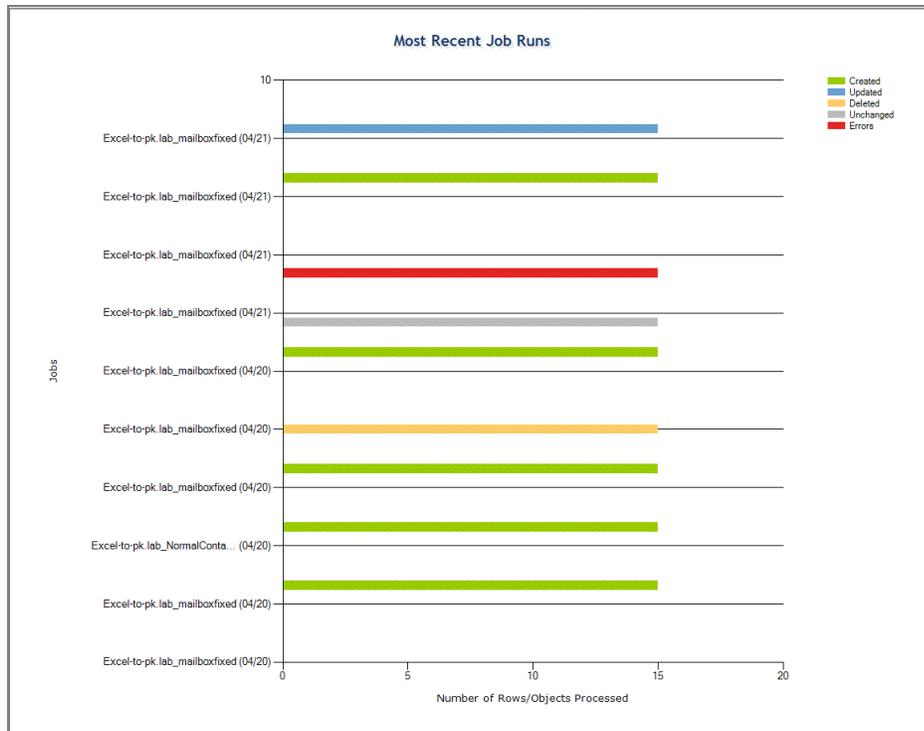


Figure 7: Most Recent Job Runs chart

By default, the number of jobs displayed on the chart are five. However, this can be changed using the [options](#) for the **Synchronize** module.

The horizontal axis (x-axis) shows the number of records that were processed in a job while the vertical axis (y-axis) shows the job names and the dates they were run. For jobs that fail, the chart displays the text **FAILED** instead of a bar.

The **Synchronize** node has four sub-nodes.

- All Jobs
- Job Groups
- Job Templates
- Job Group Templates

The listings against these sub-nodes appear as follows:

All Jobs view

This view lists the existing jobs defined in Synchronize.

Name	Description	Source	Destination	Times Run	Last Run Date	Last Outcome	Next Run	Created	Modified	Schedule	Enabled
tech2k8.com-to-tech2k8.co	Job to Synchronize Mailbox	ActiveDirectory	ActiveDirectory	0		Never Run	3/14/2017 3:40	4/10/2017 10:29			False
tech2k8.com-to-tech2k8.co	Job to Synchronize Mailbox	ActiveDirectory	ActiveDirectory	0		Never Run	3/14/2017 3:33	3/22/2017 2:03			False
tech2k8.com-to-tech2k8.co	Job to Synchronize User fro	ActiveDirectory	ActiveDirectory	0		Never Run	4/6/2017 4:48:2	4/11/2017 3:22			False
tech2k8.com-to-tech2k8.co	Job to Synchronize User fro	ActiveDirectory	ActiveDirectory	0		Never Run	4/10/2017 11:2	4/10/2017 11:20			False

Job Groups view

This view lists the existing job groups.

Name	Description	Total Job(s)	Times Run	Last Run Date	Last Outcome	Next Run	Created	Modified	Schedule	Enabled
JobGroup	Job 1 to synchronize Mailbox-enabled Use	3	0		Never Run		4/12/2017	4/12/2017		False
Job Name	Job Description	Source	Destination	Run Order	On Failure					
tech2k8.com-to-tech2k8.com	Job to Synchronize Mailbox-enabled Use	ActiveDirectory	ActiveDirectory	1	Abort					
tech2k8.com-to-tech2k8.com	Job to Synchronize Mailbox-enabled Use	ActiveDirectory	ActiveDirectory	2	Abort					
tech2k8.com-to-tech2k8.com	Job to Synchronize User from tech2k8.co	ActiveDirectory	ActiveDirectory	3	Abort					

History List View

In **All Jobs** and **Job Groups** views, expand the job / job group to view its history.

Name	Description	Total Job(s)	Times Run	Last Run Date	Last Outcome	Next Run	Created	Modified	Schedule	Enabled
JobGroup	Job 1 to synchronize User fro	1	1	4/24/2018	Completed		4/23/2017	4/23/2017		False
Job Name	Job Description	Source	Destination	Run Order	On Failure					
Excel-to-adatum.local	Job to Synchronize User from Excel-to-ad	Excel	ActiveDirectory	1	Abort					
Completed	Elapsed	Summary								
4/24/2018 10:07:02 AM	00:00:02	Completed (0 created, 0 modified, 0 deleted, 0 errors)								

Job Templates view

This view lists the existing job templates.

Template Name	Source	Destination	Description
Linked Mailbox Creation In Active Directory	ActiveDirectory	ActiveDirectory	Template to create Linked Mailboxes
Move and Disable Objects In Active Directory	ActiveDirectory	ActiveDirectory	Template to move and disable objects in active directory
Move Objects in Active Directory	ActiveDirectory	ActiveDirectory	Template to move objects in active directory
Sync GAL In Active Directory	ActiveDirectory	ActiveDirectory	Template for Synchronizing GAL

Job Group Templates view

This view lists the existing job group templates.

Group Template Name	Description	Total Job(s)	
JobGroupTemplate	Job 1 to synchronize Mailbox-enabled User from ActiveDirectory to ActiveDirector	3	
Job Template Name	Description	Source	Destination
tech2k8.com-to-tech2k8.com-GoogleApp	Job to Synchronize Mailbox-enabled	ActiveDirectory	ActiveDirectory
tech2k8.com-to-tech2k8.com-O365	Job to Synchronize Mailbox-enabled	ActiveDirectory	ActiveDirectory
tech2k8.com-to-tech2k8.com	Job to Synchronize User from tech2k	ActiveDirectory	ActiveDirectory

Customize list views

Synchronize supports column-sorting in all its list views. Use sorting to quickly [locate](#) items, such as recently added jobs, job groups, and templates, or to arrange items for information purposes, such as ordering jobs and job groups by their last execution time.

You can also customize the view by selecting the columns that you would like to see for a job using the **Configurations > Modify User Options > [Job Lists](#)** option.

Locating jobs, job groups, job templates and job group templates

Synchronize supports column-sorting in all its list views. Use sorting to quickly locate items, such as recently added jobs, job groups, and templates, or to arrange items for information purposes, such as ordering jobs and job groups by their last execution time.

1. In GroupID Management Console, select the **Synchronize** node.
2. Expand the **Synchronize** node and click a **Job** or **Job Group** node to expand it.

or

If you are looking for a template, click the **Job Template** node or **Job Group Template** node.

3. Click the column heading that you want to sort the view list by. The list is sorted in ascending order. Click the column heading again to sort in descending order.

Job files

Synchronize maintains different types of files for every job, job group, job template and job group template. There are three file types:

- [Configuration file](#)
- [Report file](#)
- [Log file](#)

The location of these files depends on the Windows version installed on your computer. You can find the Synchronize configuration folder using the Windows

The report file .dtmreport

Synchronize creates report files only for jobs and job groups. Report files are generated when a job or a job group is run. The files are saved at the following paths respectively:

- [GroupID installation drive]:\ProgramData\Imanami\GroupID 10.0\Synchronize\Jobs*Job name*\
- [GroupID installation drive]:\ProgramData\Imanami\GroupID 10.0\Synchronize\GroupJobs*Job group name*\

The file contains the records and objects inserted, updated, removed or exchanged between the source and destination. The data from this file appears on the [Reports](#) tab of the **Run Job** (Figure 48) and **Run Job Group** (Figure 79) dialog boxes.

Synchronize creates a new report file each time a job or a job group is run and archives it.

The log file .dtmlog

The log file is generated along with the report file during a job or job group run and displayed on the **Log** tab of the **Run Job** (Figure 48) and **Run Job Group** (Figure 79) dialog boxes. This file is saved with the .dtmlog extension in the same location as the report file.

- [GroupID installation drive]:\ProgramData\Imanami\GroupID10.0\Synchronize\Jobs*Job name*\
- [GroupID installation drive]:\ProgramData\Imanami\GroupID 10.0\Synchronize\GroupJobs*Job group name*\

Synchronize creates a new log file each time a job or job group is run and archives it.

Chapter 2 - Managing jobs and job templates

A Synchronize job defines the connection information needed to access data source, how the data is related, how the data should flow and the destination it should be saved at. Every job has several settings associated with it such as the data source and destination, the field mappings, data conversions, notifications, scheduling and logging.

While creating a Synchronize job for mailbox-enabled users, you can also sync subscriptions from Office 365 and G Suite messaging providers.

This chapter explains how to:

- Create a new job
- Sync subscriptions using a Synchronize job
- Create a job by duplicating an existing job
- Edit a Job
- Rename a job
- Create a custom job template

Once you create a job, you can either run it manually or schedule it to run periodically. For details, refer to Chapter 3 - Running and Scheduling Jobs.

Create a new job

You can create a Synchronize job from scratch, from a predefined template, or from a template that you create yourself.

Creating a job from scratch requires that you specify the source and destination resources involved in the transfer of data. You must also map the fields for the source and destination objects in which the data transfer takes place.

You can also apply data transformations. A [transformation](#) allows you to modify data as it is being transferred to the destination.

To create a job:

1. In GroupID Management Console, expand the **Synchronize** node, right-click **All Jobs**, and then select **New Job**.

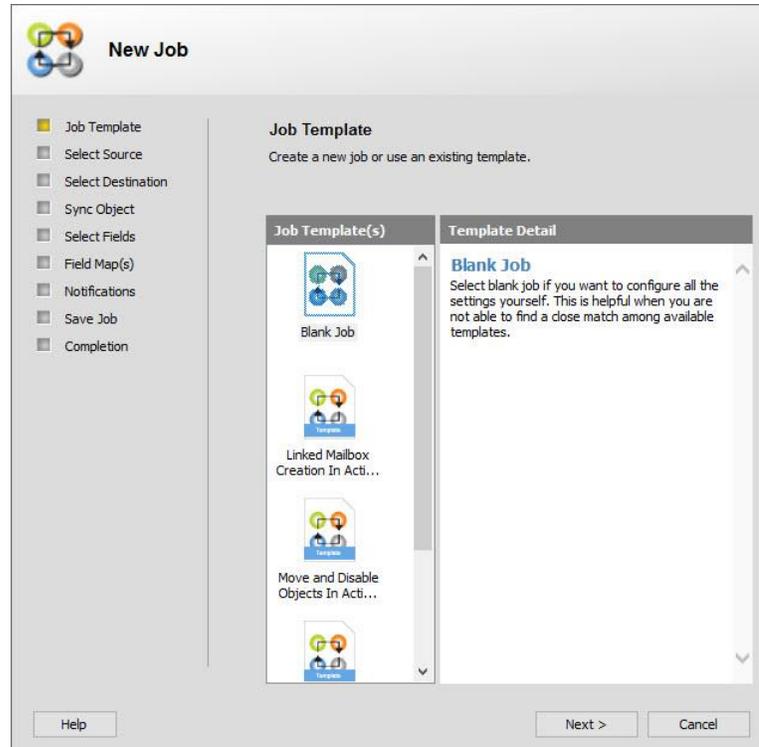


Figure 8: Job Template page

2. On the **Job Template** page, select whether to use a template or create the job from scratch

Synchronize provides these predefined job templates:

- Linked Mailbox Creation in Active Directory
- Move and Disable Objects in Active Directory
- Move Objects in Active Directory
- Sync GAL in Active Directory

These job templates represent common business scenarios. You can use these templates as is or modify them to create your own custom templates. Templates offer predefined settings, which you can apply to the new job (except for the source and destination configurations) and modify as required.

Click **Next**.

Figure 9: Select Source page

3. On the **Select Source** page, specify the data source from which to move data.
 - a. Provide the name or the IP address of the source domain controller in the **Domain controller or domain name** box. You may also specify an Active Directory name, in which case, Synchronize uses DNS to find the nearest functional domain controller.
 - b. Enter the port that LDAP is running on in the **LDAP Port** box. If this field is left blank, the default port (389) is used.
 - c. Provide the user name of the user account to use for connecting to the source domain controller in the **User** box. The user name must include the domain name as shown below:

domain\username
 - d. Provide the password for the account specified for user in the **Password** box. .
 - e. Select the **Browse** button next to the **Container** box to select a container to synchronize. This setting is optional and can be left blank.

When using the provider (Active Directory) as a source, only objects that exist in the specified container are copied to the destination. If this field

is left empty, all objects in the Exchange organization are synchronized to the destination.

- f. To determine the scope of the Synchronize job, select the **Includes sub containers** check box to synchronize sub-containers as well in the selected container.
- g. Click the **Advanced** button to open the **Advanced Connection Properties** dialog box where you can modify the schema and connection settings of your selected source provider.

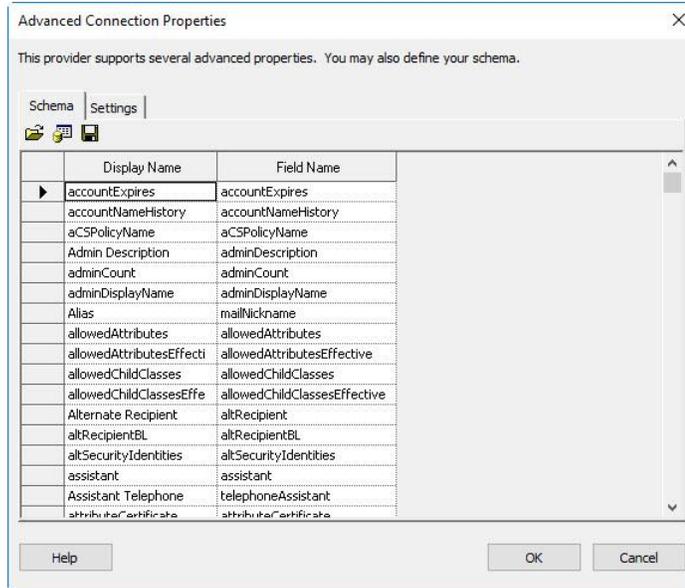


Figure 10: Advanced Connection Properties dialog box – Schema tab

Schema settings allow you to modify the Display and Field names of the selected source or destination provider. You can also save your schema settings to an XML file, which you can use to import the schema for data sources in other jobs that you define.

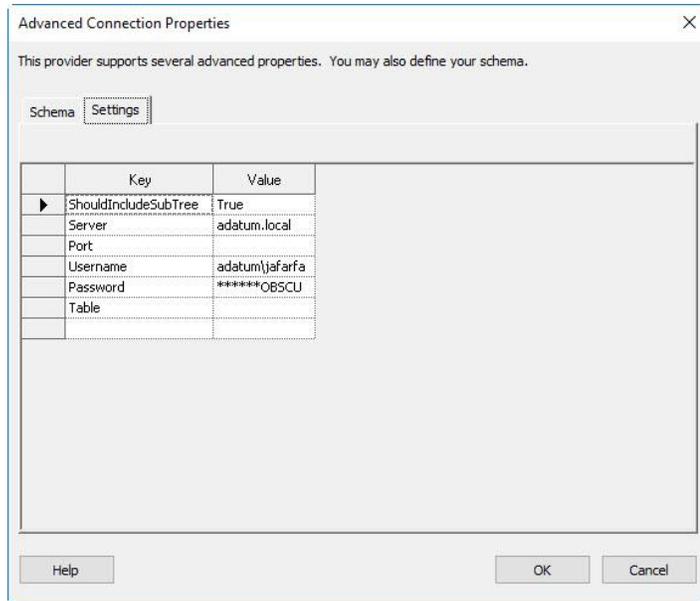


Figure 11: Advanced Connection Properties dialog box – Settings tab

The **Settings** tab displays the connections settings in key-value pairs. The Key column displays the setting name and the Value column its current value. Double-click a value to modify it.

Click **OK**.

- h. Click **Next** (Figure 9).

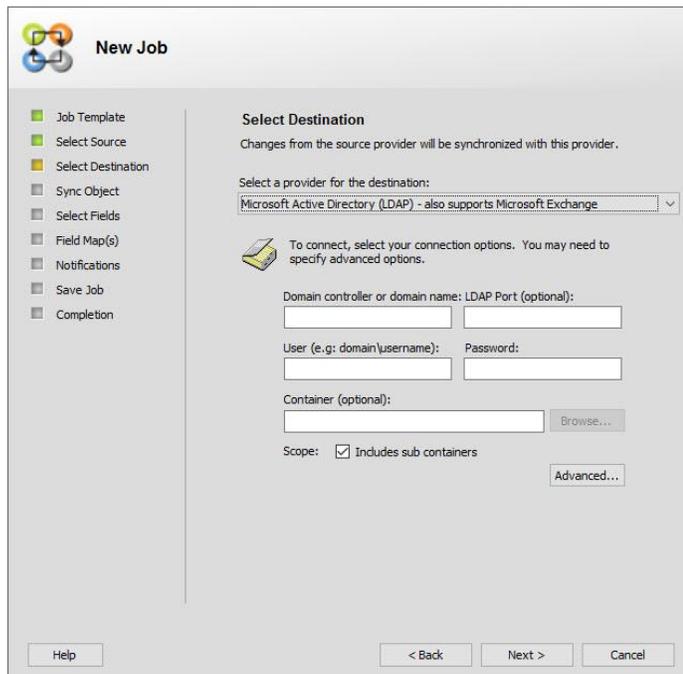


Figure 12: Select Destination page

- On the **Select Destination** page, specify the data source to move data to. See the steps from a to g for entering destination connection information.

Click **Next**.



For Active Directory destinations, users created using this provider are disabled by default. To create enabled users, include the *UserAccessControl* attribute in the job and assign it the value, '544'.

New Job

- Job Template
- Select Source
- Select Destination
- Sync Object**
- Select Fields
- Field Map(s)
- Notifications
- Save Job
- Completion

Sync Object Options
Create and update objects from destination.

What would you like to do if an object exists in the source but does not exist in the destination?

	Object Type	Create	Skip	Container Options
<input checked="" type="checkbox"/>	User	<input type="radio"/>	<input checked="" type="radio"/>	...
<input type="checkbox"/>	Mail-enabled User	<input type="radio"/>	<input checked="" type="radio"/>	...
<input type="checkbox"/>	Mailbox-enabled User	<input type="radio"/>	<input checked="" type="radio"/>	...
<input type="checkbox"/>	Linked-Mailbox	<input type="radio"/>	<input checked="" type="radio"/>	...
<input type="checkbox"/>	Contact	<input type="radio"/>	<input checked="" type="radio"/>	...
<input type="checkbox"/>	Group	<input type="radio"/>	<input checked="" type="radio"/>	...
<input type="checkbox"/>	Mail-enabled Contact	<input type="radio"/>	<input checked="" type="radio"/>	...

Messaging Provider:

Help < Back Next > Cancel

Figure 13: Sync Object Options page

- On the **Sync Object Options** page, you can specify the action to take if the data or object being exported from the source does not exist at the destination.

Here we discuss three cases:

- [A table provider as destination](#)
- [An LDAP compliant server or a phone system as destination](#)
- **If table provider is the destination**, you can enable two-way synchronization.
 - ✓ if an object exists in the source but does not exist in the destination, you can select one of the following options:

Create Object

Select this option to create objects at the destination for source objects that have no counterparts in the destination during synchronization.

Skip Object

Ignore items that do not exist on the destination and update only those that do.

- ✓ if an object does not exist in the source but exists in the destination, you can select one of the following options:

Delete Object

Delete such objects from the destination.

Skip Object

Ignore objects at the destination that do not exist at the source.

- **If LDAP-compliant directory server or a phone system is the destination,** you can do the following:
 - ✓ For LDAP providers such as Active Directory, you can select one or more object types that are synced between the source and destination directories. For other LDAP providers you can create or update objects of a specific type.

For each object type, you must specify the action to take.

Create

Select this option to create objects at the destination for source objects that have no counterparts in the destination during synchronization. You must specify a target container for each object type.

Click the **Select Container**  button to select the container at the destination to hold the new objects.

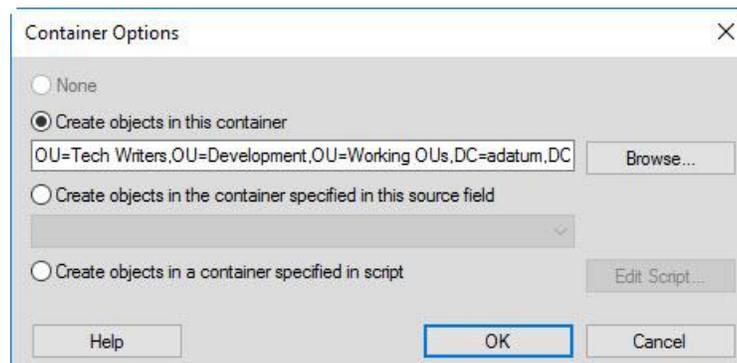


Figure 14: Container Options dialog box

On the **Container Options** dialog box, select one of the following:

- **Create objects in this container** - Click **Browse** to change the displayed destination container specified on the **Destination Provider** page (Figure 12).
- **Create objects in the container specified in this source field** - Enter the distinguished **name** of the container.
- **Create objects in a container specified in script** - Click the **Edit Script** button and write a script that identifies the desired container.

Click **OK**.

Skip

The default selection is to skip items that do not exist on the destination and only update those that do.

- ✓ For phone systems such as a third-party Switchvox provider, you can only select one object type to be synced between the source and destination directories.

For the selected object type, you must specify the action to take.

Create

Select this option to create object at the destination for source object that has no counterparts in the destination during synchronization. You must specify a target container for the selected object type.

Skip

Select this option to ignore any source objects that does not exist at the destination during synchronization.

The different object types you can create for LDAP and phone system providers are listed in the following table.

Destination Provider	Object Type	Description
Lotus Notes (LDAP)	dominoPerson	A domino person in Domino directory
Active Directory	User	An Active Directory user
	Mail-enabled User	An Active Directory user with an external email address (requires Exchange 2000 or later)

Destination Provider	Object Type	Description
	Mailbox-enabled User	An Active Directory user with an Exchange mailbox (requires Exchange 2007 or later)
	Linked-Mailbox	A linked mailbox on the resource forest selected as destination
	Contact	An Active Directory contact
	Group	An Active Directory group. Members of the group will only be synced at the destination and are not created.
	Mail-enabled Contact	An Active Directory contact with an external email address (Exchange 2007 or later)
Novell Directory Services (LDAP)	OrganizationalPerson	An organizational person in Novell directory
Sun ONE Directory Server (LDAP)	InetOrgPerson	An InetOrgPerson object in Sun ONE directory
3rd party SwitchVox Provider	SIP	An extension for an SIP phone, or an analog phone plugged into a SIP adapter (such as Sipura SPA-1001)
	Virtual	An extension without a phone or a switchboard. This type of extension behaves like a SIP phone extension, except that it does not have a switchboard and it does not display the phone as Unreachable in System

Destination Provider	Object Type	Description
		Status. It is useful as a general voice mailbox.
	Analog	A regular phone (not VOIP/SIP) that is physically plugged into the Switchvox server. An appropriate extension type for a fax machine or an intercom.

Table 1: List of Object Types

- The **Messaging Provider** option is only available with the mail-enabled objects. Select a messaging system you want to use with this job.

While creating a Synchronize job for mailbox-enabled users, you can sync subscriptions from [Office 365](#) and [G Suite](#) messaging providers.

- Click **Next**.

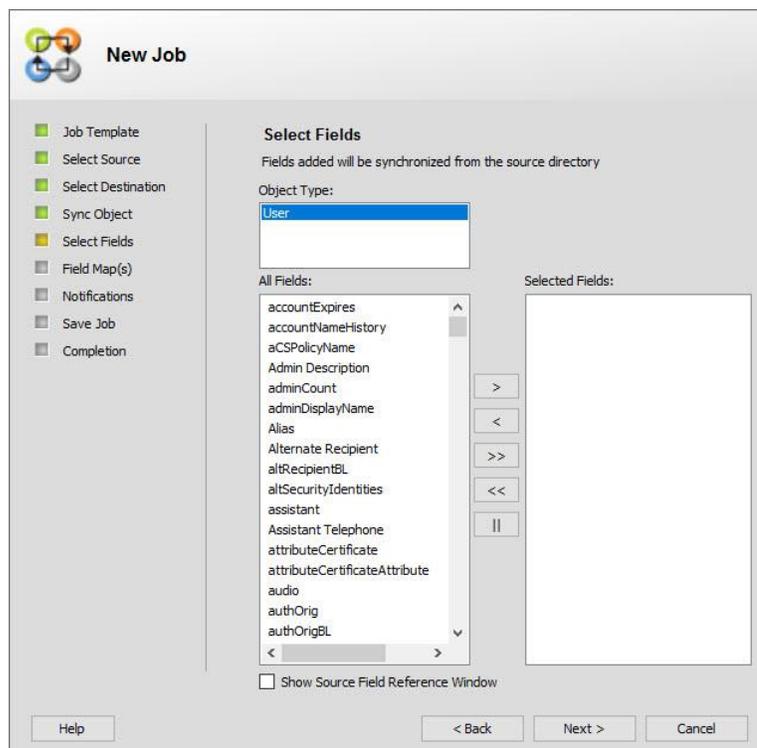


Figure 15: Select Fields page

8. On the **Select Fields** page, select the fields in the destination that you want to sync:
 - If the destination is an Active Directory domain, select an object type from the **Object Type** list and specify the fields to be synced. Repeat for each object type desired. Object types listed are based on the source directory that you selected on the **Select Source** page (Figure 9).
 - If the destination is not an Active Directory domain, select the names of fields to sync from the **All Fields** list. Click the **Add Arrow** button  to move the selected fields to the **Selected Fields** list.

By default, Synchronize moves some of the fields to this list by analyzing the fields from the source.

- For the **Group** object type, click **member (sAMAccountName)** to display the **Member Key** list, and select from it the Active Directory attribute to search for matching group members in the destination.



A Synchronize job can only create groups at the destination. In order to sync group members, it searches Active Directory for the matching objects based on the Member Key field and adds them to the group membership.

Click **Next**.

New Job

- Job Template
- Select Source
- Select Destination
- Sync Object
- Select Fields
- Field Map(s)
- Notifications
- Save Job
- Completion

Field Map(s)
Specify mappings between source and destination fields, to be used in synchronization.

Object Type:

Field Mapping:

Key	Destination	Source	Delimiter	Transform	New only
<input checked="" type="checkbox"/>	First Name	First Name			<input type="checkbox"/>
<input type="checkbox"/>	Last Name	Last Name			<input type="checkbox"/>
<input type="checkbox"/>	Password				<input type="checkbox"/>

Show Source Field Reference Window [Edit Global Script](#)

Help < Back Next > Cancel

Figure 16: Field Map(s) page

9. Use the **Field Map(s)** page to map the source and destination fields and to apply transformations:
 - a. Do the following for the object(s) of the source directory that you selected on the **Select Source** page (Figure 9).
 - **Map the source fields**
In the **Source** column of each destination item, select the source fields that contribute the data for the destination.
 - **Apply a transformation**
In the **Transform** column, click the **Browse**  button to open the **Transform [field name]** dialog box and apply a transformation to the field value before it is saved at the destination.

For details on transformations, see Chapter 6 - Applying Transformations.

If the source is an Active Directory domain, select an object type from the **Object Type** list and map its fields. Repeat for each object type desired. See the Table 1 for the list of object types.

- b. In the **Key** column, select at least one field to be a unique identifier.
- c. (*Optional*) If you do not need a field, click in the first column to select the row. Press the **Delete** button on your keyboard to delete the selected row.
- d. If the source or destination field is multi-valued, select a delimiter from the **Delimiter** list.

This delimiter is used either to separate the values of a multi-valued field at the source, or to merge values of a multi-valued field at the destination, depending on the types of providers.

- e. In the **New Only** column, select the check boxes for the fields to be updated only when creating a new object.

Fields that are not selected are continually updated. Key fields are selected by default as **New Only** fields as a requirement; you cannot change this selection.

- f. Click **Next**.

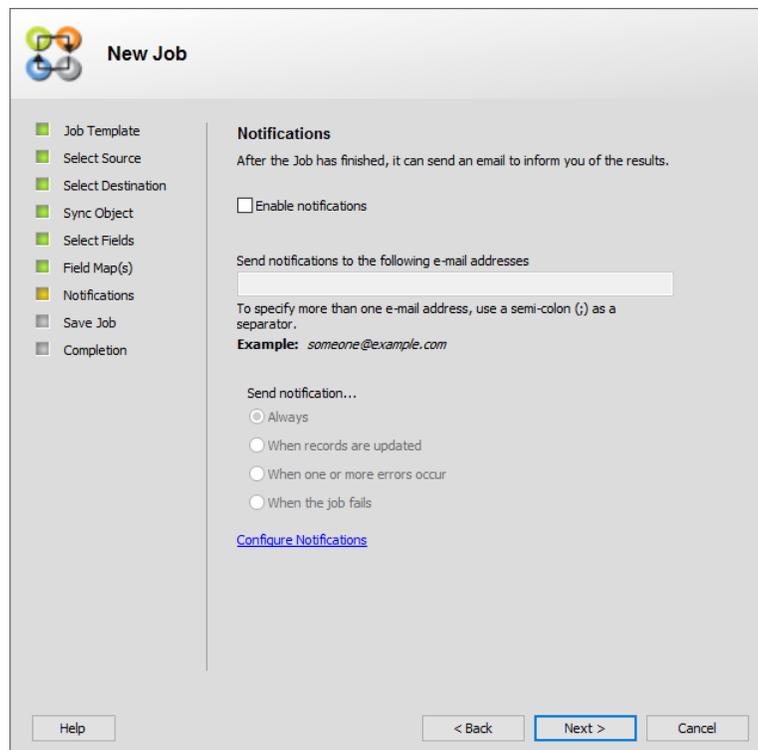


Figure 17: Notification page

10. On the **Notifications** page, set up email notification of job run results:
 - a. Select the **Enable notifications** checkbox.
 - b. Enter email addresses of notification recipients, using a semicolon to separate multiple recipients.
 - c. From the **Send Notification** options, select a notification trigger event which are as follows:

Always	Send a notification every time the job is run, regardless of outcome.
When records are updated	Send a notification only when one or more records has been updated.
When one or more error occur	Send a notification only when errors occur while executing the job.
When the job fails	Send a notification only when a fatal error occurs, causing the job to fail.

Sending notifications requires an SMTP server to be configured for the connected identity store. If it is not configured click [Configure Notifications](#) link to configure Synchronize notifications.

- d. Click **Next**.

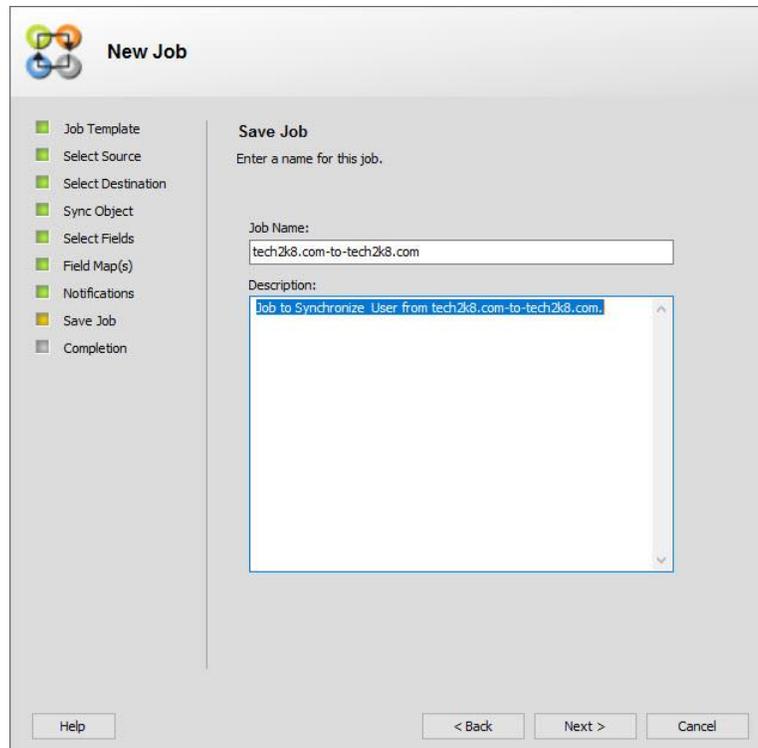


Figure 18: Save Job page

11. On the **Save Job** page, enter a unique name and a description for the job and click **Next**.

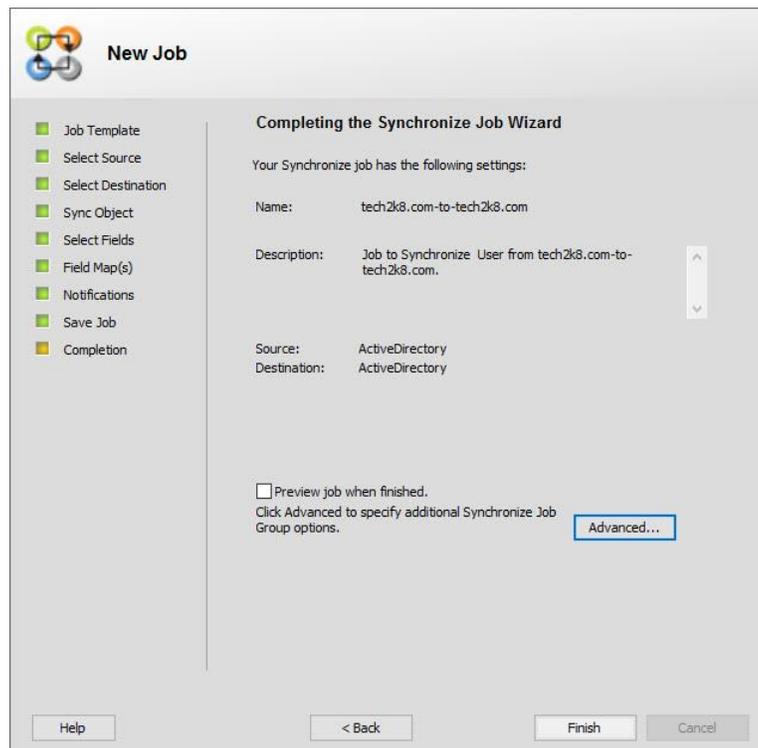


Figure 19: Completing the Synchronize Job page

12. On the **Completing the Synchronize Job Wizard** page, do one of the following:
 - **Preview job when finished**
Select this check box to preview the job when you click **Finish**. Preview Job dialog box (Figure 46) opens. For details on previewing a job, see Preview a job section.
 - Close the wizard to create the job.
Click **Finish** to close the job.
 - Configure directory synchronization and job scheduling.
Click the **Advanced** button. The following page opens:

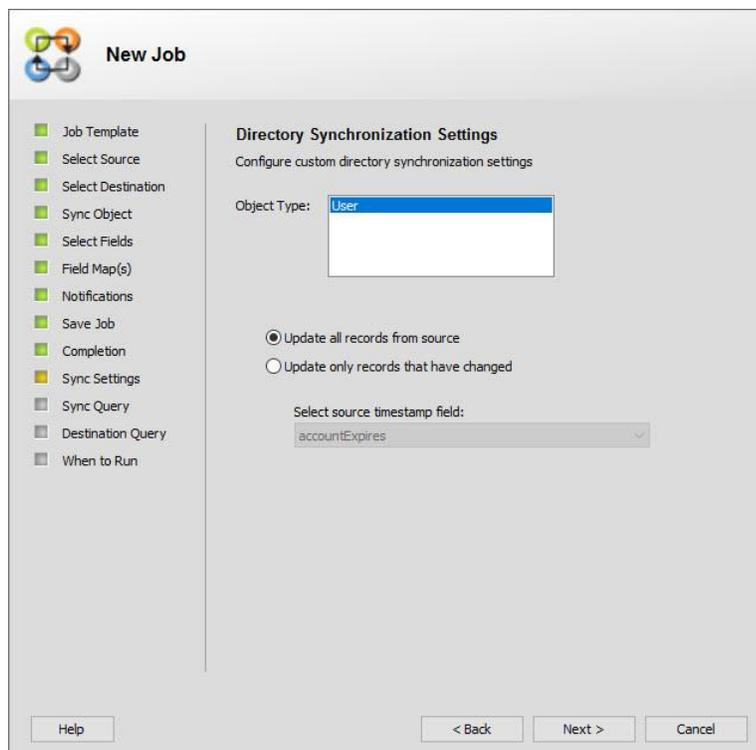


Figure 20: Directory Synchronization page

13. On the **Directory Synchronization Settings** page, select one of the following options:
 - **Update all records from source:** to synchronize all records from the source to the destination each time the job runs.
 - **Update only records that have changed:** to synchronize only those records that have changed in the source data since the last time the job was run. For this option to apply, your source must carry the last

updated time stamp of each record.

The **Select source timestamp** field drop-down list gets enabled when you select the **Update only records that have changed** option. From here, select the attribute or field in the source that would contain the time stamp value.



Synchronizing all fields every time the job runs can be inefficient. If your data source has a time stamp field that indicates the last time the row was updated or modified, Synchronize can use it to selectively update only the rows that have changed since the last time the job was run.

- a. Click **Next**.

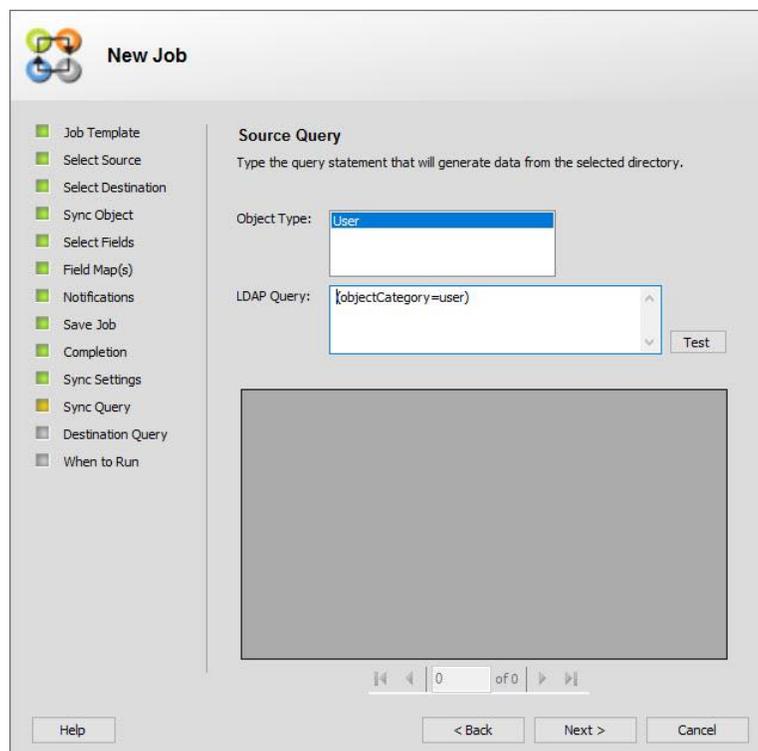


Figure 21: Source Query page

- 14. On the **Source Query** page, view or modify the default query statement for the object type listed in the **Object Type** box. This query statement is generated from the settings you have entered in the wizard. The Synchronize job uses this query to fetch records from the source provider.

If the source is Active Directory, then all objects selected on the **Sync**

Object Options page (Figure 13) appear in the Object Type box. Select the required object type and view or modify its query statement.

Click the **Test** button to test the query. Results appear below the button.

Click **Next**.

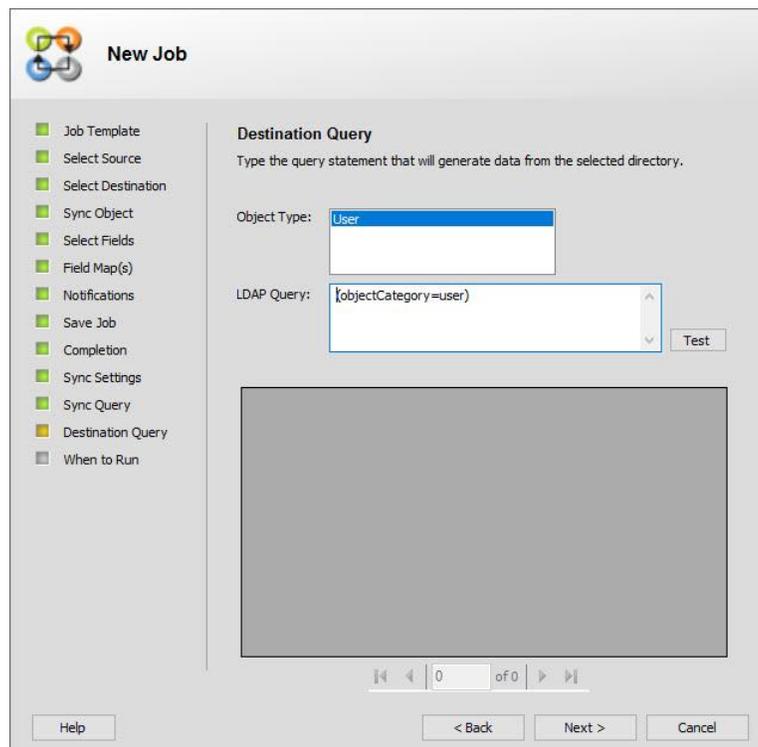


Figure 22: Destination Query page

15. Like the **Source Destination Query** page, the **Destination Query** page shows the default query statement generated from the settings you have entered in the wizard. The Synchronize job uses this query to sync records at the destination provider.

The **Object Type** box appears only if Active Directory is the destination. Select an object type to view or modify its default query statement.

Click the **Test** button to test the query. Results appear below the button.

Click **Next**.

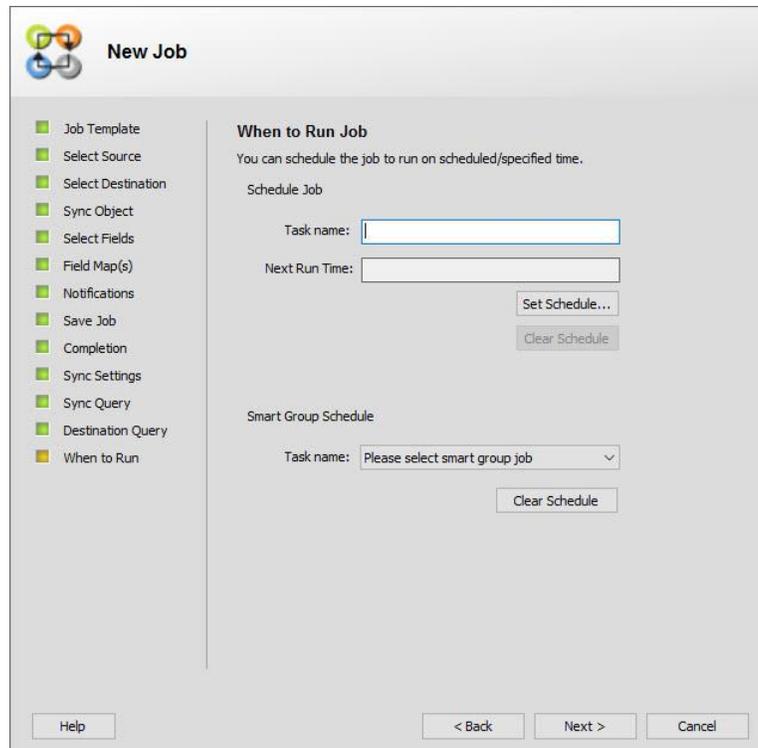


Figure 23: When to Run Job page

16. On the **When to Run Job** page:
 - In the **Schedule Job** section:
 - i. Type a name for the scheduled task for this job in the **Task name** box.
 - ii. **Next Run Time** (Read-only) - displays the date and time of the next scheduled job run.
 - iii. Click **Set Schedule** to define a schedule for the job. The job will auto run on the scheduled time.

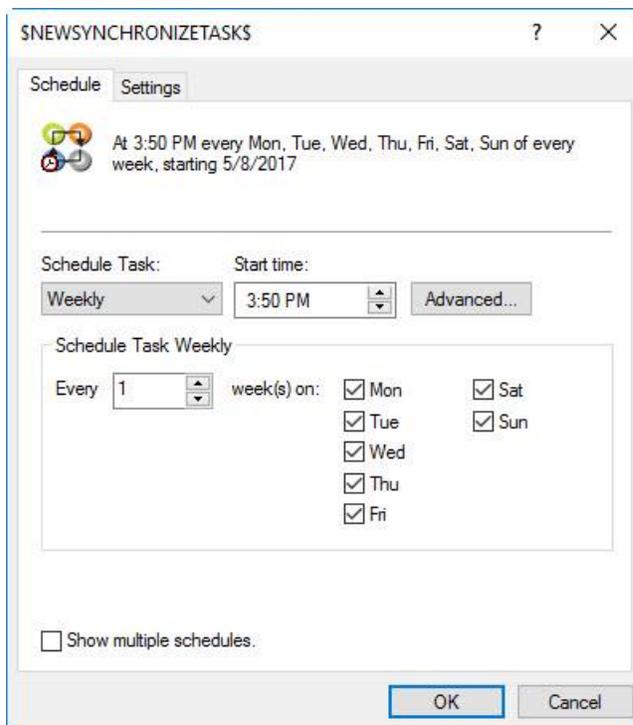


Figure 24: New Task dialog box

- iv. On the **Schedule** tab, select the frequency for this task from the **Schedule Task** list, for example, *Daily*, *Weekly*, *Monthly* and so on. The settings relevant to the selected frequency will be displayed.
- v. In the **Start time** box, type or select the time of the day to run the job. If you want to further customize the schedule, click the **Advanced** button next to **Start time**.
- vi. From the **Schedule Task** section, set the required fields. The defined schedule will be displayed in the upper area of the dialog box.
- vii. To define multiple schedules, select the **Show multiple schedules** check box. This changes the upper section of the tab.

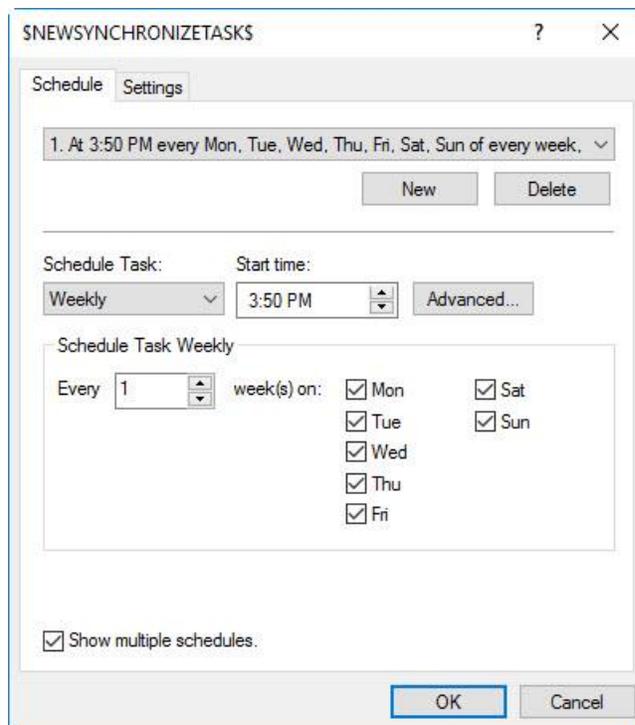


Figure 25: New Task dialog box – with Multiple Schedules option

The **New** and **Delete** buttons will be displayed. Define a new schedule by clicking the **New** button.

The selected schedule in the upper area of the dialog box is the active schedule.

viii. Click **OK** to save your new scheduled task.

The defined schedule gets populated in the **Next Run Time** box on the **When to Run Job** page (Figure 23).

- In the **Smart Group Schedule** section, the **Task name** drop down lists the Smart Group Update jobs existing in the identity store for the Active Directory domain that is provided as destination in this Synchronize job.

Select a Smart Group Update job that you want to run along with this Synchronize job. The selected job will run each time the Synchronize job is run either manually or from the Synchronize job scheduler.

Click **Next**.



Automate schedule(s) of the connected identity store will also be displayed here.

17. Click **Finish** to close the wizard.

Sync subscriptions using a Synchronize job

While creating or editing mail enabled objects (mailbox-enabled user) through a Synchronize job, GroupID enables you to sync or deprovision subscriptions from the Office 365 and G Suite messaging providers.

The following sections discuss:

- Sync Office 365 subscription
- Sync G Suite subscriptions

Sync Office 365 subscription

1. On the **Sync Object** page of the **Create New Job** wizard, select the *Mailbox-enabled User* option in the **Object Type** column.

The screenshot shows the 'New Job' wizard interface. On the left is a navigation pane with steps: Job Template, Select Source, Select Destination, Sync Object (highlighted), Select Fields, Field Map(s), Notifications, Save Job, and Completion. The main area is titled 'Sync Object Options' with the instruction 'Create and update objects from destination.' Below this is a question: 'What would you like to do if an object exists in the source but does not exist in the destination?'. A table lists object types with 'Create' and 'Skip' radio buttons and a 'Container Options' column. The 'Mailbox-enabled User' row is selected with a checkmark. Below the table, 'Messaging Provider' is set to 'Office 365' with a 'Configure Provider' button. At the bottom are 'Help', '< Back', 'Next >', and 'Cancel' buttons.

	Object Type		Container Options
<input type="checkbox"/>	User	<input type="radio"/> Create <input checked="" type="radio"/> Skip	...
<input type="checkbox"/>	Mail-enabled User	<input type="radio"/> Create <input checked="" type="radio"/> Skip	...
<input checked="" type="checkbox"/>	Mailbox-enabled User	<input type="radio"/> Create <input checked="" type="radio"/> Skip	...
<input type="checkbox"/>	Linked-Mailbox	<input type="radio"/> Create <input checked="" type="radio"/> Skip	...
<input type="checkbox"/>	Contact	<input type="radio"/> Create <input checked="" type="radio"/> Skip	...
<input type="checkbox"/>	Group	<input type="radio"/> Create <input checked="" type="radio"/> Skip	...
<input type="checkbox"/>	Mail-enabled Contact	<input type="radio"/> Create <input checked="" type="radio"/> Skip	...

Figure 26: Sync Object Options page

2. Select **Create**.

3. Click the **Container Options**  button to select a container for creating mailbox-enabled users in it (Figure 14).
4. Select Office 365 from the **Messaging Provider** drop down list and click **Configure Provider** button.

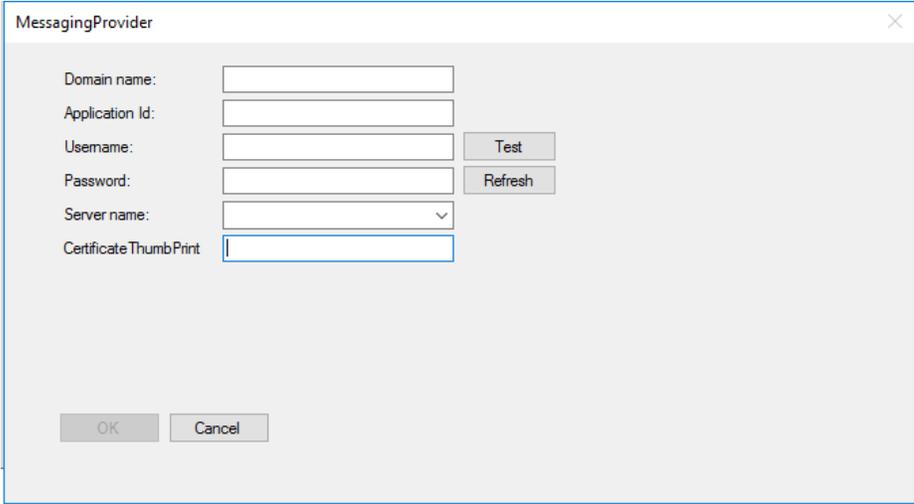


Figure 27: Messaging Provider - Office 365

5. On the **Messaging Provider** dialog box:
 - a. Enter domain name in which the mail server resides in the **Domain Name** box.
 - b. In the **Application ID** box, provide the application ID assigned to the application you registered on the Azure portal.
 - c. Type username of an authorized user account on the mail server in the **Username** box.
 - d. Enter password of the user mentioned in Username field in the **Password** box.
 - e. Click **Refresh**.
The name of mail server(s) in the given environment populates in the **Server Name** list, select your required mail server from the list.
 - f. In the **Certificate Thumbprint** box, provide the client secret generated against the certificate uploaded on the Azure portal while configuring the application.
 - g. Click **OK**.
6. Click **Next**.

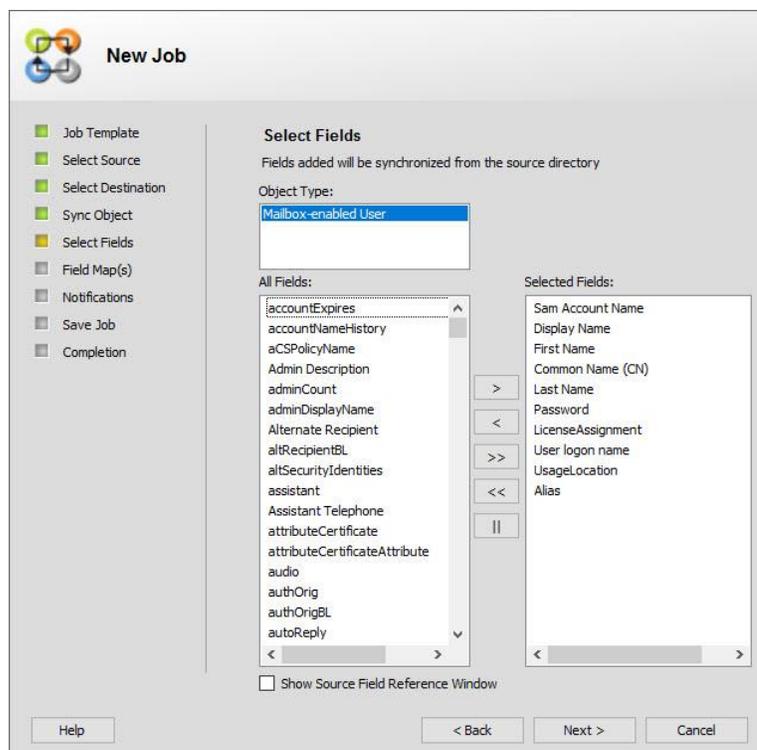


Figure 28: Select Fields page

7. On the **Select Fields** page, the following fields are selected by default in the Selected **Fields** box.
 - Sam Account Name
 - Display Name
 - First Name
 - Common Name (CN)
 - Last Name
 - Password
 - LicenseAssignment
 - User logon name
 - UsageLocation
 - Alias
8. Click **Next**.
 You have to transform the following fields to sync Office 365 subscriptions:
 - LicenseAssignment
 - User logon name
 - UsageLocation

- Password

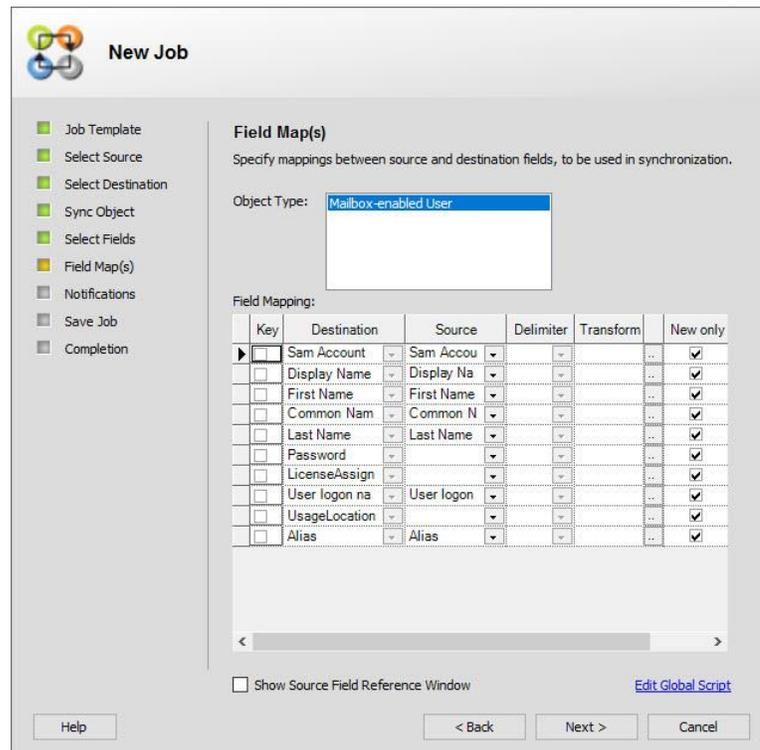


Figure 29: Field Map(s) page

9. On the **Field Map(s)** page, click the **Transform** (⋮) button for the following:
 - a. The **LicenseAssignment** field

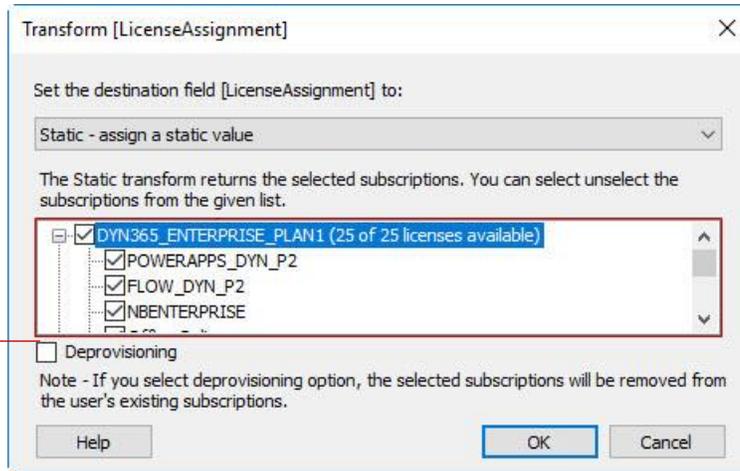


Figure 30: Transform License Assignment dialog box

- i. On the **Transform** dialog box, select *Static - assign a static value* from the **Set the destination field to** box.

The subscriptions list looks like as below:

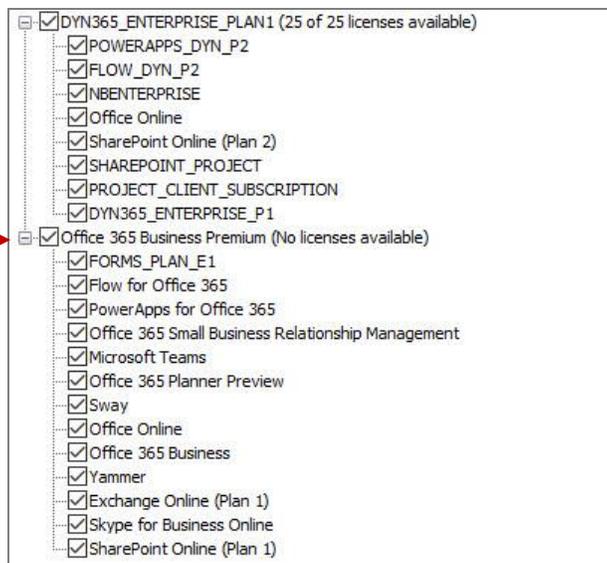


Figure 31: List of subscriptions

- ii. Clear the check box for a subscription you do not want to sync.
 - iii. Click **OK**.

b. The **User Logon Name** field

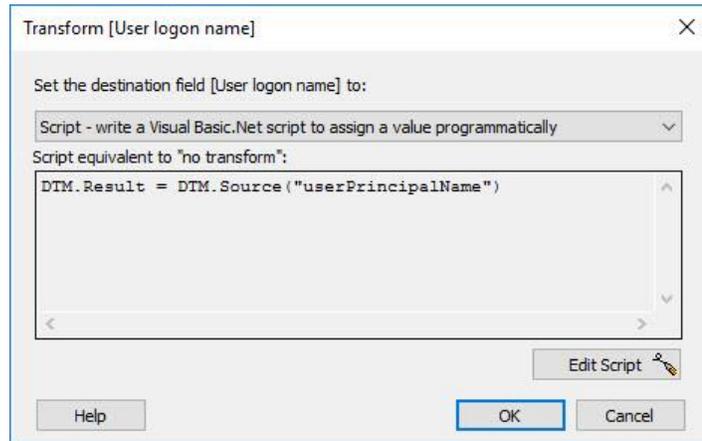


Figure 32: Transform dialog box for User logon name

- i. On the **Transform** dialog box, select *Script -write a Visual Basic.Net script to assign a value programmatically* from the **Set the destination field to** box.
- ii. Click **Edit Script** to edit the script to append the user logon name with Office 365 domain name.

By default, it is displayed as:

```
DTM.Result = DTM.Source("userPrincipalName")
```

- iii. Modify it with the attributes you want for the user logon name and add the domain name. For example:

```
DTM.Result =  
DTM.Source("givenName") & DTM.Source("sn") & "@groupi  
d.onmicrosoft.com"
```

- iv. Click to test the script.

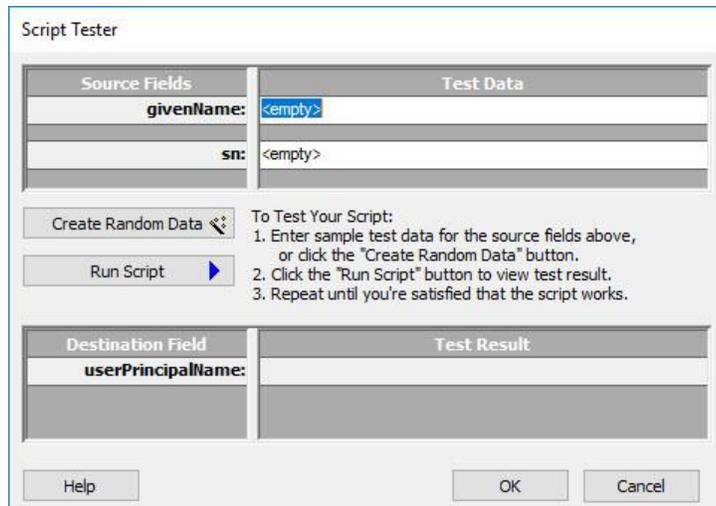


Figure 33: Script Tester dialog box

- v. On the **Script Tester** dialog box click  to populate the test results in the **Test Result** box. Click **OK**. Click **OK** again on the **Script Editor** to return to the **Transform** dialog box.
- vi. Click **OK**.
- c. The **UsageLocation** field

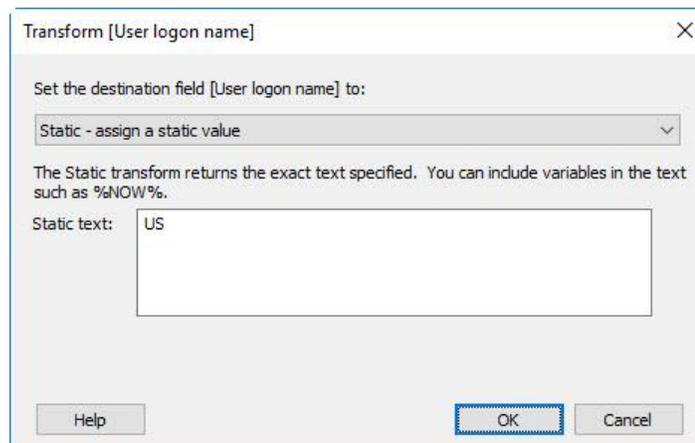


Figure 34: Transform dialog box with Static – assign a static value option

- i. On the **Transform** dialog box, select *Static - assign a static value* from the **Set the destination field to** box.
- ii. In the **Static** text box, enter a 2-letter country name abbreviation such as *US* for United States.
- iii. Click **OK**.

d. The **Password** field



Figure 35: Transform dialog box for Password field

- i. On the **Transform** dialog box, select *Static - assign a static value* from the **Set the destination field to** box.
- ii. Click **Password Complexity Options**.

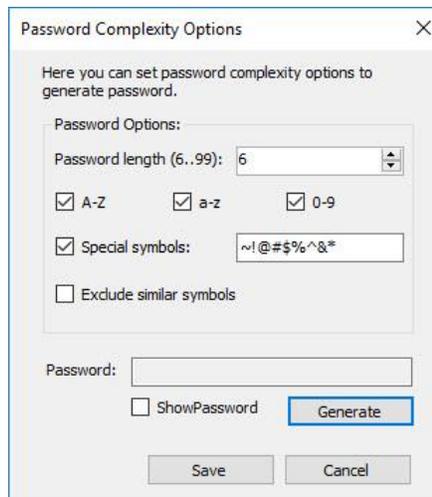


Figure 36: Password Complexity Options dialog box

- iii. On the **Password Complexity Options** dialog box, enter *10* in the **Password Length** box.
 - iv. Clear the **Special symbols** check box.
 - v. Click **Save**.
 - vi. Click **OK** to close the **Transform** dialog box.
10. Continue with the remaining pages of the wizard to complete the job.

Deprovision Office 365 subscription

To delete a subscription in an existing job,

1. Double click the required job. The **Edit Job** wizard opens.
2. Click *Next* until you reach the **Filed Map(s)** page (Figure 29).
3. For the *LicenseAssignment* field, click (...) in the **Transform** column.

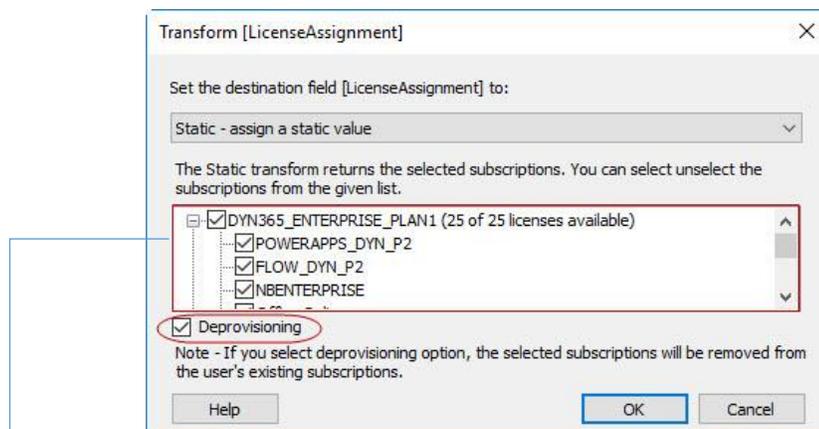


Figure 37: Transform dialog box – Deprovision option

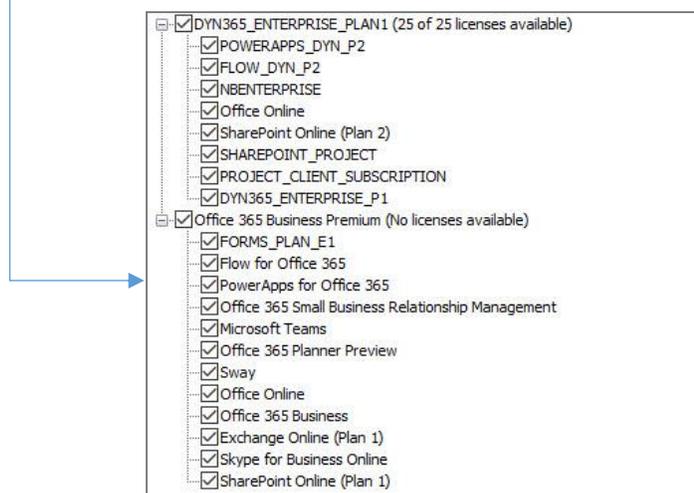


Figure 38: List of subscriptions for deprovisioning

4. On the **Transform** dialog box (Figure 37), select *Static - assign a static value* from the **Set the destination field to** box.

Select the check box(es) for the subscription(s) you want to remove from the list of subscriptions displayed (Figure 38). Then select the **Deprovisioning** check box (Figure 37).

5. Click **OK**.

Click **Finish** or click **Next** if you want to modify a setting on any page of the **Edit Job** wizard.

Sync G Suite subscriptions

While creating or updating mail enabled objects through a Synchronize job, GroupID enables you to sync or deprovision subscriptions from the G Suite messaging provider.

1. On the **Sync Object** page of **Create New Job** wizard, select *Mailbox-enabled User* option in the **Object Type** column list.

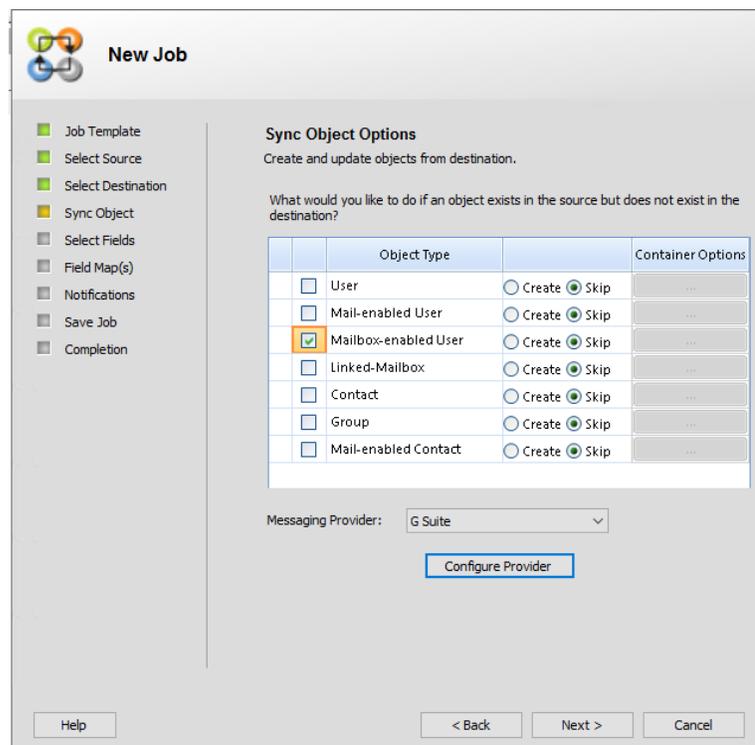


Figure 39: Sync Object Options page

2. Select **Create**.
3. Click the **Container Options** button to select a container for creating mailbox-enabled users in it (Figure 14).
4. Select *G Suite* from the **Messaging Provider** drop down list and click **Configure Provider** button.

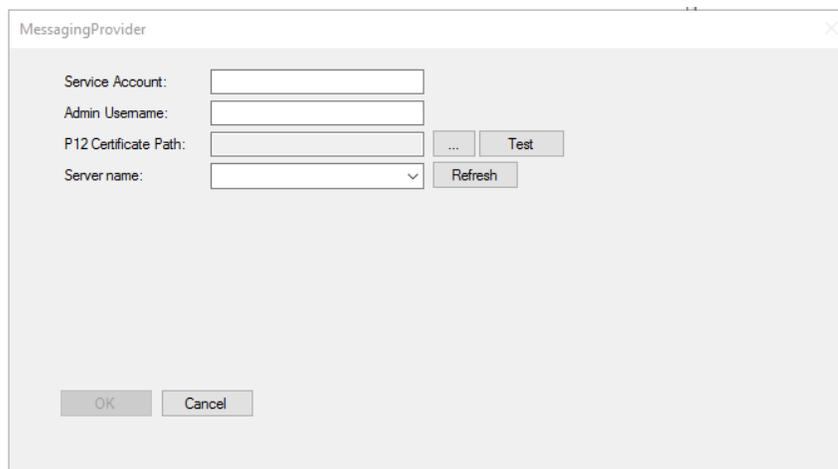


Figure 40: Messaging Provider - G Suite

5. On the **Messaging Provider** dialog box:
 - a. Enter the service account name in the **Service Account** box.
 - b. Enter the admin username in the **Admin Username** box.
 - c. Specify the location of the P12 key file in the **P12 Certificate Path** box.



 The logged-in user of the connected identity store must have permissions to access the downloaded p12 certificate file.
GroupIDSSUser or the *Everyone* group must have rights on the P12 certificate file.
 - d. Click **Refresh**.
The name of the mail server is displayed in the **Server Name** list.
 - e. Click **OK**.
6. Click **Next**.

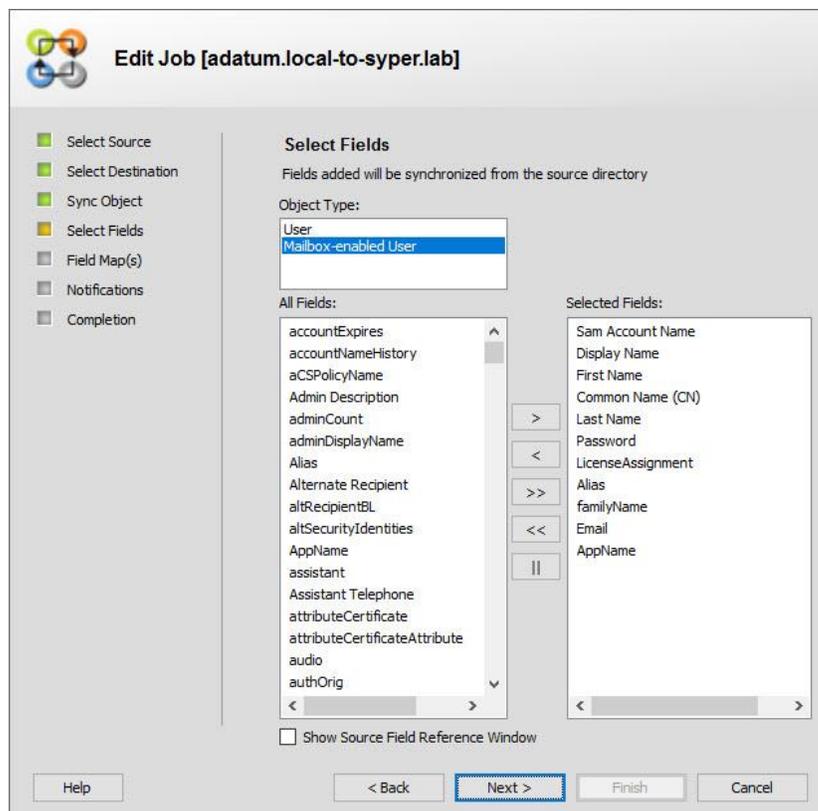


Figure 41: Select Field page

7. On the **Select Fields** page, the following *G Suite* specific fields are selected by default in the **Selected Fields** box:
- Sam Account Name
 - Display Name
 - First Name
 - Common Name(CN)
 - Last Name
 - Password
 - LicenseAssignemnt
 - Alias
 - familyName
 - Email
 - AppName

8. Click **Next**.

You have to transform all the above fields to work them properly with the G Suite messaging provider.

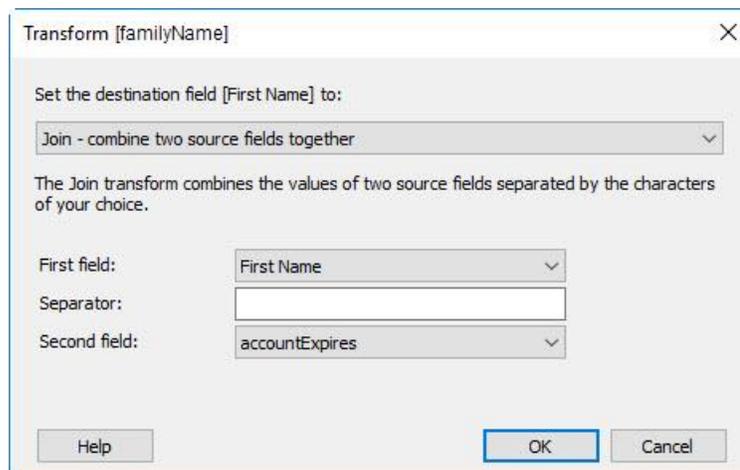


Figure 42: Transform Family Name dialog box

9. On the **Field Map(s)** page, click the **Transform** (...) button for the:

a. the **familyName** field

- i. On the **Transform** dialog box, select *Join - combine two source fields together* from the **Set the destination field to** box.
- ii. Select an attribute from the **First field** list to form a value for the family name field.
- iii. (Optional) provide a separator of your choice in the **Separator** box to separate the values of **First field** and **Second field**.
- iv. Select an attribute from the **Second field** list to form a value for the family name field.
- v. Click **OK**.

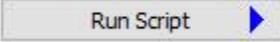
b. the **Email** field

- i. On the **Transform** dialog box (Figure 29), select *Script -write a Visual Basic.Net script to assign a value programmatically* from the **Set the destination field to** box.
- ii. Click **Edit Script** to edit the script to append the user logon name with the *G Suit* domain name.

By default, it displays: `DTM.Result = ""`

Modify it with the attributes you want to form email address of the mailbox-enabled user. For example:

```
DTM.Result = DTM.Source("First") & "_go_" &  
DTM.Source("Last") & "@theasp.net"
```

- iii. Click  to test the script.
 - iv. On the **Script Tester** dialog box (Figure 33) click  button to populate the test results in the **Test Result** box. Click **OK** on the **Script Editor** to return to the **Transform** dialog box (Figure 30).
 - v. Click **OK**.
- c. the **LicenseAssignment** field
 - i. On the **Transform** dialog box (Figure 30), select *Static - assign a static value* from the **Set the destination field to** box.
 - ii. Select the check box(es) for the subscription(s) you want to sync from the list of subscriptions displayed.
 - iii. Click **OK**.
 - d. the **AppName** field
 - i. On the **Transform** dialog box (Figure 30), select *Static - assign a static value* from the **Set the destination field to** box.
 - ii. In the **Static** text box, enter *G Suite*.
 - iii. Click **OK**.
10. Continue with the remaining pages of the wizard to complete the job.

Deprovision G Suite subscriptions

1. To delete a subscription in an existing job, double click the required job. The **Edit job** wizard opens.
2. Click *Next* until you reach the **Filed Map(s)** page (Figure 16).
3. Click the **Transform** (⋮) button for the **LicenseAssignment** field.
4. On the **Transform** dialog box (Figure 30), select *Static - assign a static value* from the **Set the destination field to** box.
5. Select the check box(es) for the subscription(s) you want to remove from the list of subscriptions displayed.
6. Select the **Deprovisioning** check box.
7. Click **OK**.

Click **Finish** or click **Next** if you want to modify a setting on any pages of the Edit Job wizard.

Create a job by duplicating an existing job

You can create new jobs from existing jobs and reuse their settings in new jobs.

1. In GroupID Management Console, expand the **Synchronize** node and click **All Jobs**.
2. In the jobs list, right-click the desired job and click **Duplicate**. A copy of the original job is created and displayed in the **All Jobs** list.
3. Right-click the duplicate job and select **Rename** to give the new job a name.
4. Right-click the duplicate job's new name and select **Open** to modify the job, as described in the Create a new job section.

Edit a Job

When you double-click a job to view or change its settings, the **Edit Job** wizard opens, which is virtually identical to the [Create Job](#) wizard.

1. In GroupID Management Console, expand the **Synchronize** node and click **All Jobs**. Do one of the following to launch the **Edit Job** wizard:
 - Double-click the job name.
 - Right-click the job name and select **Open** from the menu.
 - Select the job name, and then select **Actions > Open**.

2. In the **Edit Job** wizard, navigate to the page containing the information that you want to view or modify.

Rename a job or job template

Renaming a job or job template lets you save them under a new name and a new description. As you would expect, renaming a job or job template does not affect their settings.

1. In GroupID Management Console, expand the **Synchronize** node and click **All Jobs**.
2. Right-click the required job or job template and then click **Rename**. The **Rename Job** dialog box is displayed.

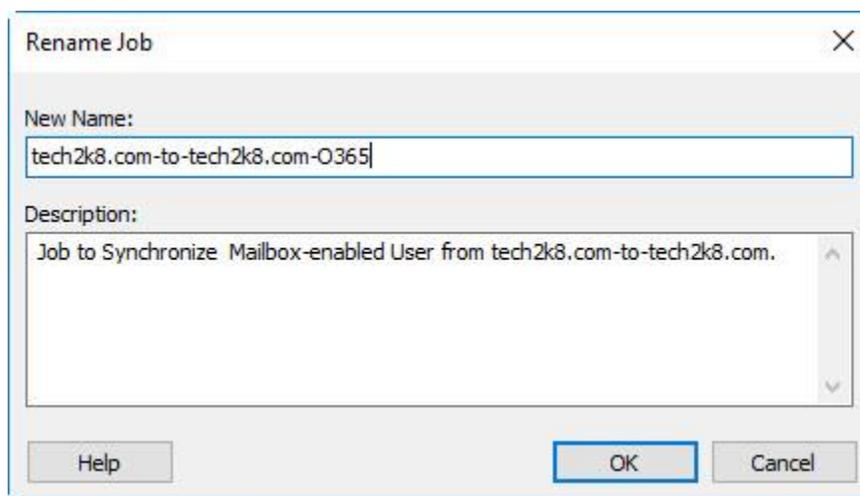


Figure 43: Rename Job dialog box

3. In the **New Name** box, type a new name for the job or job template..
4. In the **Description** box, type a new description. (optional).
5. Click **OK**.

Create a custom job template

Synchronize comes with a set of pre-defined job templates that represent some of the most common business scenarios in use. You can use these templates as is, modify them to suit your needs, or create your own custom templates.

Synchronize provides these predefined job templates:

- Linked Mailbox Creation in Active Directory

- Move and Disable Objects in Active Directory
- Move Objects in Active Directory
- Sync GAL in Active Directory

Creating a custom template involves saving a job as a template. Therefore, you must first create a job with commonly used settings before you can save it as a template.

To create a job template:

1. In GroupID Management Console, expand the **Synchronize** node and click **All Jobs**.

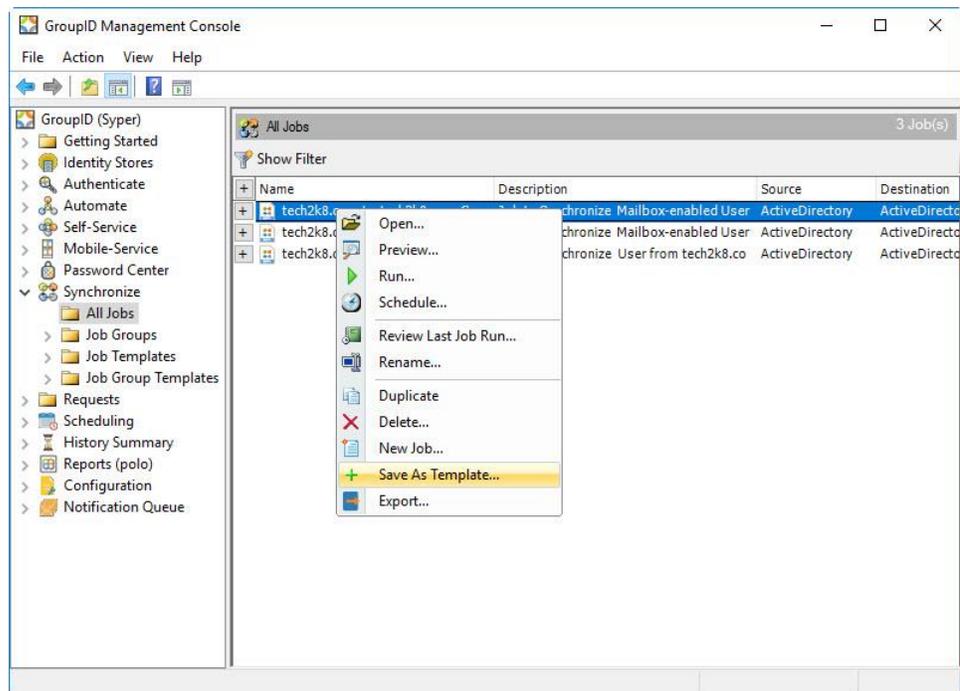


Figure 44: Synchronize All Jobs view – Save As Template option

2. In the **All Jobs** view, right-click the job you want to save as a template and click **Save As Template**.

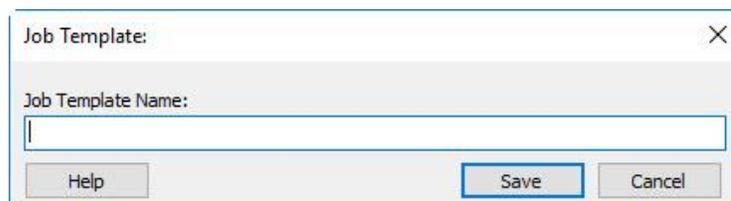


Figure 45: Job Template dialog box

3. In the **Job Template** dialog box, type a name for the new template.
4. Click **Save**. The template is saved in the **All Job Templates** list.



Any schedule is associated with the job will not be associated with the template.

Chapter 3 - Running and Scheduling Jobs

You can run a job manually or you can schedule it to run. Running a job results in the execution of the commands that transfer data from the source to the destination while applying any data [transformations](#) that you might have defined in the job.

You can preview a job to verify that it yields the intended results. No changes are committed to the destination during a preview.

This chapter explains how to:

- Preview a job
- Run a job
- Preview last job run
- Export a job
- Import a job
- Schedule a job run
- Run a job from the Command Line Utility
- Rename a job

Preview a job

Synchronize enables you to preview the results of a job to verify that it yields the intended results. This saves users from making changes to the actual data at the destination and lets them test whether their job is working as intended.



This preview run will not make any changes to the data source. To make actual changes to the provider, you need to run this job.

1. In the GroupID Management Console, expand the **Synchronize** node and click **All Jobs**.
2. In the **All Jobs** list, right-click the required job and select **Preview**. This displays the **Preview Job** dialog box, which shows the job run progress.

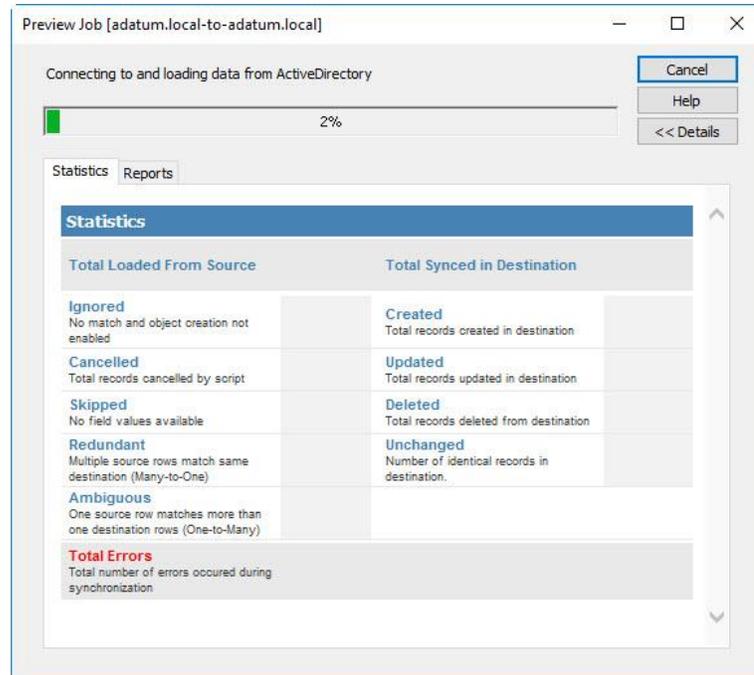


Figure 46: Preview Job dialog box – Statistics tab

- When the job run completes, the results can be viewed on the **Statistics** and **Reports** tabs.
 - Statistics tab:** displays a summary of the test run providing information on the number of records that are affected at both the source and destination sides.
 - Reports tab:** presents a drill down report that shows the records affected. The report provides a breakdown of the records depending on whether they were inserted, updated or deleted as a result of the run.

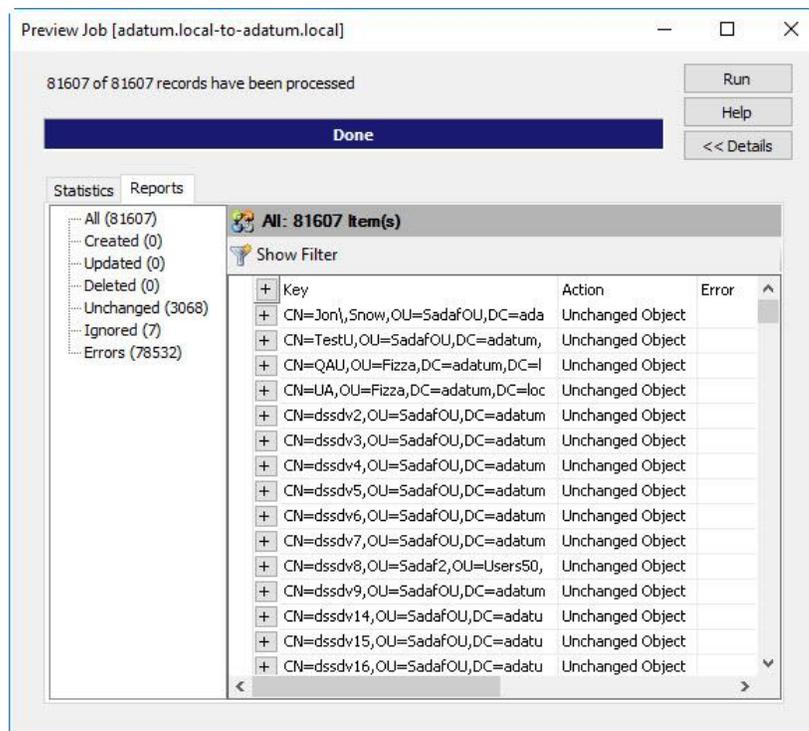


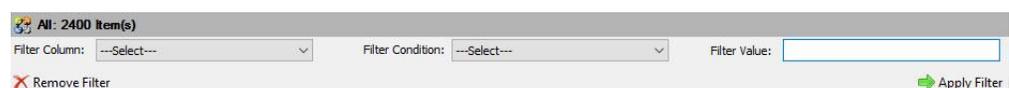
Figure 47: Preview Job dialog box – Reports tab

Data on the **Reports** tab is displayed in a tabular format. This table consists of three columns: **Key**, **Action** and **Error**.

Column	Description
Key	Shows the display name and the value of field(s) marked as <i>Key</i> . Key fields are selected on the Fields page (Figure 16) of the wizard when creating or modifying a job.
Action	Shows the action done for a record, for example, Insert Row, Update Object, and more..
Error	Shows the error message for a record, if any, encountered during the job run.

Click  to expand a record and view the rows added at the destination.

You can specify a filter to get reports according to a certain criterion. Click the **Show Filter** link (Figure 47) to define a criterion.

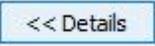


- From the **Filter Column** box, select a field to apply the filter to.

- From the **Filter Condition** box, select the operator to apply on the selected field.

Equals	Returns everything that matches the value.
Starts With	Returns everything that starts with the value.
Ends with	Returns everything that ends with the value.
Contains	Returns everything that contains the value.

- In the **Filter Value** box, type the value (not case-sensitive) that determines whether the condition satisfies the requirement for this filter.

4. Click  to collapse both the **Statistics** and **Reports** tabs.

Run a job

Running a job carries out the data transfer operation. It makes changes to the data at the destination in accordance with the job settings.

1. In the GroupID Management Console, expand the **Synchronize** node and click **All Jobs**.
2. In the **All Jobs** list, right-click the required job and select **Run**. This displays the **Run Job** dialog box showing the progress of the job as it runs.

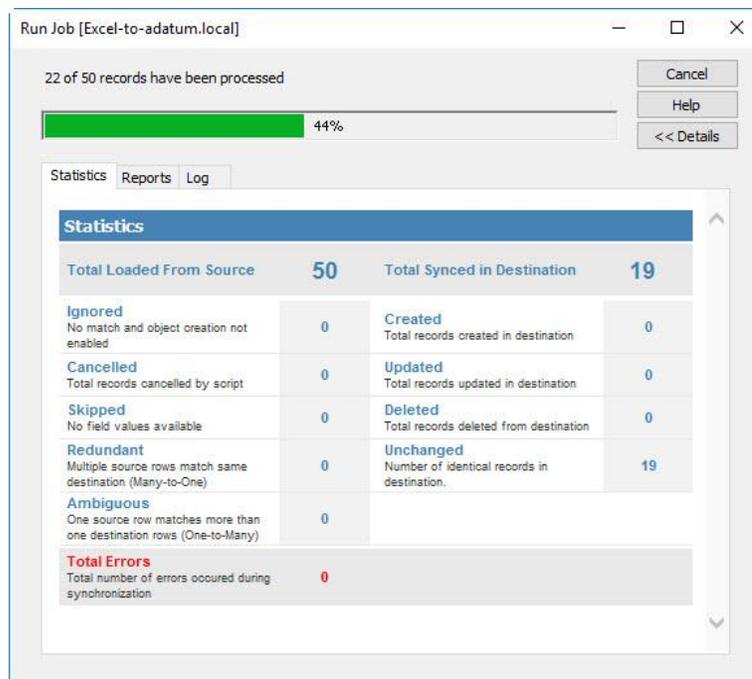


Figure 48: Run Job dialog box

- When the job run completes, you can view its statistics, reports and logs on the Statistics, [Reports](#) and [Log](#) tabs respectively.



You can also run a job with the Synchronize command-line utility. For details, see [Run a job from the Command Line Utility](#) section.

The information displays on the **Run Job** dialog box is similar to that on the **Preview Job** dialog box (Figure 46) with one additional **Log** tab.

Many actions take place in the background when a job is run. These actions are logged and displayed on the **Log** tab.

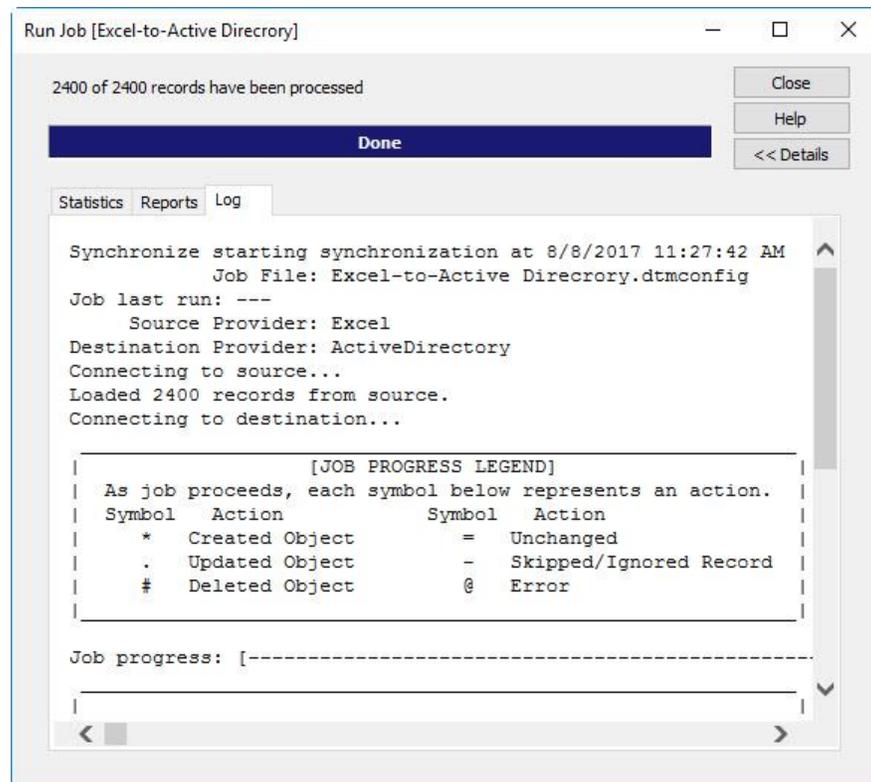


Figure 49: Run Job dialog box – Log tab

The information contained in a log file depends on the event logging configuration setting of the connected identity store level.

Logs files for every job run are archived and stored in temporary folder for the logged-on user. Access them using the `%TEMP%` environment variable. These files are in XML format and can be viewed by opening them in any XML or text editor program, like Windows Notepad.

To view the result files for previous history job runs, see Job files.

Preview last job run

You can view the results of a job for its last run.

1. In the GroupID Management Console, select the **Synchronize** node.
2. Expand the **Synchronize** node and click **All Jobs**.
3. In the list, right-click the required job and select **Review Last Job Run**.
4. The **Review Job Run** dialog box is displayed. You can view the statistics, reports and logs for the job as generated for its last run on the [Statistics](#), [Reports](#) and [Log](#) tabs respectively.

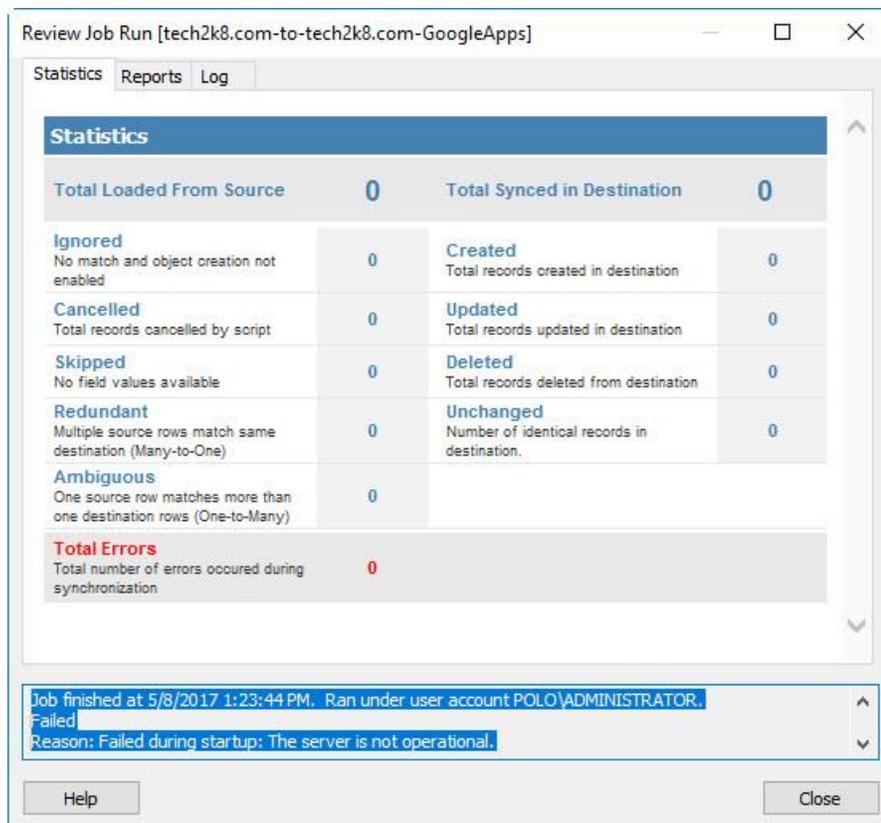


Figure 50: Review Last Job run dialog box

Export a job

You can export Synchronize job(s) to a location on your local hard drive or on another machine on your network. The exported job(s) can then be imported to other machines running GroupID Synchronize, using the **Import Job** option.

In the export function, only the job's configuration file is exported. For information on the configuration file, see [Job Files](#).

If the job being exported is a scheduled job, the export action also exports the schedule configurations to a file with the **.scheduledjob** extension in a separate folder named Synchronize. Thus the job is executed on the new machine according to the defined schedule.

To export a job:

1. In GroupID Management Console, expand the **Synchronize** node and click **All Jobs**.
2. In the list, right-click the required job(s) and click **Export**. The **Export Jobs** dialog box is displayed.

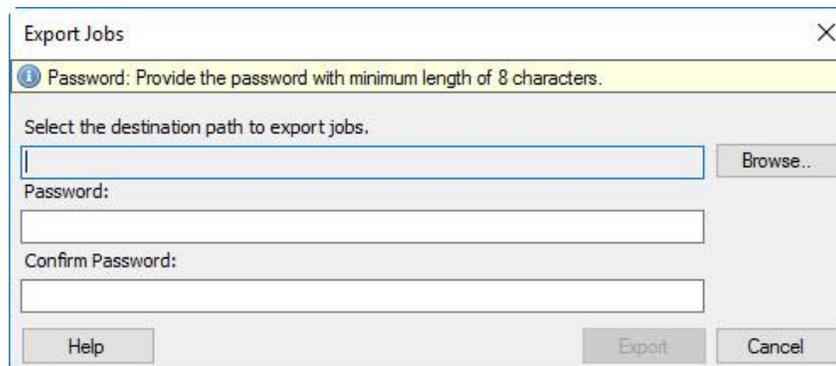


Figure 51: Export Jobs dialog box

3. Click **Browse** next to the **Select the destination path to export jobs** box to select the location to export the selected job(s) to.
4. Type a password in the **Password** box to protect the exported job(s). Only users who know this password can import the job(s) to their GroupID machines. The password should not be less than 8 characters.
5. Re-type the password in the **Confirm Password** box.
6. Click **Export** to perform the export action. The following dialog box displays the status.

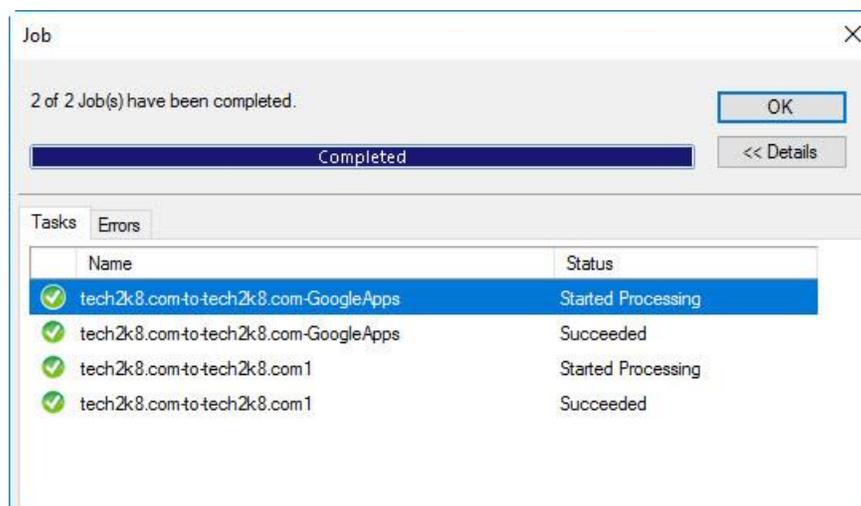


Figure 52: Export Job Status dialog box

Click **Details >>** to view information about the tasks performed and errors encountered during the export operation on the **Tasks** and **Errors** tabs respectively.

7. While exporting, if a job with the same name already exists on the machine, a confirmation dialog box is displayed for you to replace the existing job or save it as a new one.

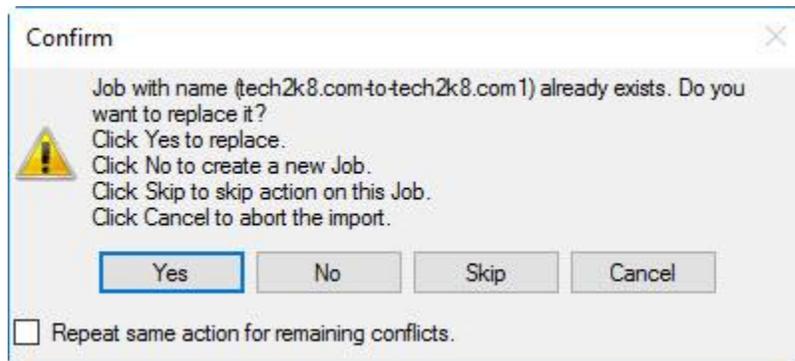


Figure 53: Confirmation dialog box

If you export it as a new job by clicking *No*, Synchronize appends a numeric code to the job name to differentiate it from the existing one.

Import a job

You can import Synchronize jobs exported from other machines. The import action requires you to select the location where the exported jobs reside and provide the protection password assigned during export.

If the job being imported is a scheduled job, the schedule defined for it is also imported so that the job can be executed on the machine according to the defined schedule.

1. In the GroupID Management Console, expand the **Synchronize** node and click **All Jobs**.
2. Select **Import Jobs** in the **Actions** pane. The **Import Jobs** dialog box is displayed.

7. While importing, if a job with the same name already exists on the machine, a confirmation dialog box is displayed (Figure 53) for you to replace the existing job or save it as a new one.

If you import it as a new job, Synchronize appends a numeric code to the job name to differentiate it from the existing one.

Rename a job

You can rename an existing job and save it under a new unique name and a new description. Renaming a job does not affect its settings.

1. In GroupID Management Console, click the **Synchronize** node.
2. Expand the **Synchronize** node and click **Job Groups**.
3. Right-click the required job group and then click **Rename**. **Rename Job Group** dialog box opens.

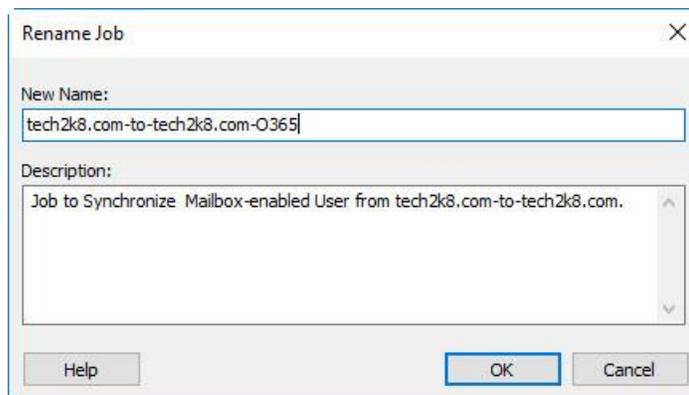


Figure 56: Rename Job dialog box

4. On the **Rename Job** dialog box, type a new name for the Job in the **New Name** box,
5. In the **Description** box, type a new description for the job (optional).
Click **OK** to close the dialog box and save changes.

Schedule a job run

The scheduling feature in GroupID Synchronize enables you to set any Synchronize job or job group to run automatically. Define a schedule for a job or job group, so that the job or job group runs at the specified date, time, and frequency.

The schedule can be defined using any of the following:

- [Synchronize](#) module
While creating a new job, use the **When to Run Job** page of the **New Job** wizard (Figure 23) to create a job schedule.
or
right-click a job in the **All Jobs** view and click **Schedule** to:
 - define a new schedule (Figure 23)
 - modify an existing schedule (Figure 23)
 - Remove a job schedule
 - Remove a Smart Group Update job
- [Scheduling node in GroupID](#)

Remove a job schedule

1. In the GroupID Management Console, expand the Synchronize node and click **All Jobs**.
2. In the list, right-click the required job and click **Schedule**.
The **Schedule Job** page is displayed.

Schedule Job [tech2k8.com-to-tech2k8.com-O365]

When to Run

When to Run Job
You can schedule the job to run on scheduled/specified time.

Schedule Job

Task name: Polo SG Update Job

Next Run Time: 5/31/2017 2:21:00 PM

Set Schedule...
Clear Schedule

Smart Group Schedule

Task name: Please select smart group job

Clear Schedule

Help Finish Cancel

Figure 57: Scheduled Job page

3. Click **Clear Schedule** in the **Schedule Job** area.
4. Click **Finish** to save the changes.

Remove a Smart Group Update job

You can remove a Smart Group Update job that you selected to run along with a Synchronize job.

1. In the GroupID Management Console, select the **Synchronize** node.
2. Expand the Synchronize node and click **All Jobs**.

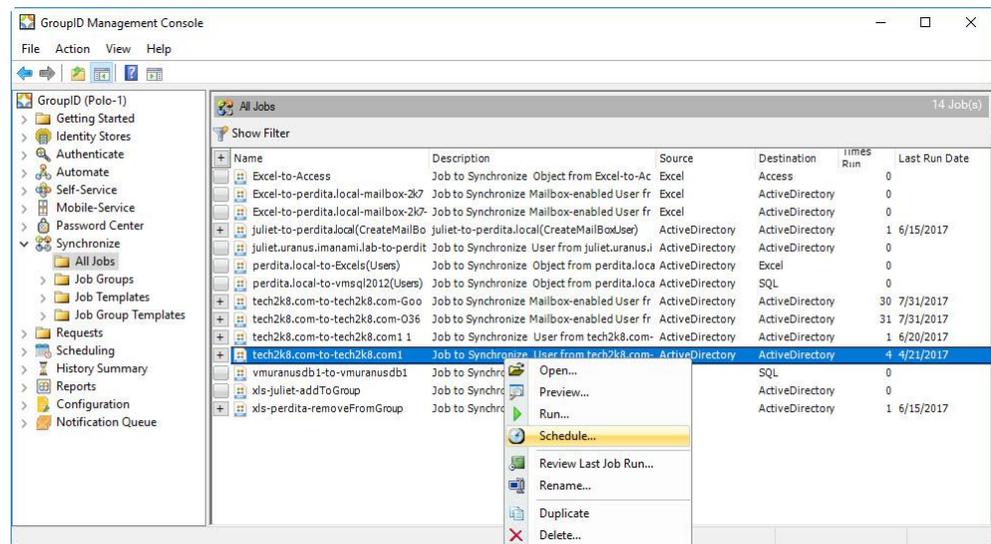


Figure 58: Schedule option

3. In the list, right-click the required job. Right-click the selected job and select **Schedule**.
The **When to Run Job** page of **New / Edit Job** wizard is displayed

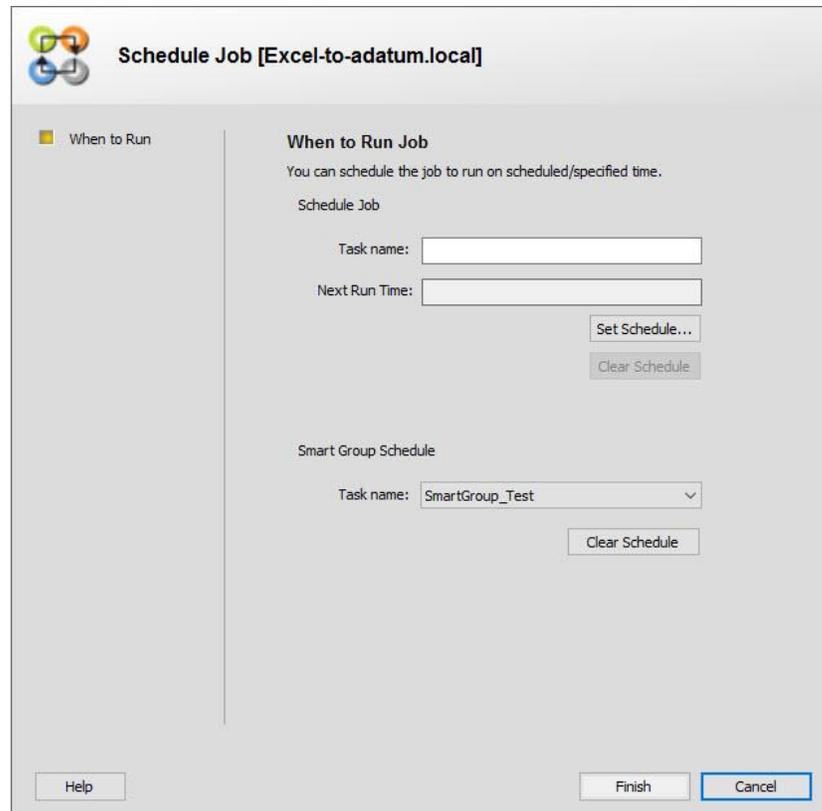


Figure 59: Schedule Job wizard

4. On the **When to Run Job** page, click **Clear Schedule** in the **Smart Group Schedule** area.
It clears the selected Smart Group Update job displayed in the **Task name** field.
5. Click **Finish** to save the changes.

Define a scheduled Synchronize job from the Scheduling node

GroupID schedule function allows you to set any Synchronize job or job group to run automatically. Define a schedule for a job or job group to run at the specified date, time, and frequency.

1. In GroupID Management Console, click the **Scheduling** node.

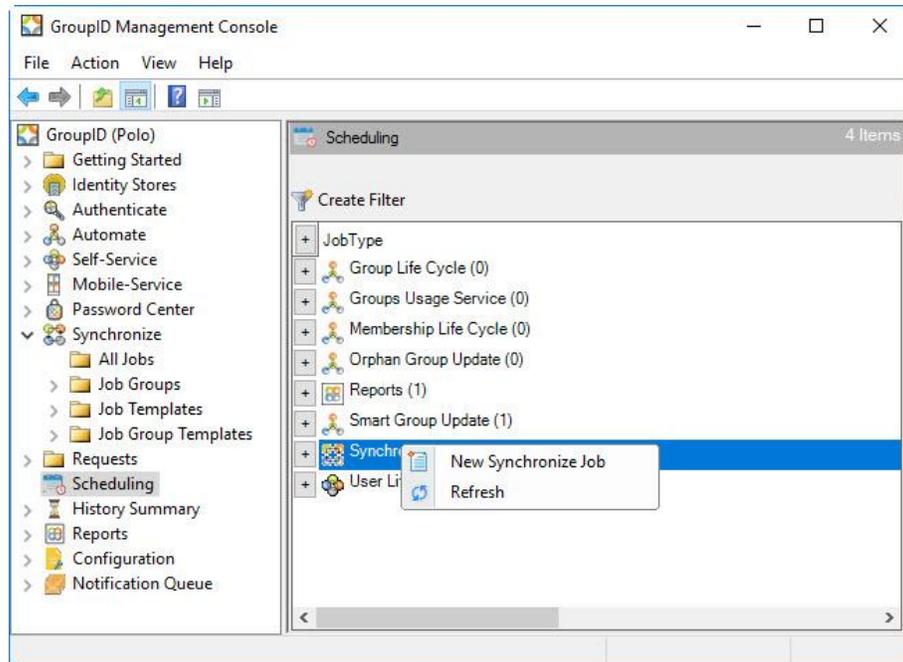


Figure 60: Scheduling node – Synchronize option

2. Right-click the Synchronize option and select **New Synchronize Job**. The **New Job** dialog box is displayed.

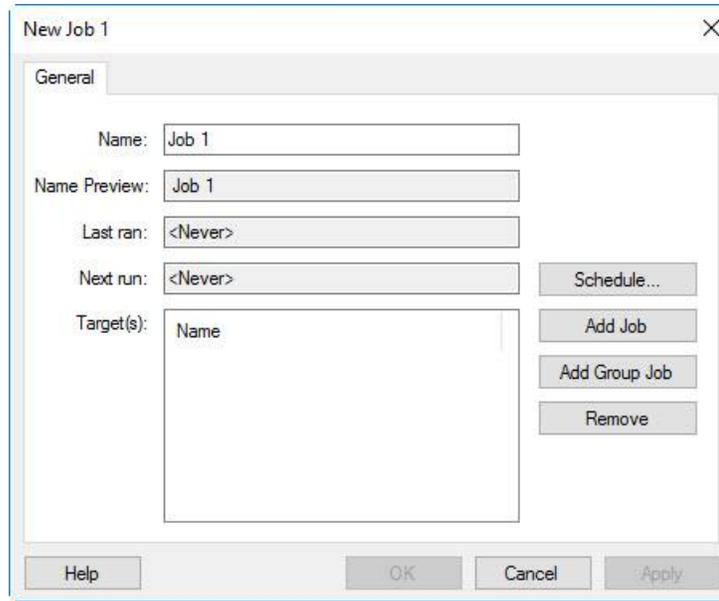


Figure 61: New Job dialog box

3. Type a name for the job in the **Job Name** box. By default, the box displays a system suggested job name. You can either use this name or enter a different one.
The entered name is displayed in the **Name Preview** box.
4. Click the **Schedule** button. The following dialog box is displayed.

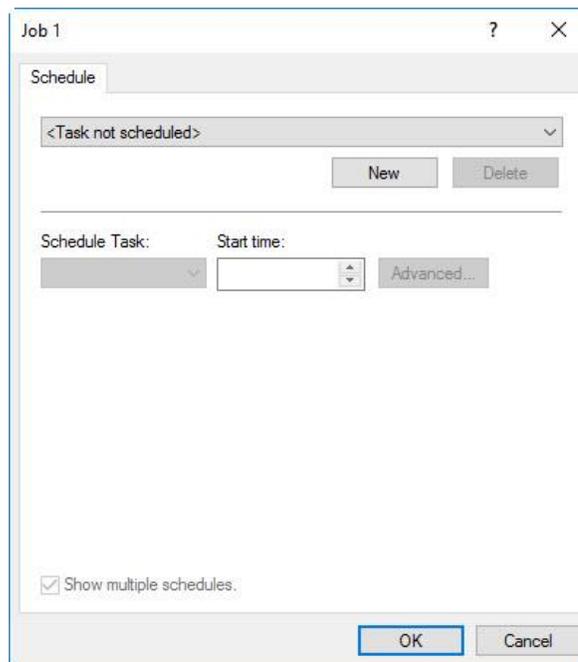


Figure 62: New Schedule dialog box

- a. Click the **New** button to define a schedule for the job.

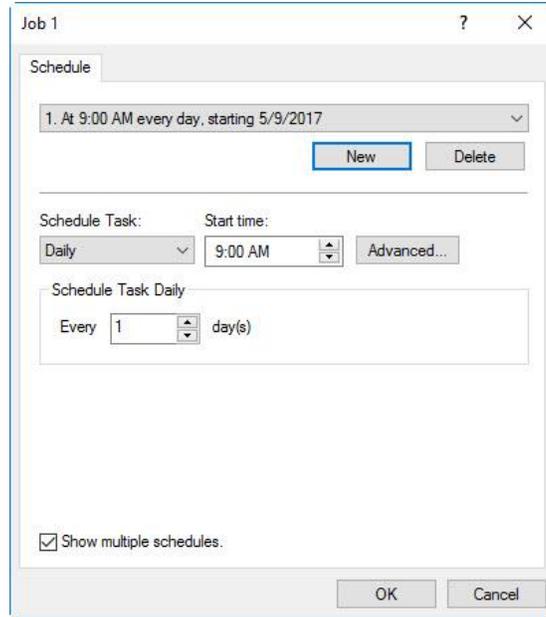


Figure 63: New Schedule dialog box

Follow the step iv - viii under Figure 24 to define a new schedule.

5. Click **Add Job** to add a Synchronize job, to this scheduled job.

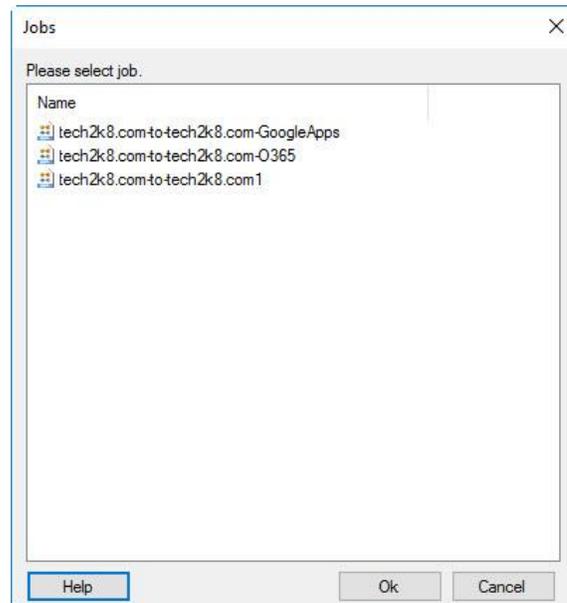


Figure 64: Jobs dialog box

Or

Click **Add Group** Job to add a job group to this scheduled job.

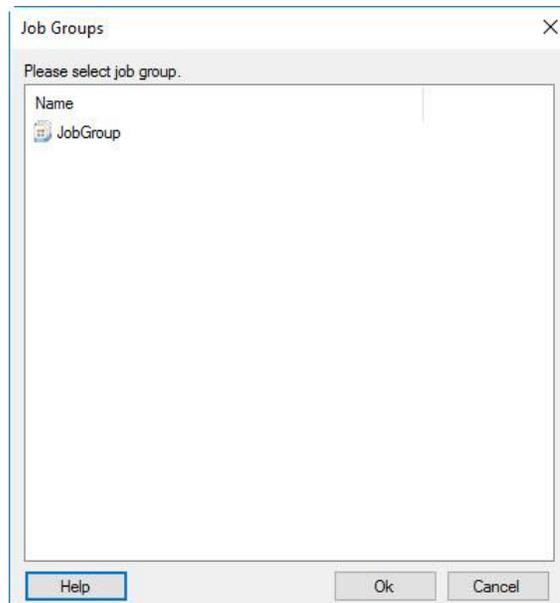


Figure 65: Job Groups dialog box

The **Jobs** and **Job Groups** dialog boxes display the jobs and job groups that are not yet scheduled for auto run. Select a desired job or a job group and click **OK**. The added job/job group will auto run according to the set schedule.

6. Click **OK** to close the **New Job** dialog box (Figure 61).

Run a job from the Command Line Utility

If you prefer to execute a synchronize job through the command line rather than GroupID Management Console, Synchronize provides a command-line utility. The utility resides in the GroupID installation directory:

```
[GroupID Installation drive]:\Program Files\Imanami\GroupID  
10.0\Imanami.GroupID.Synchronize.exe
```

Use this utility from the Windows command prompt to execute a synchronization job.

Before you run the utility, you must know the path where the job's [configuration file](#) is placed. The location of this file depends on two factors:

- The Windows Server version installed on your machine
- Whether you installed GroupID for everyone who uses your machine, or just for yourself

View Synchronize Command-line Help

1. At the command prompt, enter the following command to view Synchronize command-line help:

```
[GroupID Installation drive]:\Program  
Files\Imanami\GroupID 10.0\Imanami.GroupID.Synchronize  
/Help
```

2. Press **Enter**.

View Synchronize Version

1. At the command prompt, enter the following command to move to the installation directory for GroupID.

```
[GroupID Installation drive]:\Program  
Files\Imanami\GroupID 10.0\Imanami.GroupID.Synchronize  
/Ver
```

2. Press **Enter**.

Chapter 4 - Managing Job Groups

A job group is a collection of individual jobs that you want to run in a particular order. For instance, you can create a job group to synchronize user accounts between multiple Active Directory domains. You first create multiple Synchronize jobs to transfer data between two directories, and then combine them in a job group. Then you can execute the job group instead of executing each job one by one.

This chapter describes the following:

- Create a job group
- Create a job group by duplicating an existing one
- Edit a job in a job group
- Remove a job from a job group
- Run a job group
- Preview a job group
- Review last job group run
- Export a job group
- Import a job group
- Rename a job group
- Delete a job group

Create a job group

You can do the following in a job group:

- **Add existing jobs to the group**
When you add existing jobs to a group, Synchronize creates a copy of the original job for the group. Any changes you make to the job at group level are applied to the group's copy, not the original. Similarly, any change in the original job is not applied to the group's copy.

- **Create new jobs to add**
If the job to be added does not exist, you can launch the **New Job** wizard from within the **New Job Group** wizard to create it. The new job is automatically added to the group upon creation. Such jobs only exist in the originating job group and do not appear in the **All Jobs** list.
- **Remove jobs from the group**
Suppose you add an existing job to a group. If this job is removed from the group, the group's copy is deleted while the original continues to exist in the **All Jobs** list.
- **Determine the order of their execution**
You can specify the order in which jobs are run one after another.
- **Specify a failure action for each job**
For each job in the group, you can specify the action to take if it fails to run successfully, choosing whether to continue or to abort the execution of the remaining jobs in the group.
- **Set up job run notifications**
Email notifications contain a brief numerical summary of the objects processed by the job group and a detailed log of statistics and errors.

To create a job group:

1. In GroupID Management Console, expand the **Synchronize** node, right-click **Job Groups**, and then click **New Group**. The **New Group** wizard is displayed.

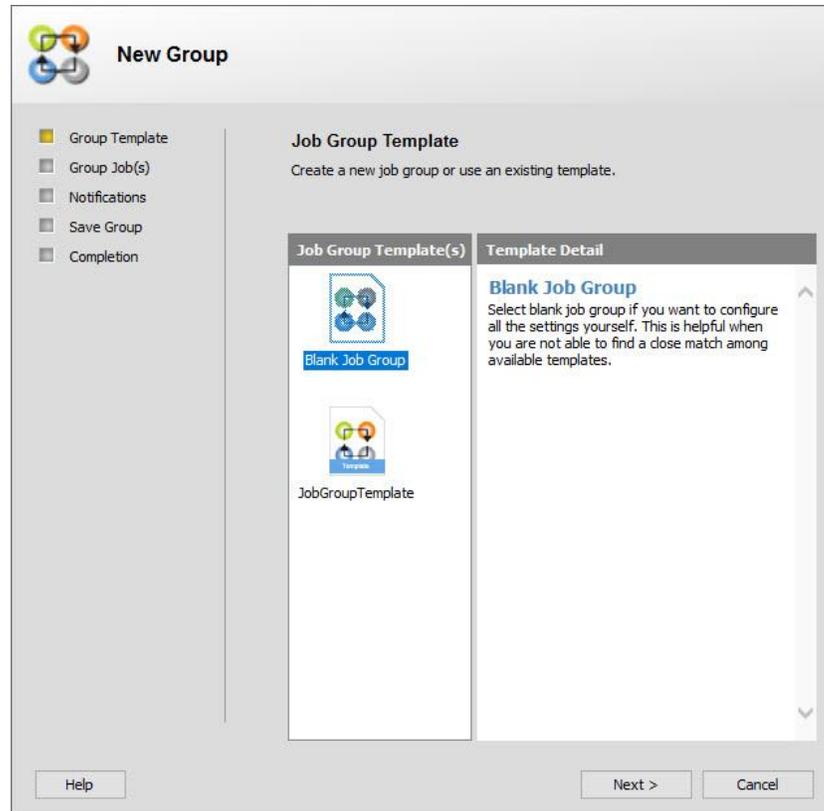


Figure 66: Job Group Template page

2. On the **Job Group Template** page, select whether to use a job group template or create the job group from scratch.
3. Click **Next**.

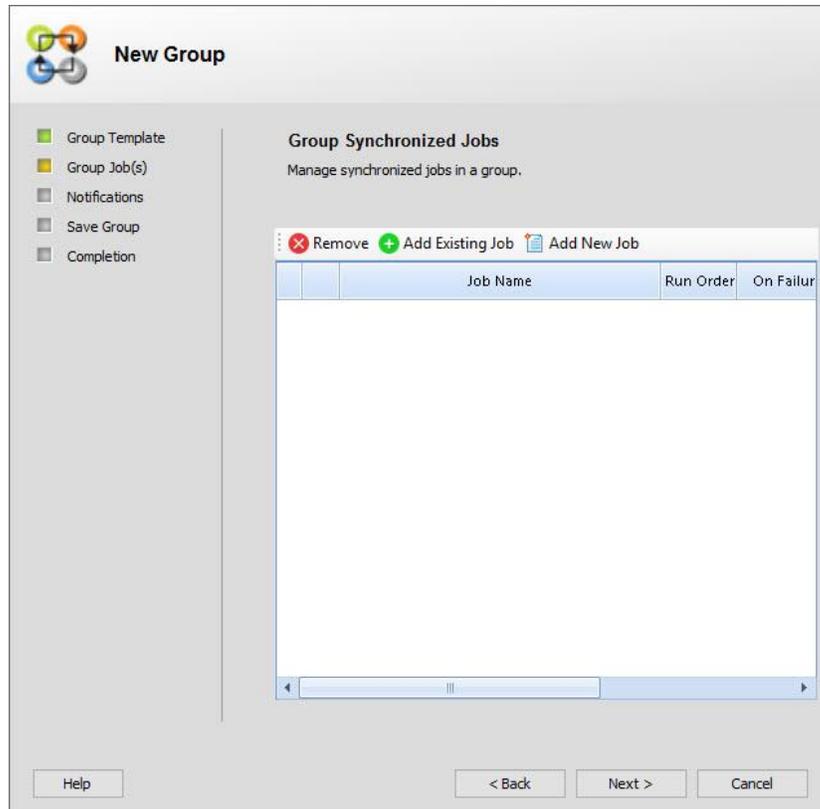


Figure 67: Group Synchronized Jobs page

4. On the **Group Synchronized Jobs** page, add jobs to the group.
 - To add an existing job to the group, click **+ Add Existing Job**.

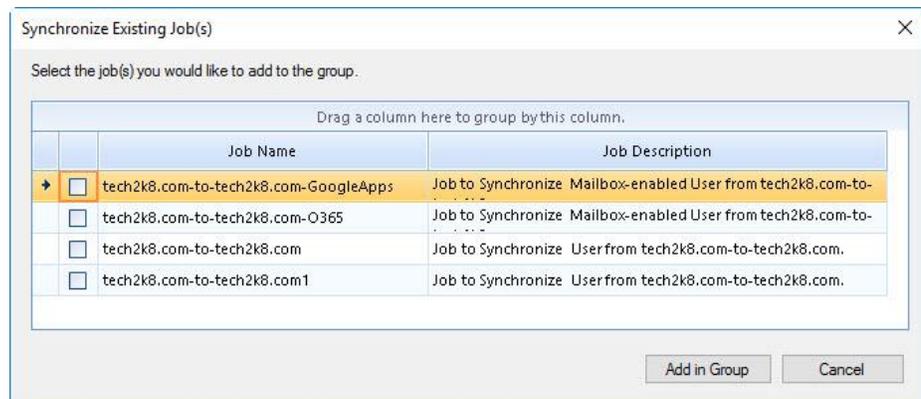


Figure 68: Synchronize Existing Job(s) dialog box

On the **Synchronize Existing Job(s)** dialog box, select the check boxes for the jobs you want to add to the group and click **Add in Group**.

- To add a new job to the group, click  **Add New Job** and [create a new job](#) to add it to the group.

The jobs you added from the **Synchronize Existing Job(s)** dialog box or newly created appear as follow on the **Groups Synchronized Jobs** page.

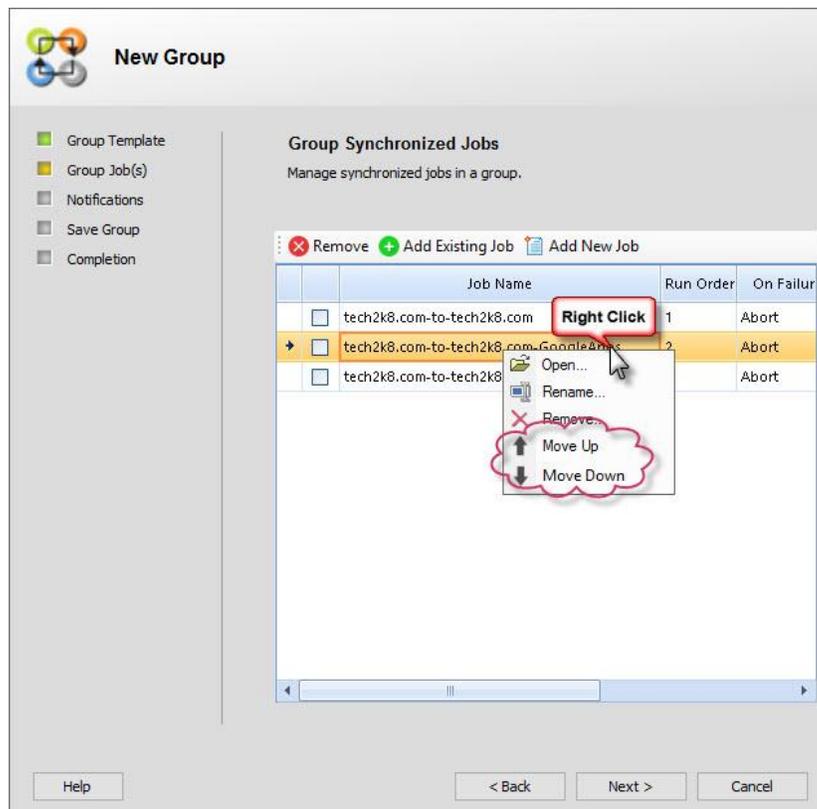


Figure 69: Group Synchronized Jobs page

5. Set the run order for a job by right-clicking it and then selecting **Move Up** or **Move Down**.
6. Set the action to take on the failure of a job by clicking its cell in the **On Failure** column and then selecting one of the following:
 - **Abort:** to stop the execution of the remaining jobs in the group.
 - **Continue:** to continue with the next job in the group.

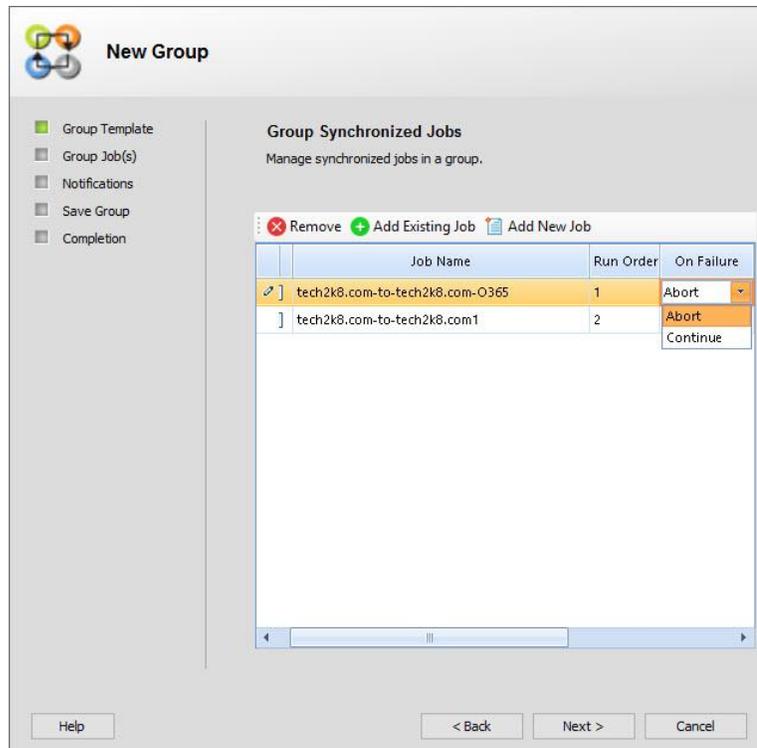


Figure 70: Job Run on Failure option

7. Click **Next**.

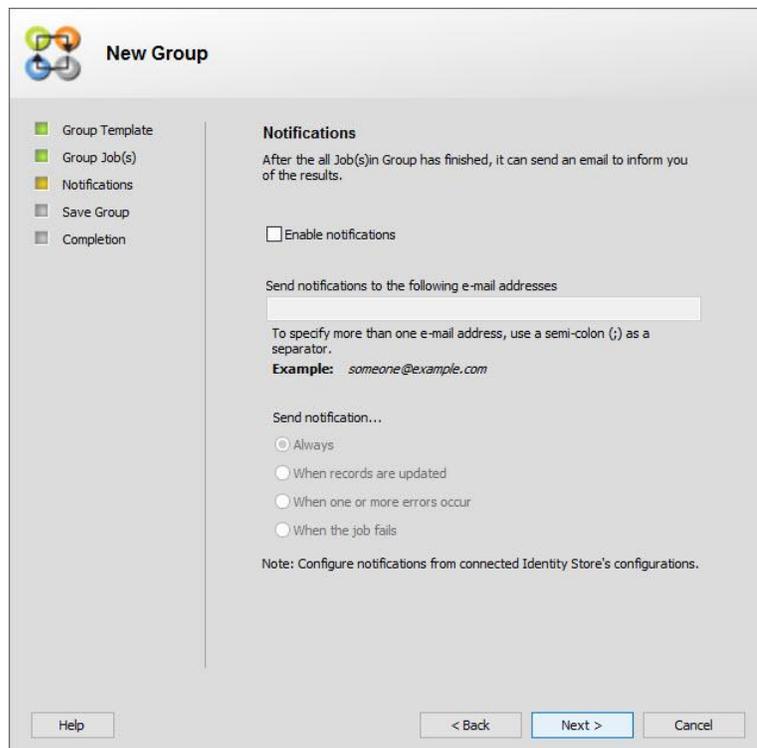


Figure 71: Notifications page

8. On the **Notifications** page, set up email notifications for job group run results. Notifications are disabled by default and can be enabled/disabled on this page.

Select the **Enable notifications** check box to enable notifications.



Notification configurations of the connected identity store are used for sending notifications.

9. Enter the email addresses of notification recipients in the **Send notifications to the following e-mail addresses** box.
10. In the **Send notification** list, select the notification trigger event. Options are:
 - **Always:** Send a notification every time the job group is run, regardless of outcome.
 - **When records are updated:** Send a notification only when one or more records have been updated at the destination.
 - **When one or more errors occur:** Send a notification only when errors occur while executing the job group.
 - **When the job fails:** Send a notification only when a fatal error occurs causing the job group to fail.
11. Click **Next**.

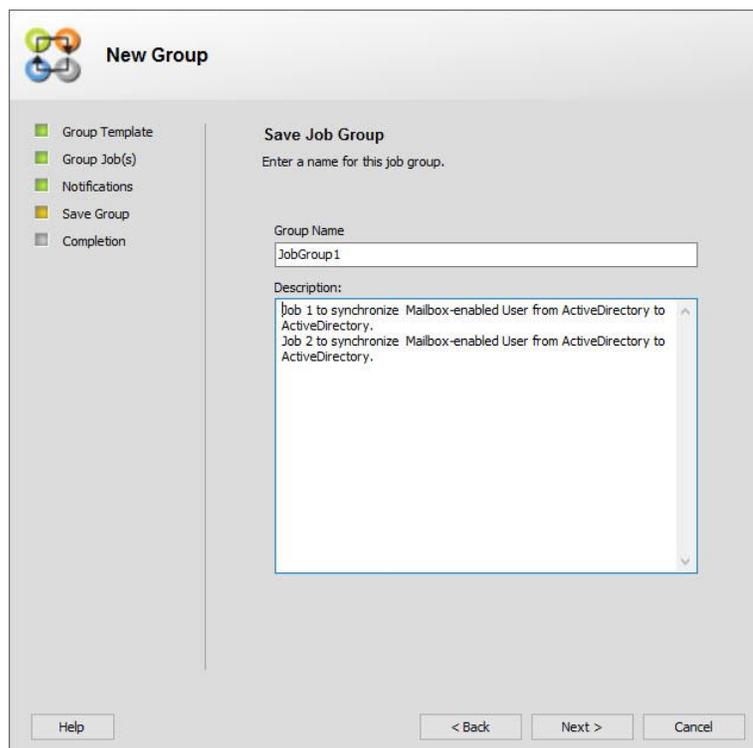


Figure 72: Save Job Group page

12. On the **Save Job Group** page, provide a name and a description for your job group.
13. Click **Next**.

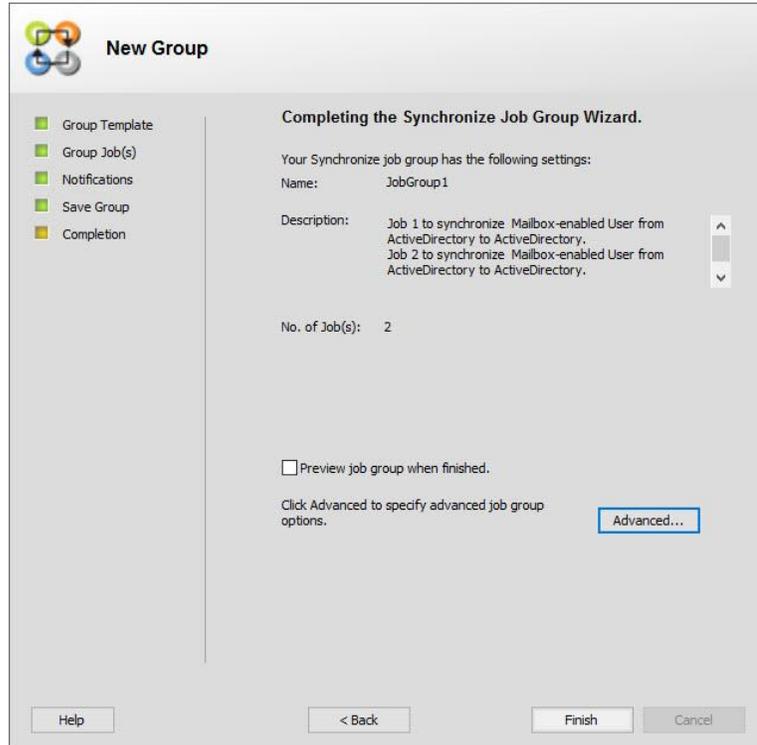


Figure 73: Completing the Synchronize Job Group Wizard page

14. On the **Completing the Synchronize Job Group Wizard** page, select the **Preview job group when finished** check box to view details about the job group on clicking **Finish**.
15. Click the **Advanced** button if you want to set up a run schedule for the job group.

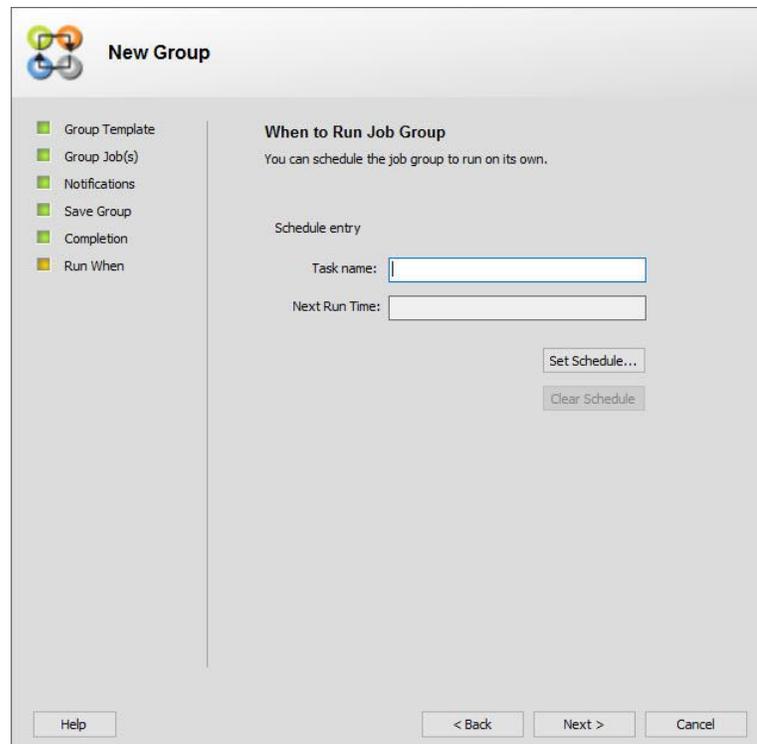


Figure 74: When to Run Job Group page

- On the **When to Run Job Group** page, enter a name for the scheduled task in the **Task name** box.

- Click **Set Schedule**.

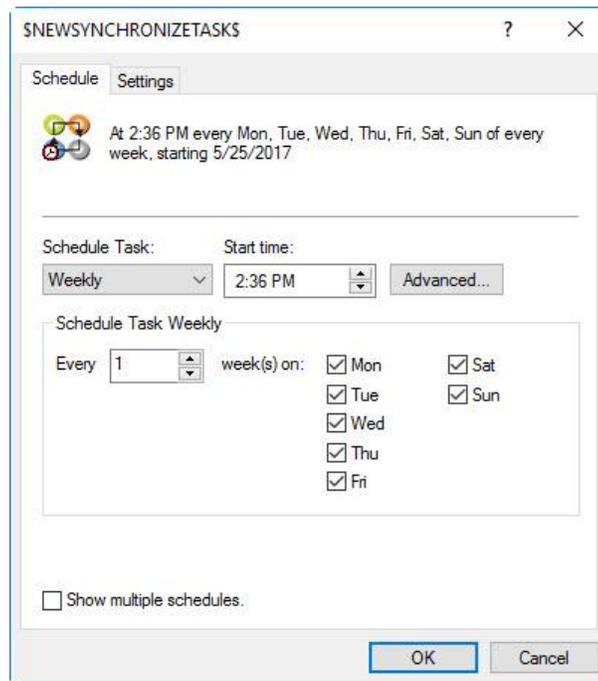


Figure 75: New Synchronize Task dialog box

Define a schedule to auto run the job group.

Follow the step iv - viii under Figure 24 to define a new schedule.

16. Click **Finish** to complete the wizard and create the job group.

Create a job group by duplicating an existing one

You can create a new job group by duplicating an existing job group.

To create a job group by duplicating an existing one:

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. In the job groups list, right-click the required job group and select **Duplicate**.

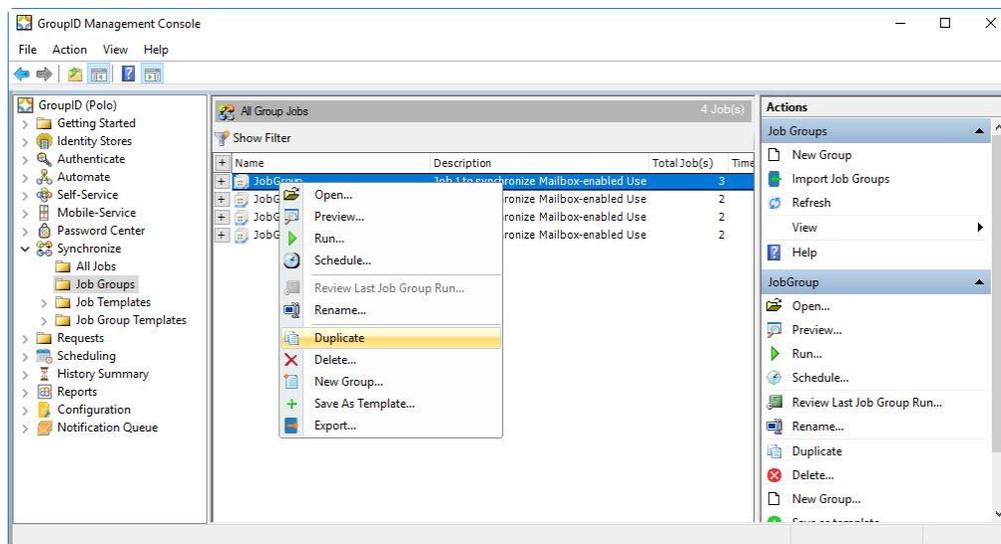


Figure 76: Duplicate Job Group option

A new job group with the name *Copy of <Job Group name>* is created and displayed in the **Job Groups** list.

3. Use the **Rename** command in the **Actions** pane to rename the job group and then open it for modifications.

Edit a job in a job group

You can edit a job from within a job group.

To edit a job in a job group:

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. In the job groups list, right-click the required job group and select **Open**. The **Open Group** wizard is displayed.

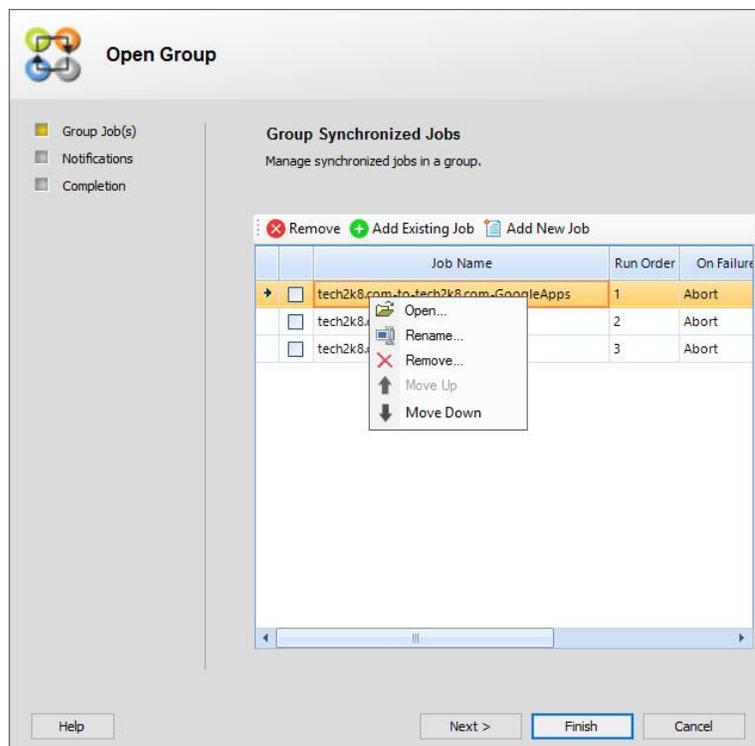


Figure 77: Job Group - Open Job option

3. On the **Group Synchronized Jobs** page, right-click the job you want to edit and select **Open**.
4. Go through the **Open Job** wizard to modify the job as required.
5. Click **Finish** twice to close both wizards.

Remove a job from a job group

You can remove a job added earlier in the job group.

To remove a job from a job group:

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. In the job groups list, right-click the required job group and select **Open**. The **Open Group** wizard is displayed.
3. On the **Group Synchronized Job(s)** page, right-click the required job and select **Remove**.

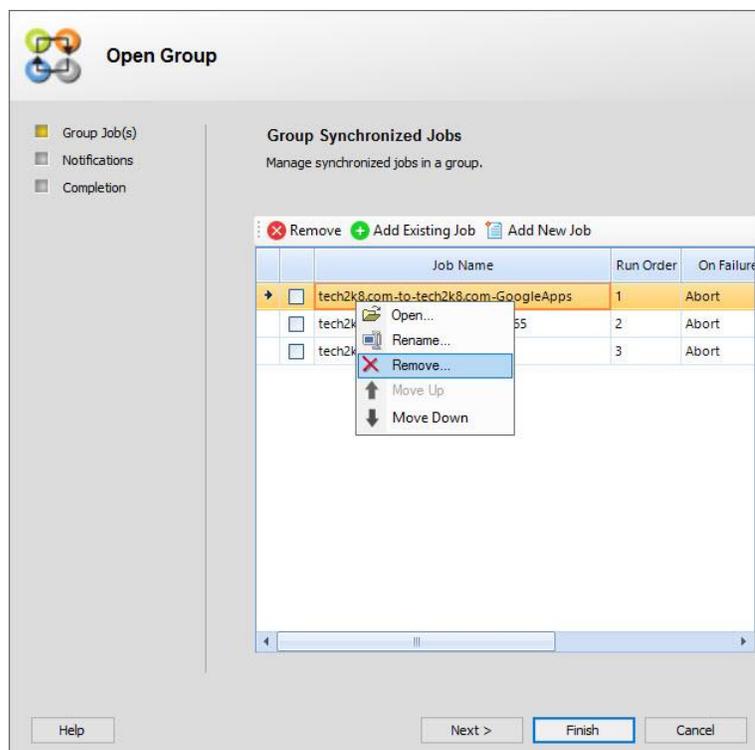


Figure 78: Job Group - Remove Job option

4. Click **Finish**.

Run a job group

You can run a job group manually or automatically with a schedule. When a job group runs, it executes each job in the group sequentially in the order that you determine (Figure 69).

You can also specify actions to take should a job in the group fail. Failure mode actions (Figure 70) are:

- **Abort:** to stop the execution of the remaining jobs in the group.
- **Continue:** to continue with the next job in the group.

To run a job group manually:

1. In the GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. In the list, right-click the required job group and click **Run**.
3. The **Run Job Group** dialog box is displayed, showing the progress of the job group as it runs.

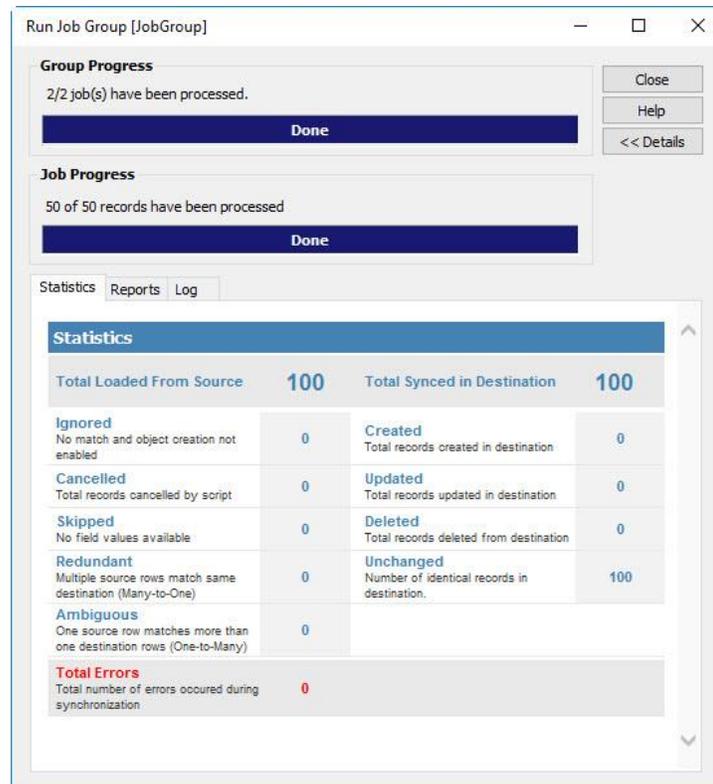


Figure 79: Run Job Group dialog box

When the job group completes its run, click [Details >>](#) to expand the **Run Job Group** dialog box and view overall group [statistics](#) for the run, [reports](#) and individual [logs](#) for each job in the group.

Like jobs, you can set job groups to run on a scheduled interval. See [Schedule a job run](#).

Preview a job group

You can preview the results of a job group before actually running it. You can view the job group run progress collectively as well as by individual job.

To preview results of a job group:

1. In the GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. In the list, right-click the required job group and click **Preview**. The **Preview Job Group** dialog box is displayed, showing the progress of job group and all the jobs included in the job group.

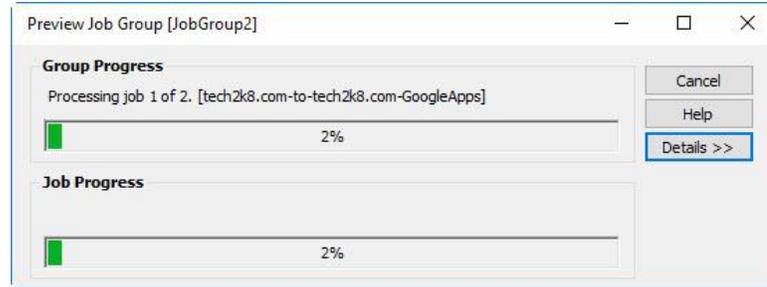
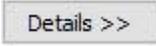


Figure 80: Preview Job Group dialog box

- Once the job group completes its run, click  to expand the **Preview Job Group** dialog box and view the overall job group [statistics](#) and [reports](#).

Review last job group run

You can view the results of a job group for its last run.

To review last job group run:

- In the GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
- From the list, right-click the required job group and click **Review Last Job Group Run**.

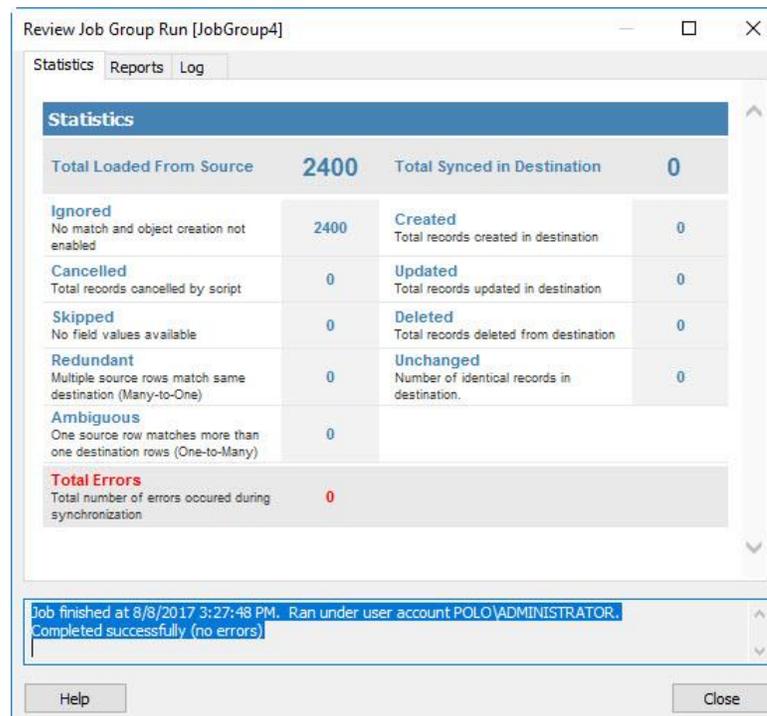


Figure 81: Review Last Job Group Run dialog box

The **Review Last Job Group Run** dialog box provides the overall group [statistics](#), [reports](#) and individual [logs](#) for each of the jobs in the group for their last run activity.

Export a job group

You can export job groups to a location on your local hard drive or on another machine on your network. These exported job groups can then be imported to other machines running GroupID Synchronize, using the **Import Job Groups** option.

In the export function, only the job's configuration file is exported. For information on the configuration file, see [Job files](#).

If the job group being exported is a scheduled job group, the export action also exports the schedule configurations to a file with the **.scheduledjob** extension in a separate folder named **Synchronize**. Thus the job group is executed on the new machine according to the defined schedule.

To export a job group:

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. In the list, right-click the required job group and click **Export**. The **Export Job Groups** dialog box is displayed.

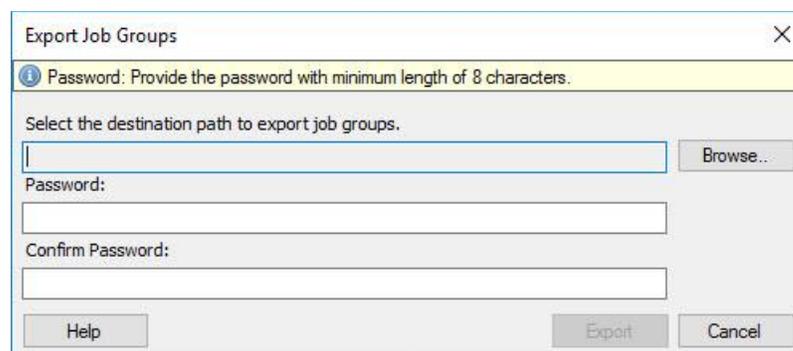


Figure 82: Export Job Groups dialog box

3. Click **Browse** next to the **Select the destination path to export job groups** box to select the location to export the selected job groups to.
4. Type a password in the **Password** box to protect the exported job group(s). Only users who know this password can import the job groups to their GroupID machines. The password should not be less than 8 characters.

5. Re-type the password in the **Confirm Password** box.
6. Click **Export** to perform the export action. The following dialog box displays the status.

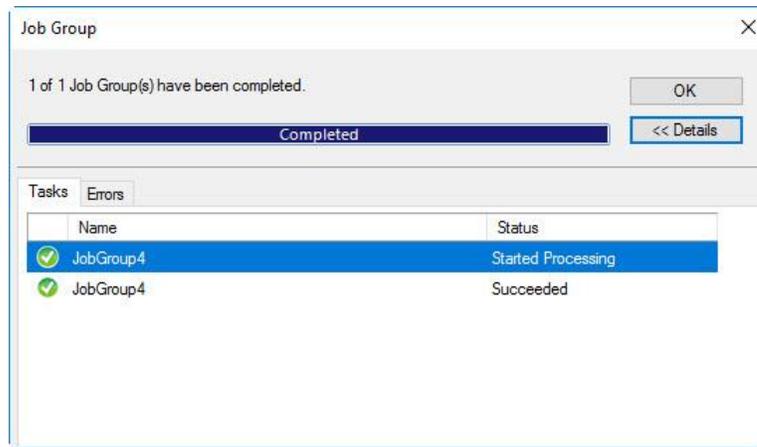
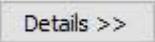


Figure 83: Export Job Group dialog box

Click  to view information about the tasks performed and errors encountered during the export operation on the **Tasks** and **Errors** tabs respectively.

7. While exporting, if a job group with the same name already exists on the machine, a confirmation dialog box is displayed (Figure 53) for you to replace the existing job group or save it as a new one.

If you export it as a new job group by clicking *No*, Synchronize appends a numeric code to the job group name to differentiate it from the existing one.

Import a job group

You can import Synchronize job groups exported from other machines. If the job group being imported is a scheduled job group, the schedule defined for it is also imported so that the job group can be executed on the machine according to the defined schedule.

To import a job group:

1. In the GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. Select **Import Job Groups** in the **Actions** pane. The **Import Job Groups** dialog box is displayed.

Rename a job group

You can rename an existing job group and save it under a new unique name and a new description. Renaming a job group does not affect the jobs in the group.

To rename a job group:

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. Right-click the required job group and click **Rename**.
The Rename Job Group dialog box is displayed.

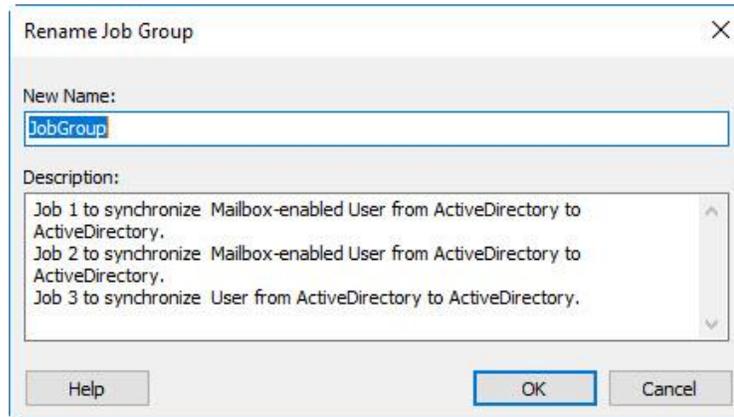


Figure 85: Rename Job Group dialog box

3. In the **New Name** box, type a new name for the job group.
4. In the **Description** box, type a new description. (optional).
5. Click **OK**.

Delete a job group

If a job group is no more required, you can delete it.

To delete a job group:

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. In the job groups list, right-click the required job group and select **Delete**. A confirmation message is displayed.

3. Click **Yes** to confirm the deletion of the job group.
The **Delete Job Group/Job/History Record(s)** dialog box is displayed, showing the progress of delete operation.

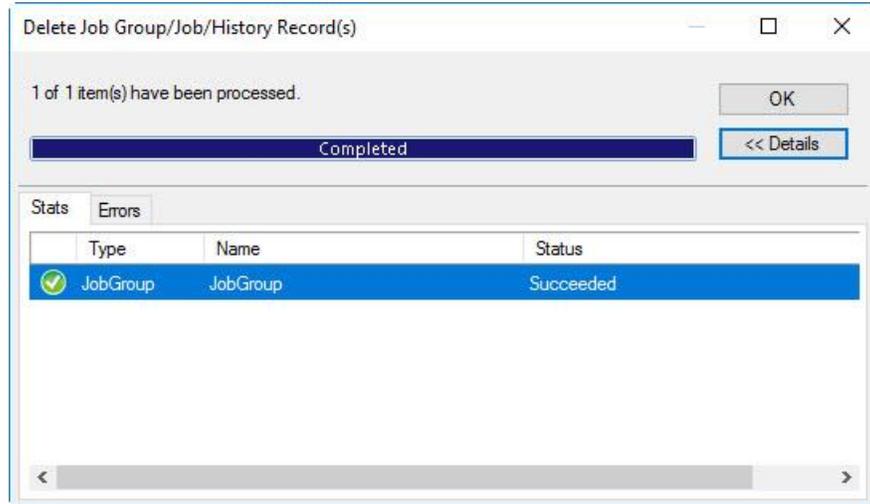


Figure 86: Delete Job Group dialog box

On the **Stats** tab you can view the status of the delete operation and if an error occurs during the delete operation, you can view its details on the **Errors** tab.

Chapter 5 - Managing Job Group Templates

You can create a job group template either by converting an existing job group into a job group template or by importing a job group template.

By using a template for creating a new job group, you can duplicate its job set, execution order, and failure actions. The run schedule for the group, however, is not copied in the template.

A job group template cannot be modified. Any changes made to it are not saved in the template but a new job group is created with the modifications.

Because of the wide variation of possible job combinations, Synchronize does not provide predefined job group templates.

This chapter describes how to:

- Create a job group template from a job group
- Export a job group template
- Import a job group template
- Rename a job group template
- Create a job group from a template
- Delete a job group template

Create a job group template from a job group

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Groups**.
2. In the **Job Groups** list, right-click the job group you want to save as a template and click **Save As Template**.

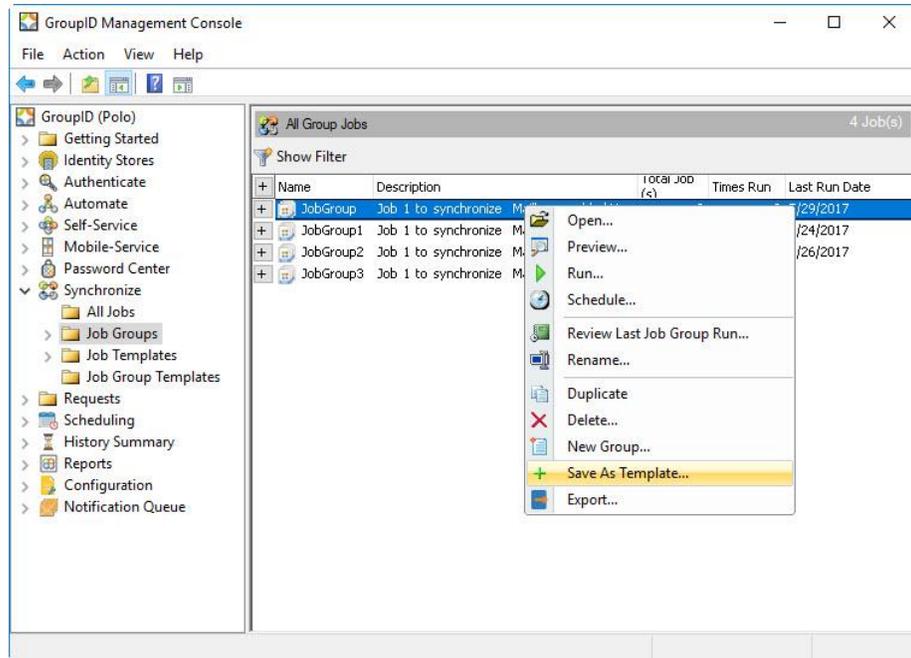


Figure 87: Job Group – Save as Template option

3. In the **Job Group Template** dialog box, type a name for the new template.

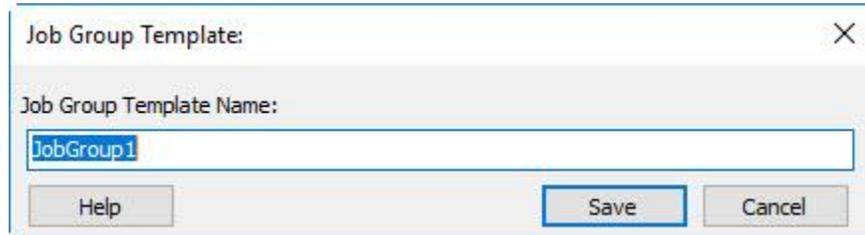


Figure 88: Job Group Template dialog box

4. Click **Save**.
5. Now click **Job Group Templates** under the **Synchronize** node and click **Refresh** in the **Actions** pane. The newly created job group template is displayed in the **All Job Group Templates** list.
6. Click **+** next to the new job group template to view the jobs included in it.

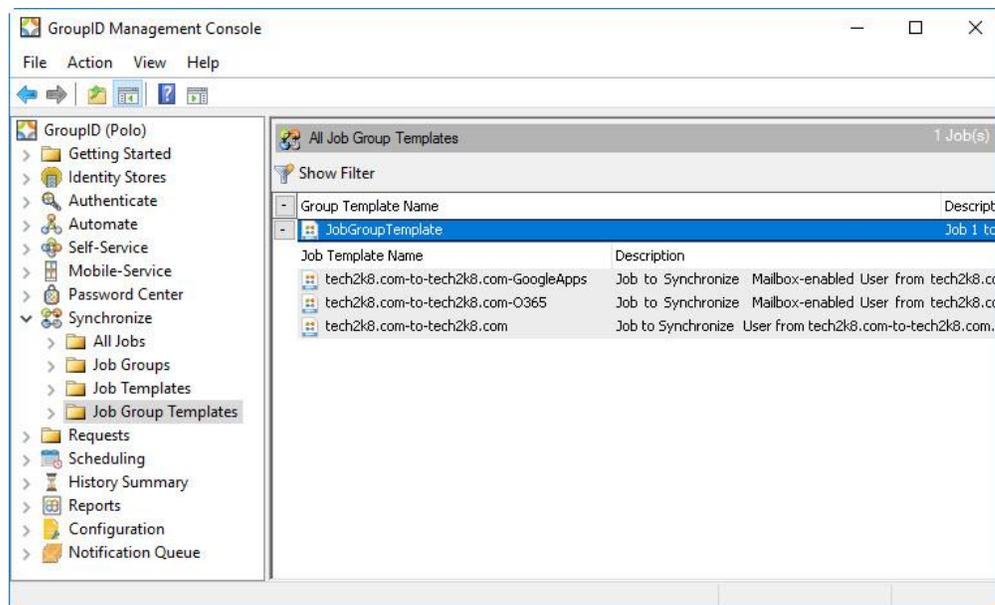


Figure 89: All Job Group Templates list

7. If a run schedule has been defined for the job group, it does not become part of the template.

Export a job group template

You can export job group templates to a location on your local hard drive or on another machine on your network. These exported job group templates can then be imported to other machines running GroupID Synchronize.

1. In GroupID Management Console, click the **Synchronize** node and click **Job Group Templates**.
2. In the list, right-click the required job group template and click **Export Job Group Templates** in the **Actions** pane; the **Export Job Group Templates** dialog box is displayed.

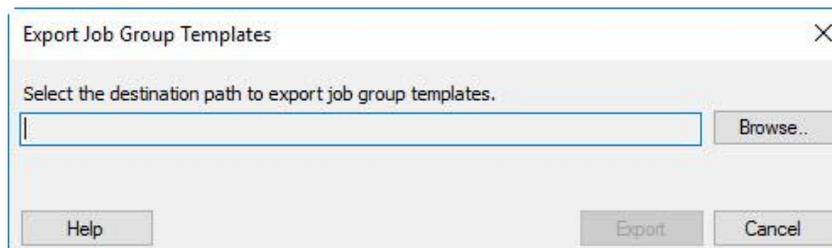


Figure 90: Export Job Group Template dialog box

3. Click **Browse** next to **Select the destination path to export job group templates** box to select the location to export the selected job groups templates to.
4. Click **Export** to perform the export action.

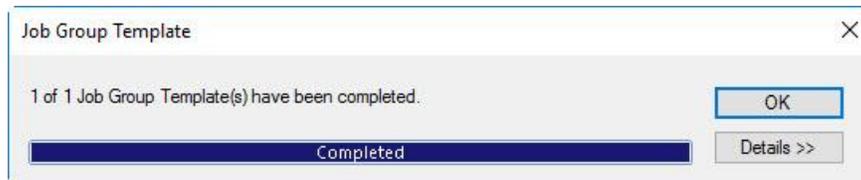


Figure 91: Export Job Group Template Status dialog box

5. While exporting, if a job group template with the same name already exists on the machine, a confirmation dialog box is displayed (Figure 53) for you to replace the existing job group template or saving it as a new one.

If you export it as a new job group template by clicking *No*, Synchronize appends a numeric code to the job group template name to differentiate it from the existing one.

Import a job group template

You can also import job group templates. Only job group templates that have been exported from GroupID Synchronize can be imported to other machines running GroupID Synchronize.

The import action only requires you to select the location where the exported template resides.

1. In GroupID Management Console, click the **Synchronize** node.
2. Click **Import Job Group Templates** in the **Actions** pane; the **Import Job Group Templates** dialog box is displayed.

7. While importing, if a job group template with the same name already exists on the machine, a confirmation dialog box is displayed (Figure 53) for you to replace the existing template or saving it as a new one. If you import it as a new template by clicking *No*, Synchronize appends a numeric code to the template name to differentiate it from the existing template.

Rename a job group template

You can rename an existing job group template and save it under a new unique name and a new description. Renaming a job group template does not affect the jobs in the group template.

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Group Templates**.
2. Right-click the required job group and then click **Rename**. The **Rename Job Group** dialog box is displayed.

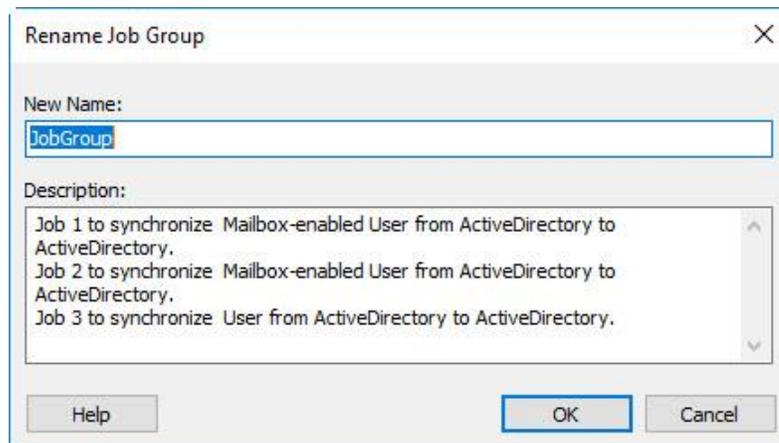


Figure 93: Rename Job Group dialog box

3. In the **New Name** box, type a new name for the job group template.
4. In the **Description** box, type a new description. (optional).
5. Click **OK**.

Create a job group from a template

1. In GroupID Management Console, expand the **Synchronize** node and click **Job Group Templates**.

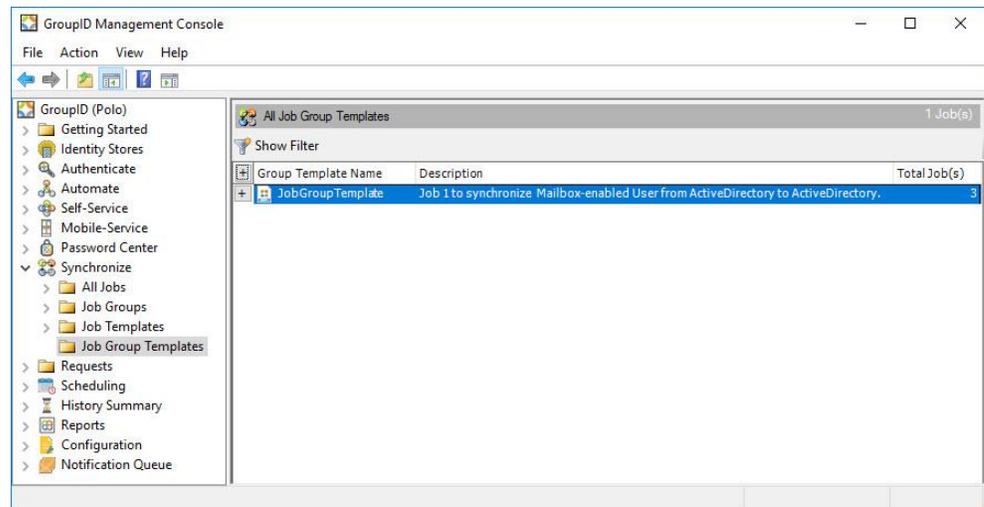


Figure 94: All Job Group Template listing

2. For every template listed, the view provides its name, description and the number of jobs it contains. Click **+** to view the jobs included in the template.
3. Right-click the job group template you want to use for creating a new job group and select **Use Template to Create Job Group**.

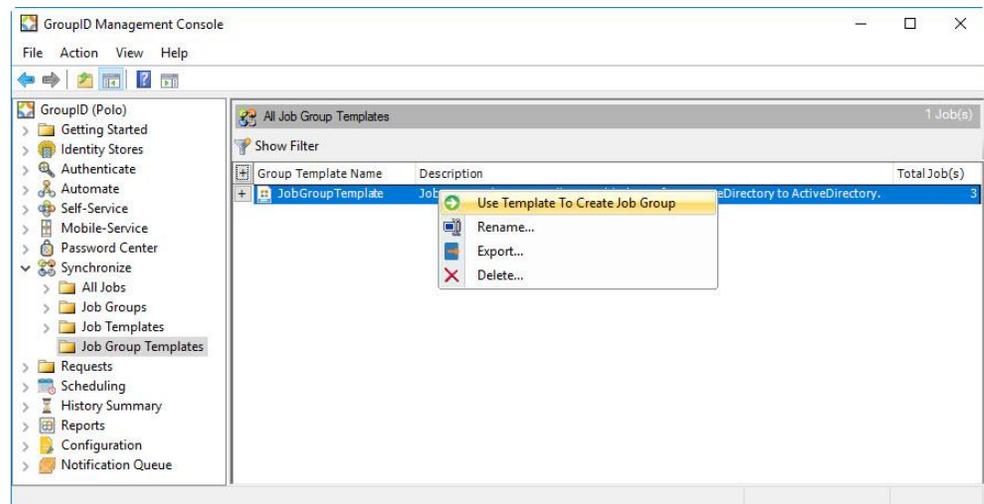


Figure 95: All Job Group Templates listing – Use Template to Create Job Group option

4. The **New Group** wizard opens to the **Group Job(s)** page (Figure 67). Proceed through the wizard to map the settings stored in the template on to the new job group.

Delete a job group template

1. In GroupID Management Console, expand the **Synchronize** node, and click **Job Group Templates**.
2. In the **All Job Group Templates** listing, right-click the template that you want to delete and click **Delete**.

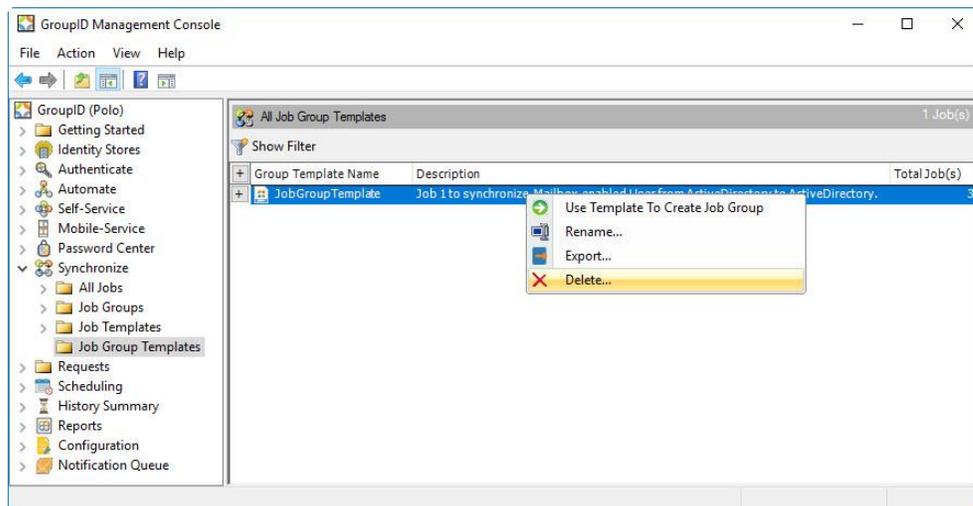


Figure 96: All Job Group Template – Delete option

3. A confirmation dialog box is displayed.

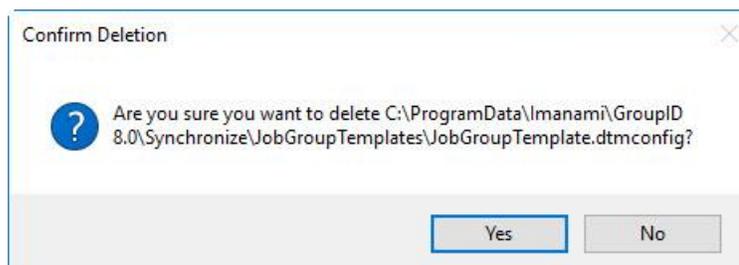


Figure 97: Job Group Template – confirmation message for deletion

4. Click **Yes**; another dialog box is displayed, showing the deletion status. Click **Details >>** to view detailed information about the deletion process on the **Stats** and **Errors** tabs.

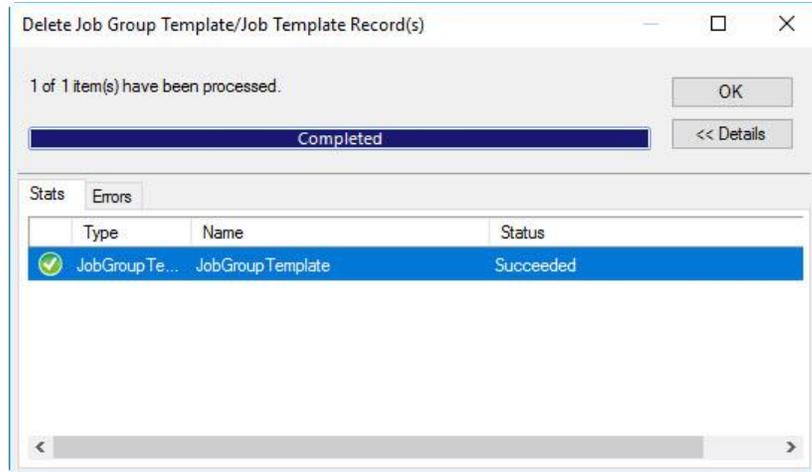


Figure 98: Job Group Template – deletion process status dialog box

Chapter 6 - Applying Transformations

In synchronization jobs, you can apply transformation scripts to manipulate source data before saving it to the destination.

You can use transformations to perform these following actions and more:

- Combining the values of two source fields into one destination field
- Extracting a set of characters from field values
- Assigning a string constant to a field regardless of source restrictions

You can write your own transformation scripts using the Visual Basic .NET editor.

Synchronize provides a pre-defined set of transformation methods that you can apply to perform simple and complex conversions.

Synchronize provides these transformations:

- Static
- Resolve
- Join
- Left
- Substring
- Script

Static

During synchronization, the static transformation copies specified text to the destination field and ignores the value in the source field mapped to it.

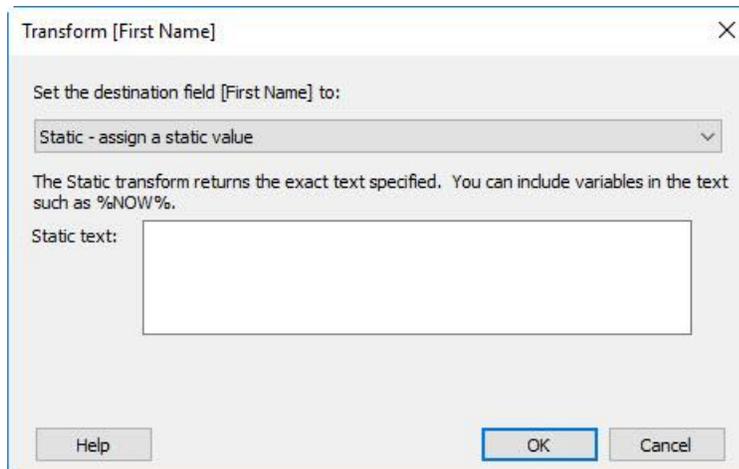


Figure 99: Transformation dialog box – Static transform option

You can use this option to:

- Insert updated data in the destination

Type the text in the **Static text** box. This text is copied for the field at the destination.

You can also specify Windows environment variables as static text. While transferring the data during a job run, the job obtains the current value of the variable and saves it to the destination field.

Examples:

- If static text is set to **%COMPUTERNAME%**, running the Job will save the host computer's name in the target field.
- If static text is set to variables **%NOW%** and **%Computer%** as follows:

Updated by GroupID %NOW% from %COMPUTERNAME%.

Running the job will return the current date and the name of the host machine. The results will look like as:

Updated by GroupID 1/12/2003 10:04 AM from EX01-DTM

Environment variables may vary for different Windows releases and editions. Before using environment variables, determine that they are supported by the Windows installed on your host machine

- [Auto-generate passwords based on complexity rules](#)

You can assign a single password to all synced objects or generate individual passwords for each object.



If you plan to use this transformation for setting passwords for user accounts on an Active Directory destination, please read the Auto-generate unique, complex passwords **Error! Reference source not found**.section in this chapter.

Resolve

The **Resolve** transformation attempts to locate a recipient at the destination that matches the selected filter and returns the distinguished name. It is useful for setting the manager or owner fields.

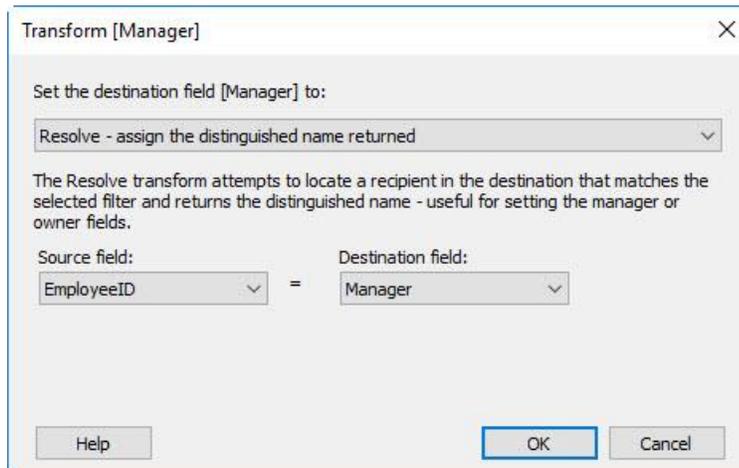


Figure 100: Transform dialog box – Resolve transform option



This transformation can adversely affect performance, as it adds an additional query to each record. It applies to Active Directory and Exchange only.

Join

The **Join** transformation combines values from two source fields into a single destination field.

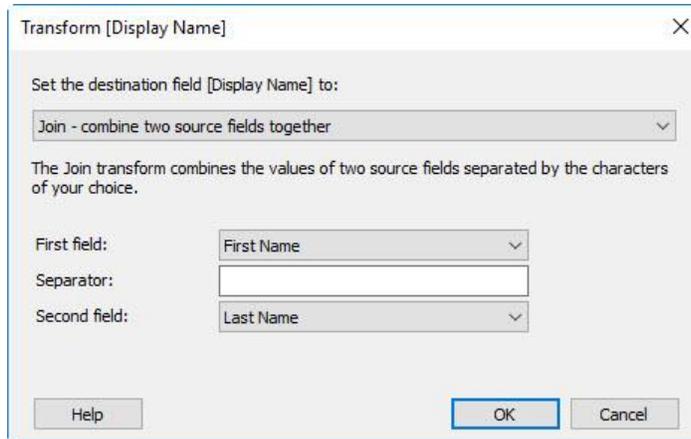


Figure 101: Transform dialog box –Join transform option

For instance, you can use a **Join** transformation to create a *Display Name* field at the destination from the source's *FirstName* and *LastName* fields. The values for the two source fields are saved as a single value in the destination.

The following table lists the three parameters the **Join** transformation requires:

	Parameter	Description
1	First field	Select the first source field.
2	Separator	Specify the character to use as separator between the values of the two fields. You can specify more than one character as separators.
3	Second field	Select the second source field.

Left

Use the **Left** transformation to return a specific number of characters from the left side of a source value.

For example, your requirement is to set the first three characters of a user's logon name as their initials. You can easily achieve this by applying the settings shown in the following figure.

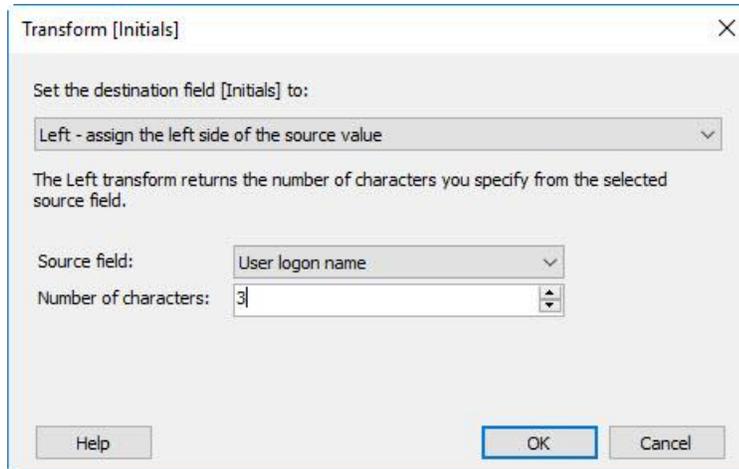


Figure 102: Transform dialog box –Left transform option

The following table lists the two parameters the **Left** transformation requires:

	Parameter	Description
1	Source field	Select the source field from which to get the value.
2	Number of characters	Specify here the number of character to extract starting from the left.

Substring

The **Substring** transformation extracts a set of characters from the source value. The set of characters to extract from the source value is determined by the *Start at* and *Length* parameters passed to the transformation.

Substring transformation is useful in cases where the set of characters to extract are from within a value that has a fixed number of characters or digits. The use of this transformation can become tricky if the number of characters or digits in values of the source field may vary.

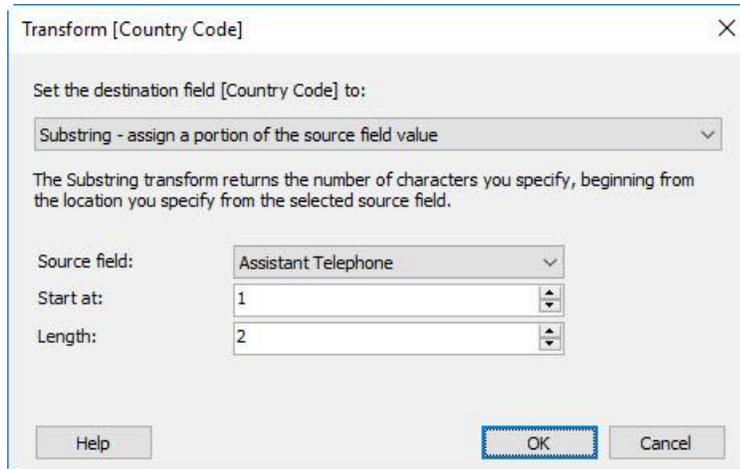


Figure 103: Transform dialog box – Substring transform option

The following table lists the parameters the Substring transformation requires:

	Parameter	Description
1	Source field	Select the source field from which to get the value.
2	Start at	Specify the index number of the character to set as the starting point. The character at this position will not be included in the result itself.
3	Length	This represents the count of characters to extract from the starting point.

Example:

Telephone numbers are usually written with country and city codes. You may have a destination field where you may only require the country code to be copied excluding the city code and the number itself.

Consider the number, +92-42-5787711. Where:

Country Code	City Code	Telephone
92	42	5787711

To extract the country code, you would set the parameters for this transformation as shown in Figure 103.

When executed, this would extract **92** from the number and save it to the destination field.

Script

Unlike the built-in transforms described above, the **Script** transformation is a template for writing custom scripts.

The script transformation is for performing complex data transformations which will usually include a custom logic that you want to apply on the data being transferred. This transformation is meant for advanced users and requires programming in Visual Basic .NET.

When you select the script transformation option, it shows you the default script which is based on the current mapping of the selected field. To change this script and write your own custom logic for data transformation, click **Edit Script** to launch the Script Editor. For more information, refer to The Script Editor in Chapter 7 - Synchronize Scripting.

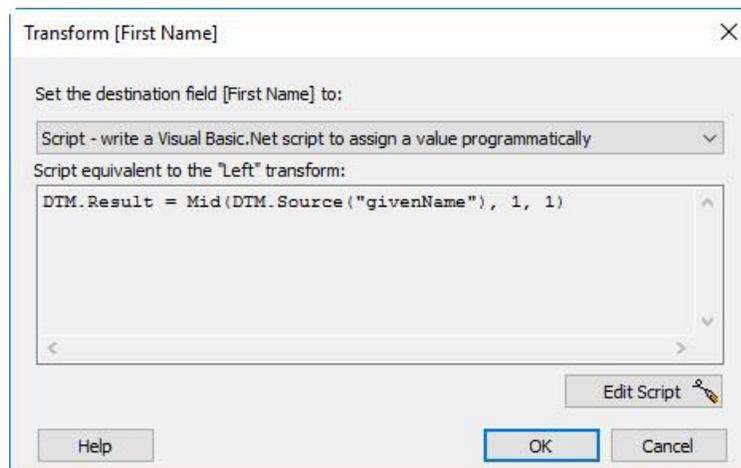


Figure 104: Transform dialog box –Script transform option

Auto-generate unique, complex passwords

In GroupID Synchronize, you can auto-generate passwords based on password complexity rules.

Common uses:

- Providing a login and temporary password while provisioning a user
- Providing users with a new password after password expiry or account lock
- Generating a password for multiple objects

Launched from the **Transform (Password)** dialog box (Figure 105), the **Password Complexity Options** dialog box (Figure 106) enables you to set password complexity rules to generate passwords randomly for the objects being synced. You can assign a single password to all synced objects or generate individual passwords for each object. The new password for each object can be sent to the user's manager if email notifications are configured for the connected identity store.

If the destination is Active Directory, the **Password Complexity Options** dialog box (Figure 106) also ensures that options set here comply with the [password policy](#) of the target domain.

In addition, if you choose to ignore a generated password and enter your own, Synchronize validates it according to the complexity requirements set for the destination Active Directory. If the password does not meet those requirements, Synchronize requires you to correct the password before continuing, with the exception of these two conditions:

- **Password history:** The user tries to enter a previously used password.
- **Account name containment:** The user tries to enter a password that includes the username in it.

If the destination is an Active Directory domain, the password transformation is available only for the objects that support the password attribute; for example, users, mail-enabled users, and mailbox-enabled users. The same applies to other directory services that Synchronize supports. For destination providers such as CSV and text files, password transformation is performed for the fields under any column labeled Password in the header.

To auto-generate unique, complex passwords:

1. In the GroupID Management Console, select the **Synchronize** node, right-click **All Jobs** and select **New Job** or **open** an existing job.
2. Click **Next** until you reach the **Field Map(s)** page (Figure 16).
3. In the **Password** row, click the **More Options**  button next to the **Transform** column. The **Transformation [Password]** dialog box is displayed.



Figure 105: Transform dialog box

4. Select *Static – assign a static value*. Options relevant to password generation are displayed.
5. Select one of the following options:
 - **Use a single static password for all rows** – Select this option to assign the same password to all objects. You can either enter the password manually or click the **Generate Password** button to auto generate a password. This password is based on the rules defined in the **Password Complexity Options** dialog box (Figure 106).
 - **Use unique password generated dynamically against each row** - Select this option to generate a unique password for every object. The new password for each object is sent to the administrator by email when the job runs.
Make sure notifications are enabled on the **Notification** page (Figure 17) of the **Create a New Job** wizard,

Sending notifications requires an SMTP server to be configured for Synchronize using GroupID Configurations.
6. Select the **Send email notification to manager** check box if you want to send the new password for each object to the user’s manager by email when the

job runs. This applies to both static and dynamic passwords. Note that the email is not sent if the user does not have a manager.

7. Click the **Password Complexity Options** button. The **Password Complexity Options** dialog box is displayed.



Figure 106: Password Complexity Options dialog box

Options on **Password Complexity Options** dialog box enable you to set password complexity rules to generate complex passwords randomly for the objects being synced. If the destination is Active Directory, the dialog box also ensures that options set here comply with the password policy of the target domain.

- a. In the **Password length** box, type or select the number of characters within the given range that a password should contain. The minimum value displayed in the range may vary depending on the selected destination provider.

For an Active Directory destination, the minimum value is determined on the basis of the password complexity requirements and minimum password length set for the domain. The following table explains the rules that determine how the minimum value is calculated.

	Password Complexity Requirements	Minimum Password Length	Minimum Value Displayed in the Range
1	Enabled	Less than or equal to 6	6
		Greater than 6	6
2.	Disabled	Less than or equal to 6	6
		Greater than 6	The minimum password length set for the domain

For any other destination providers, you can type a value from 6 to 99.

- b. Select the **A-Z** check box if you want the password to contain any uppercase English alphabets (A through Z).
- c. Select the **a-z** check box if you want the password to contain any lowercase English alphabets (a through z).
- d. Select the **0-9** check box if you want the password to contain any base 10 digits (0 through 9).
- e. Select the **Special symbols** check box if you want the password to contain special characters. When the check box is selected, the box next to it becomes available. You can specify special characters in the box that the password can contain.



For an Active Directory destination, if password complexity requirements are enabled for the target domain, then you must select three of the preceding four settings (discussed in point numbers b – e).

- f. Select the **Exclude similar symbols** check box if you do not want a special character to appear more than once in the password.
- g. The **Password** box shows a sample password based on the settings you have selected on this dialog box. It is displayed as text rather than placeholder characters if the **Show Password** check box is selected.
- h. You can view as many sample passwords as you want by clicking the **Generate** button.
- i. Click the **Save** button to save your settings and close the dialog box.

If you chose to assign a static password for all synced objects on the **Transform [Password]** dialog box (Figure 105), the auto-generated password will be shown in the corresponding box. If you selected the dynamic password assignment option, a password is auto generated for

each object based on the rules defined in the **Password Complexity Options** dialog box (Figure 106).

8. Click **OK** to close the **Transform [Password]** dialog box (Figure 105) and return to the **Field Map(s)** page (Figure 16).
9. Click **Next**.
10. In the **Notifications** page (Figure 17), select **Enable notifications**. If you have selected the **Use unique password generated dynamically against each row** option on the **Transformation [Password]** dialog box (Figure 105), then the new password for each object is sent to specified recipient(s) in the **Send notifications to the following e-mail addresses** box and/or to user's manager by email when the job runs.



An SMTP server must be configured for the connected identity store for sending passwords in email notifications.

Chapter 7 - Synchronize Scripting

Synchronize scripts are written in Visual Basic .NET. A script is run after having established a current source row ("object"). The script determines a single value--the "result" value--and assigns that value to the keyword **DTM.Result**.

The type of script determines the nature of the script result:

- **Transform scripts:** the script result is the value of a destination field. For examples, see Sample Transform Scripts.
- **Container scripts:** the script result is the distinguished name of a parent container. For examples, see Sample Container Scripts.

Custom conversions are supported through VB.NET scripting. By writing conversion scripts using VB.NET, Synchronize users can extend the data transformation possibilities beyond those that are available out of the box. For general information, see Visual Basic .NET for GroupID.

This chapter covers the following:

- Scripting Environments: introduces you to the environments that Synchronize supports for scripting.
- DTM Object: provides information about DTM objects and explains how you can use them in scripting.
- Scripting restrictions enforced by Synchronize: describes restrictions that apply while scripting in Synchronize.
- Visual Basic options set by Synchronize: explains Option statements set by Synchronize.
- .Net assembly references: describes system assembly references that Synchronize establishes before compiling your scripts.
- .Net Namespaces: describes namespaces that Synchronize imports when compiling your scripts.

Scripting Environments

Synchronize provides two scripting environments. These are:

1. [Script Editor \(SE\)](#)
2. [Global Script Editor \(GSE\)](#)

In **Script Editor**, you can write a custom transformation script. Transformations are applicable at field level, hence its scope is limited to the event that creates or updates the particular field and the SE environment provides the tools specific to this scope.

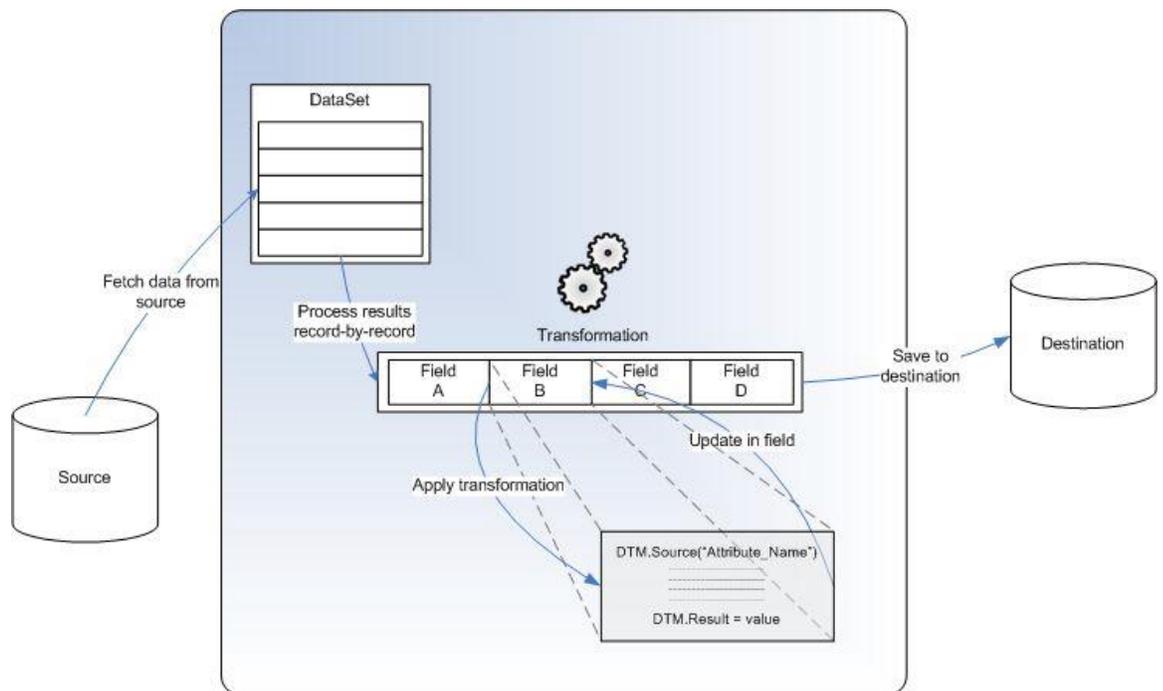


Figure 107: A high level representation of the mechanics involved in a transformation

The **Global Script Editor** link is available on **Field Map(s)** page of the New Job and Edit Job wizards which is the same page from where you apply transformations. The scope of the script that you write in the GSE is job-wide compared to that written in SE.

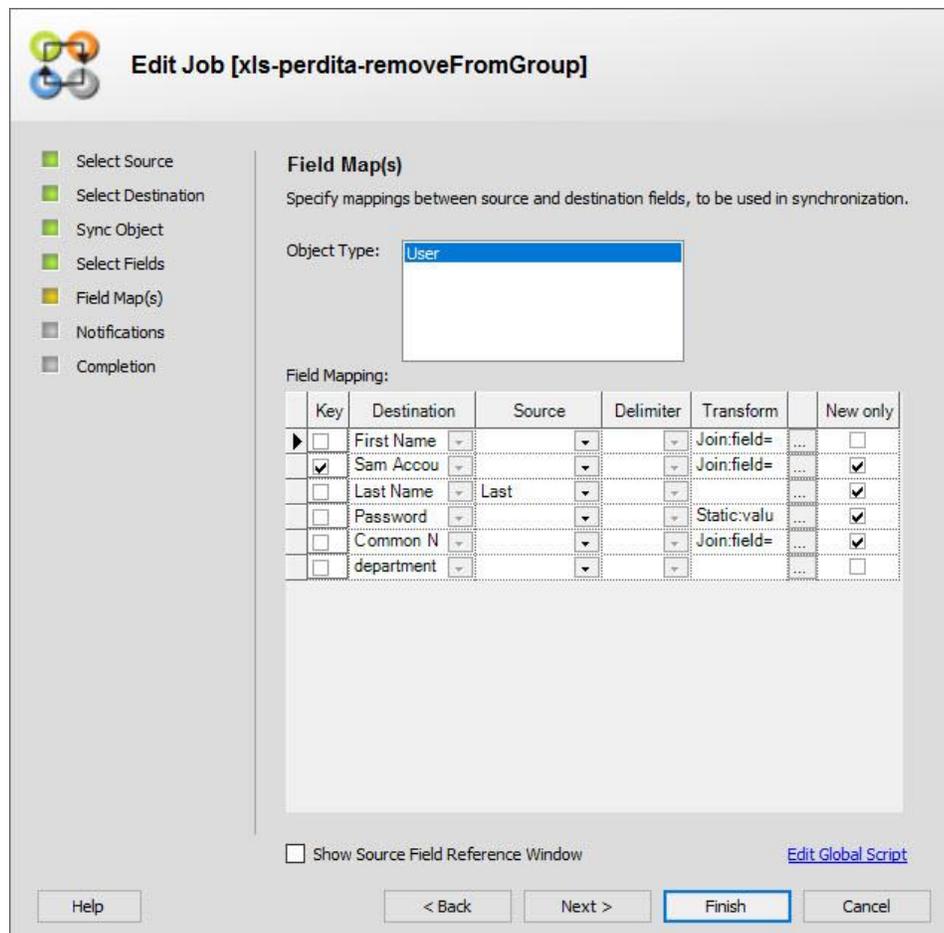


Figure 108: New/Edit Job wizard - Field Map(s) page with Global Script Editor link

In addition to the native DTM object, you can also create objects of the default .NET classes in the system namespace as they are referenced by the editor by default. And if that does not meet your need, you can add references for additional .NET or third-party assemblies to use them in your script.

GSE is also intelligent enough to sense the script as you type and displays the list of object properties and functions as well as the help about the parameters that are supposed to be passed to the functions.

The Script Editor

The Script Editor is a utility for writing Visual Basic .NET scripts. It can be launched from two locations on the New Job and Edit wizards:

- From the **Sync Object Option** page (Figure 13) of the New / Edit Job wizard, when the destination data source is a directory service.
 - a. Select **Create** for the required object.

- b. Click the **More Options** button () in the **Container Options** column of a *Create* action that you selected in the preceding step.
 - c. Select **Create Objects in a container specified in script** (Figure 14).
 - d. Click **Edit Script**.
- From the **Transform** dialog box (Figure 104).
 - a. Select the **Script – write a Visual Basic .Net script to assign a value programmatically** option from the **Set the destination field to** list.
 - b. Click **Edit Script**.

The script editor lets you write a script, save it, open existing script files and test your script. The script files are saved with the .vb extension.

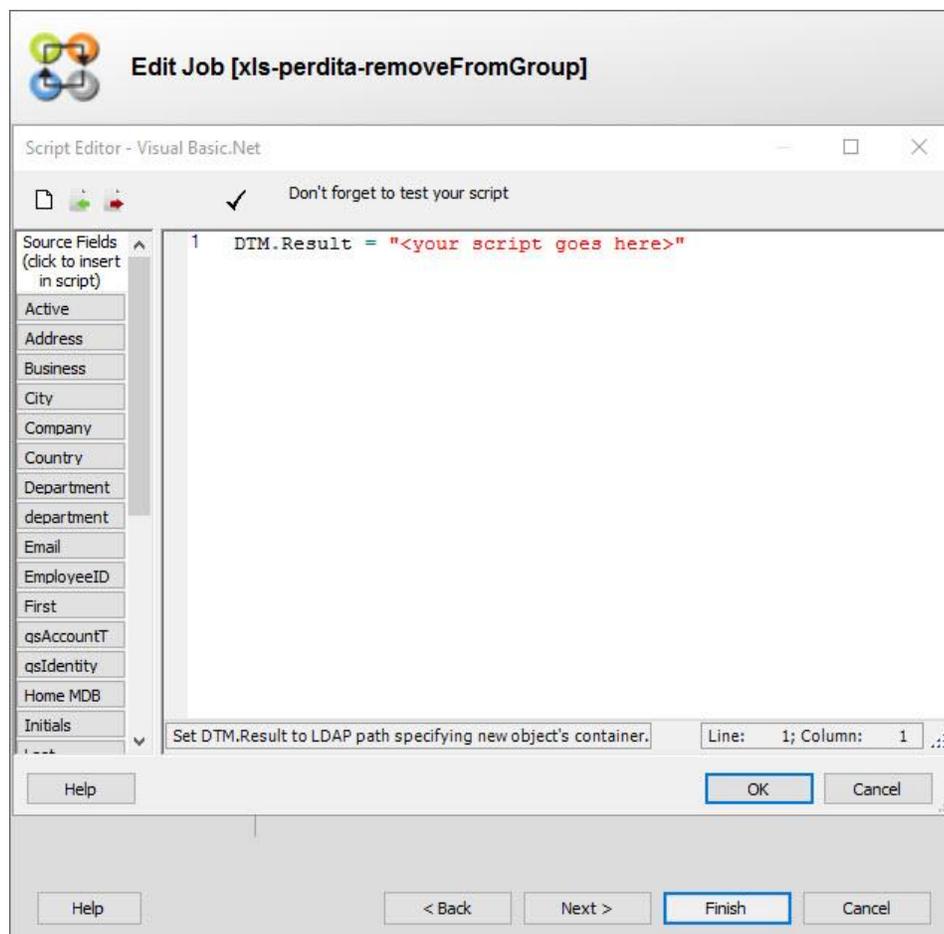


Figure 109: Script Editor dialog box

The common file commands; new, open, save and test are given on the toolbar of the editor. The left pane shows the list of directory fields that can be used in the script with the DTM object. For example:

```
DTM.Source("displayName")
```

To learn more about the DTM object, see the section DTM Object.

Testing your script

To test your code, click  after you have written it. This launches the **Script Tester** dialog box that lets you test your script by using test data. The Script Tester generates input fields in the **Source Field** section based on the source fields that you specified in your code. It then identifies the destination field and shows the resultant value in the **Destination Field** section.

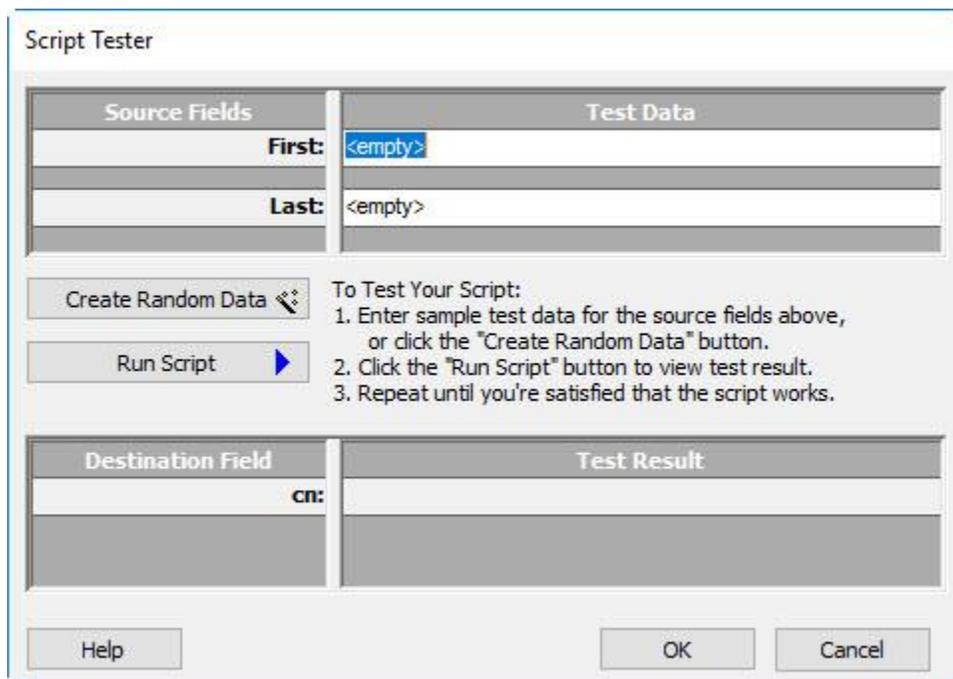
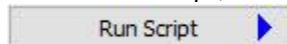


Figure 110: Script Tester dialog box

To test the script, enter values for the source fields, and then click



. This will show the result in **Test Result** section.

You can also test against random test data generated by the **Script Tester** itself. For this, click the **Create Random Data** button.

Click **OK** when you are done testing your script to close the **Script Tester**.



The **Script Editor** will not allow you to save your transformation script until you have run the **Script Tester** and tested your code.

Script Transformation Example

The following script generates a logon name based on the format: L5F1I1, where:

L5 = First five characters of the last name
 F1 = first character of the first name
 I1 = first character of the user's initial

If a user name *Steven T. Segal* is saved as follows:

The screenshot shows a 'New Object - User' dialog box. At the top, it says 'Create in: syper.lab/Users'. Below that, there are several input fields:

- First name: Steven
- Last name: Segal
- Full name: Steven T. Segal
- Initials: T
- User logon name: (empty) @syper.lab (dropdown)
- User logon name (pre-Windows 2000): SYPER\ (empty)

 At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

The logon name generated by the script will be *SegalST*.

```
Dim sResult As String 'The variable for holding the result
Const MaxUsernameLength As Integer = 7

Dim sFirst As String
Dim sInitial As String
Dim sLast As String
Dim sFirstPart As String
Dim sInitialPart As String
Dim sLastPart As String

'
' Remove spaces and hyphens...
'
sFirst = Replace(Replace(Trim(DTM.Source("givenName")), " ", ""), "-", "")
sInitial = Replace(Replace(Trim(DTM.Source("initials")), " ", ""), "-", "")
sLast = Replace(Replace(Trim(DTM.Source("sn")), " ", ""), "-", "")
```

```

'
' Construct the logon name...
'
If (Len(sFirst) + Len(sInitial) + Len(sLast)) <=
MaxUsernameLength Then
'We don't have 7 characters total, let's go with what we
have
sResult = sLast & sFirst & sInitial
Else
If Len(sInitial) > 0 Then
sInitialPart = Left(sInitial,1)
Else
sInitialPart = ""
End If

If Len(sLast) >= 5 Then
sLastPart = Left(sLast,5)
Else
sLastPart = sLast
End If

If Len(sFirst) >= (MaxUsernameLength - (Len(sLastPart) +
Len(sInitialPart))) Then
sFirstPart = Left(sFirst, (MaxUsernameLength -
(Len(sLastPart) + Len(sInitialPart))))
Else
sFirstPart = sFirst
End If

sResult = LCase(sLastPart & sFirstPart & sInitialPart)
End If

'
' Skip this record if the resultant value is a Null
string...
'
If sResult = vbNullString Then DTM.CancelRow()

'
' Return the logon name...
'
DTM.Result = sResult

```

Global Script Editor

The **Global Script Editor** allows you to manage global events and link to your Synchronize power tools.

The Synchronize New Job and Edit Job wizards make basic job configuration an easy process, but in some rare instances the simple transformation may not meet your specific needs. Though the Transformation [Script Editor](#) allows users to write script that transforms the contents of a field, it does not support going beyond that - to take action on an entire data row or react to a global event such as insert row. The **Synchronize Global Script Editor** connects to global events. It even exposes access to powerful user controls (power tools) giving the script writer more flexibility and power.

Use of the **Global Script Editor** is intended for advanced users who are familiar with Visual Basic programming and have a good understanding of Synchronize.

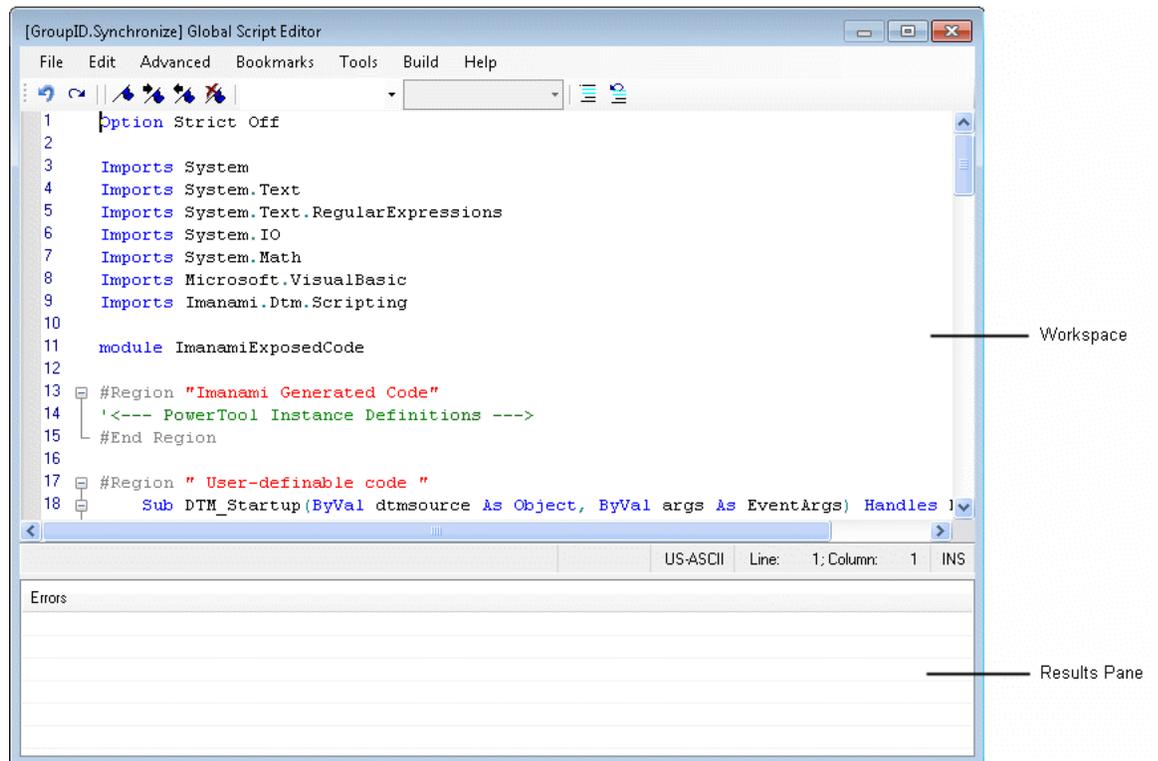


Figure 111: Global Script Editor dialog box

Menu bar

File Menu

Command	Description
Exit	Closes the editor.

Edit Menu

Command	Description
Cut	Copies the current text selection to the clipboard and deletes the selection.
Copy	Copies the current text selection to the clipboard while keeping the selection.
Paste	Inserts the copied or cut text from the clipboard in the workspace.
Delete	Deletes the current text selection.
Undo	Reverses the last change.
Redo	Re-applies a change reversed using the Undo action.
Find	Opens the Find dialog box for searching text in the editor.
Replace	Opens the Replace dialog box for searching and replacing text in the editor.
Go To	Opens the Go To Line dialog box for jumping to a specific line in the editor.
Select All	Selects all the text in the editor.
Insert File As Text	Opens the Select a text file dialog box that allows you to select a text file from which to insert text into the editor.
Time/Date	Inserts the current date and time in the editor.

Advanced Menu

Command	Description
Tabify Selection	Increases indentation of the current text selection.
Untabify Selection	Decreases indentation of the current text selection.
Comment Selection	Comments the current text selection.
Uncomment Selection	Uncomments the current text selection.
Make Uppercase	Converts the current text selection to uppercase.
Make Lowercase	Converts the current text selection to lowercase.
Delete Horizontal Whitespace	Removes horizontal white space characters from the current text selection. Horizontal white spaces include, tabs, spaces, new line characters and similar.

Command	Description
Increase Line Indent	Increases the indenting of the current text selection.
View White Space	Toggles the show, hide behavior for displaying white space characters in the editor.
Incremental Search	Use with the <i>Find</i> command to search for other instances of a string in the editor.

Bookmarks Menu

Command	Description
Toggle Bookmark	Adds a bookmark to the current line, or removes it if already present.
Next Bookmark	Jumps to the next bookmarked line in the editor.
Previous Bookmark	Jumps to the previous bookmarked line in the editor.
Clear Bookmarks	Clears all applied bookmarks.

Tools Menu

Command	Description
Add/Remove Reference	Opens the Add Reference dialog box for including other .NET assemblies in the project.

Build Menu

Command	Description
Compile Script	Checks the script for errors and compiles it.

Help Menu

Command	Description
Contents	Opens the help for GroupID.

Command	Description
About	Opens the About Imanami Synchronize dialog box.

Toolbar



Figure 112: The Global Script Editor toolbar

Button	Description
	Reverses the last change.
	Re-applies a change reversed using the Undo action.
	Adds a bookmark to the current line, or removes it if already present.
	Jumps to the next bookmarked line in the editor.
	Jumps to the previous bookmarked line in the editor.
	Clears all applied bookmarks.
DTM ▾	Shows the list of global objects.
	Comments the current text selection.
	Un-comments the current text selection.

DTM Object

The DTM object provides access to the data extracted from the underlying data source. Using the properties and functions exposed by this object, you can manipulate object values within your custom code. This object has the following members:

- Properties
 - Source
 - Result
 - ExpandVariables
 - Context
- Methods
 - CancelRow

- AddToContext
- DTM Global Events

These are described in the sections that follow.

Properties

Source

Retrieves the value of the specified field name. This is a read-only property and cannot be used for assigning values.

Syntax

```
DTM.Source("Field Name")
```

Example

```
Dim LastName As String = DTM.Source("sn")
```

Result

Returns the referenced string, number or variable value to save it to the destination field.

Syntax

```
DTM.Result string | number | variable
```

Example

```
Dim sAlias As String = "jsmith"  
DTM.Result = sAlias
```

ExpandVariables

Returns the value, as a string, of the specified text after replacing each environment variable embedded in the text with the string equivalent of the value of the variable.

Syntax

```
DTM.ExpandVariables("Text")
```

Example

The following code uses the **%SystemDrive%** environment variable to get the system drive letter of the host machine and then concatenates it with the directory path that follows. The result is stored in a string type variable.

```
Dim UserProfile As String =
DTM.ExpandVariables("%SystemDrive%" & "\Documents and
Settings\")
```

Context

This is a property with a single argument: Key. The object which has been added to the Context is retrieved by passing its key (identity) to this property.

Syntax

```
DTM.Context("Key")
```

Example

The following code retrieves a DataSet object from the Context and returns the total number of rows for the table at zero-index using DTM.Result.

```
If (DTM.Context("UsersDataSet") IsNot Nothing)
  Dim DS As System.Data.DataSet
  DS = DTM.Context("UsersDataSet")
  DTM.Result = DS.Tables(0).Rows.Count
End If
```

Methods

CancelRow

CancelRow is a DTM function that cancels the update or create action for the current destination row. It provides a way to bypass certain objects based on their attributes.

For performance reasons, it is preferable to use a filter query to exclude records not to be updated or created.

Syntax

```
DTM.CancelRow()
```

Example

The following code sets the manager attribute for records having department set to *Support*. For other departments, it will bypass the action.

```
If DTM.Source("department") = "Support" Then
DTM.Result = "Roger Mason"
Else
DTM.CancelRow()
End If
```

AddToContext

This is a function with two arguments: Key and Value. When data is to be shared across segments of code in different editors supported by the Synchronize job wizard, it needs to be placed in the Context.

Syntax

```
DTM.AddToContext("Key", Object)
```

Example

The following code loads an XML file into a DataSet and then adds it to the Context on the Startup event of a Synchronize job.

```
Sub DTM_Startup(dtmsource As Object, args As EventArgs)
Handles DTM.Startup
' User-definable script goes here -----
Dim DS As New System.Data.DataSet()
DS.ReadXML("C:\ADUsers.xml")
DTM.AddToContext("UsersDataSet", DS)
' -----
End Sub
```

DTM Global Events

The DTM object exposes job and row level events through the Global Script Editor for implementing custom business logic. These events are also called the DTM Global Events and are raised during the execution of a DTM job.

Event	Event is raised
DTMStartup	As soon as the job starts. Since it is raised at the job start, it requires no previous action to be performed. Any other action that needs to be performed has to be made part of an event that is raised after this one.
DTMBuildSourceQuery	When the Source Query is analyzed. The Source Query contains information about which row(s) or column(s) need to be processed. Selection of the relative data entities raises this event.

Event	Event is raised
DTMRowStarting	When a complete row is being prepared for copying to the destination.
DTMBuildDestinationQuery	When the query is generated for copying source data to the destination.
DTMRowChanging	Before updating a record in the destination.
DTMRowChanged	When changes have been made to the selected attributes' values on the destination side.
DTMRowAdding	When a new record is to be added in the destination.
DTMRowAdded	When a new record has been added in the destination.
DTMRowDeleting	When a record is selected for deletion
DTMRowDeleted	When the record has been deleted in the destination.
DTMRowFinishing	When the record copying process is about to finish.
DTMRowFinished	When the record copying process finishes.
DTMRowFailed	When a change, add, or delete action on a record fails to execute successfully.
DTMShutdown	When the Close (X) button is clicked on the user interface at any stage. This event will not be raised if the job is being executed using the command line.

Context

The Context plays a central role in the Synchronize job model. Since in a Synchronize job, assemblies for Synchronize PowerTools and other third-party libraries can only be referenced in the Global Script Editor, manipulating objects of these libraries in other code segments in a job is only possible by adding them to the Context.

The Context is an implementation of the .NET Hashtable collection which is an in-memory data structure that stores and retrieves objects using key/value pairs. The DTM object in the Synchronize job model provides two members: `AddToContext` and `Context` for adding and retrieving objects from the Context respectively. To learn more about these two members, please see the [DTM Object](#) section.

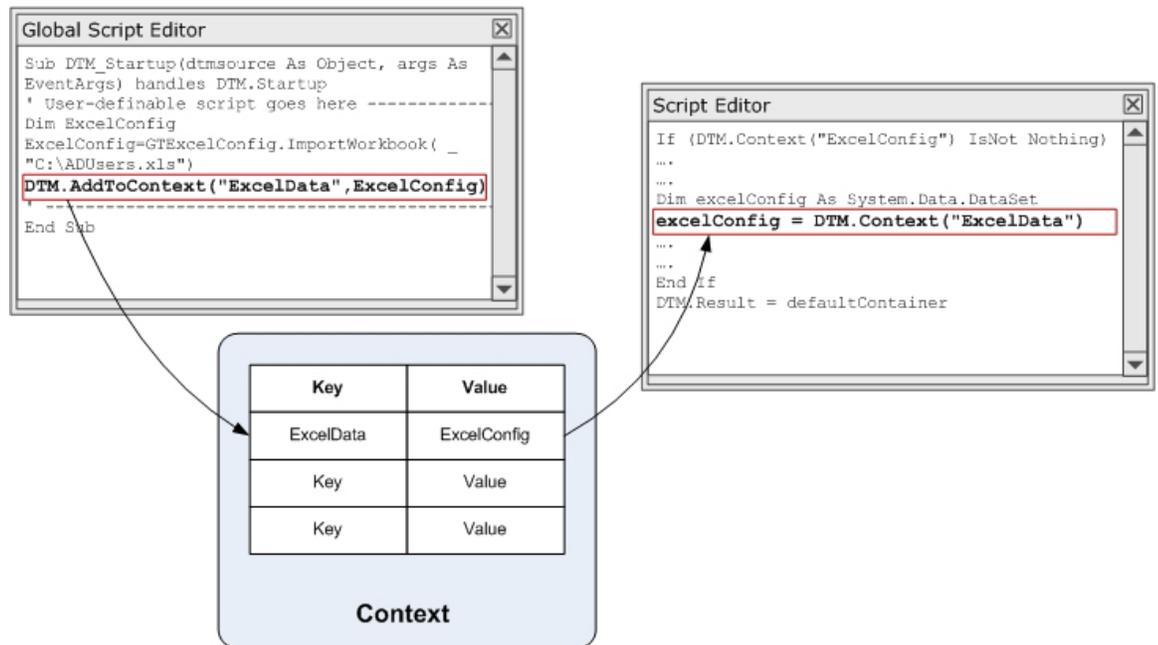


Figure 113: The use of DTM.AddToContext and DTM.Context members to add and retrieve objects from the Context.

Although a Context makes possible the sharing of objects added to it across different code segments of a Synchronize job, it is not possible to test your code for each segment individually without actually running the job. For this reason, you may find yourself in one of the following situations:

- Receive an exception when trying to compile the code in the Script Editor, stating that the object reference is not found.
- If you have handled the exception in your code and have checks in place for null object references, testing your script using the in-built Script Tester (Figure 110) with random data may not provide you with the expected results.

JobEventArgs Class

JobEventArgs is the class containing event data for all Row events in DTM Object. This class has the following members:

Property

- StagingDestination

Method

- SetStagingDestination

StagingDestination

Returns the value of the specified destination attribute.

Syntax

```
StagingDestination("Field Name")
```

Example

See the example for SetStagingDestination.

SetStagingDestination

Sets the value of the specified destination attribute.

Syntax

```
SetStagingDestination("Field Name", "Value")
```

Example

The code in the following example, transforms the middle name of a user to a shorter form. For example, if the middle name is Andrew, it will be changed to "A."

```
Sub DTM_RowAdding(ByVal dtmsource As Object, ByVal args As
JobEventArgs) Handles DTM.RowAdding
    Dim MiddleName As String
    MiddleName =
String.Left(args.StagingDestination("middleName"), 1) & "."
    args.SetStagingDestination("middleName", MiddleName)
End Sub
```

The example demonstrates a scenario where Active Directory is being used as a destination and the middleName attribute amongst the selected fields on the **Select Destination Fields** page of the Job wizard.

The StagingDestination Concept

Staging Destination refers to a stage where destination fields and their values are stored in an in-memory data structure before they are saved at the destination. These destination fields will be those that have been selected on the **Select Fields** page (Figure 15) of the Synchronize Job wizard. However, programmatically, more destination fields can also be added using the SetStagingDestination method of the JobEventArgs class provided that they exist on the destination side.

Scripting restrictions enforced by Synchronize

Behind the scene, Synchronize inserts each script into the body of a subroutine before compiling. Therefore, any Visual Basic .NET constructs that are only valid outside of a subroutine/function will fail to compile and will be disallowed.

These restrictions apply to creating a Synchronize script:

- Subroutines, functions, classes, modules, and namespaces are not allowed.
- Module-level statements, such as Import or Option statements, are not permitted.
- Shared (that is, static and global) variables are not supported.

Visual Basic options set by Synchronize

Synchronize establishes the following Option statements which apply to all scripts and cannot be overridden:

- Option Explicit On – all variables must be declared before use via a Dim statement. With Visual Basic .Net, it is possible to both declare and assign variables at their first use, as follows:

```
Dim MyVariable = "Hello"
```

```
Dim MyObject = New Object()
```

- Option Strict Off – data types do not need to be declared for each variable. Conversions between types, when possible, are performed implicitly. (By declaring data types, unnecessary conversions can be avoided, hence performance improved).

.Net assembly references

Synchronize establishes certain system assembly references before compiling your scripts. These references apply to all scripts and cannot be overridden.

These references are:

- MsCorLib.dll
- System.dll
- System.Data.dll
- System.Xml.dll

System.DirectoryServices, in particular, is “off-limits” to your scripts so as to prevent direct access to Active Directory and other LDAP data stores. This restriction is desirable, as it prevents your script from acting in conflict with Synchronize, which, after all, has the ultimate responsibility for updating these data stores.

.Net Namespaces

Synchronize imports certain namespaces when compiling your scripts. These imports apply to all scripts and cannot be overridden.

These imports are:

- Imports System
- Imports System.Text
- Imports System.Text.RegularExpressions
- Imports System.IO
- Imports System.Math

.Net namespaces other than those listed here can still be accessed by specifying the fully-qualified namespace. For example, a DataSet (which belongs to the System.Data namespace) can be read from a file as follows:

```
Dim ds = New System.Data.DataSet()  
ds.ReadXml("C:\Temp\MyFile.xml")
```

Sample Transform Scripts

Assembling a Full Name: <last name>, <first name>

Assumptions:

- Last name is present in a source field named *sn* (for surname)
- First name may or may not be present in a source field named *givenName*

```
If Len(DTM.Source("givenName")) > 0 Then  
    DTM.Result = DTM.Source("sn") & ", " &  
    DTM.Source("givenName")  
Else  
    DTM.Result = DTM.Source("sn")  
End If
```

Assembling a Full Name: <last name>, <middle initial>. <first name>

Assumptions:

- Last name is present in a source field named *sn* (for surname)
- First name may or may not be present in a source field named *givenName*
- Middle name may or may not be present in a source field named *middleName*

```
Dim LastName = DTM.Source("sn")
Dim FirstName = DTM.Source("givenName")
Dim MiddleName = DTM.Source("middleName")
Dim FullName = LastName

If Len(FirstName) > 0 Or Len(MiddleName) > 0 Then
  FullName = FullName & ", "
End If

FullName = FullName & FirstName
If Len(FirstName) > 0 And Len(MiddleName) > 0 Then
  FullName = FullName & " "
End If

If Len(MiddleName) > 0 Then
  FullName = FullName & Left(MiddleName, 1) & "."
End If

DTM.Result = FullName
```

Formulating a UserName: 6 chars of last name & first initial, all lower case

Assumptions:

- Last name is present in a source field named *sn* (for surname)
- First name is present in a source field named *givenName*

```
DTM.Result = LCase(Left(DTM.Source("sn"), 6) &
  Left(DTM.Source("givenName"), 1))
```

Formulating a UserName: Combine first letter of each part of name, all lower case

Assumptions:

- Last name is present in a source field named *sn* (for surname)
- First name may or may not be present in a source field named *givenName*
- Middle name may or may not be present in a source field named *middleName*
- Each part of name may be composed of multiple words separated by hyphens, spaces or commas, and script must pick out the first character of each word – for example, "Reginald Howard-Hughes Thompson, Jr." converts to "rhhtj".

```
Dim Fullname As String = DTM.Source("givenName") & " "
_
& DTM.Source("middleName") & " " _
& DTM.Source("sn")

Dim Nameparts As String() = Fullname.Split(" , -", _
.ToCharArray())
Dim Initials As String = ""
For Each Namepart As String In Nameparts
  Initials = Initials & Left(Namepart, 1)
Next

DTM.Result = LCase(Initials)
```

Code Translation: Translating Case-By-Case

Assumptions:

- Source data contains a *DeptCode* field with 2-character codes.
- Corresponding destination field data needs full spelling of the department name.

```
Select Case DTM.Source("DeptCode")
Case "SA"
  DTM.Result = "Sales"
Case "EN"
  DTM.Result = "Engineering"
Case "AD"
  DTM.Result = "Administration"
Case Else
  DTM.Result = "Other"
```

```
End Select
```

Sample Container Scripts

Object Routing Case-By-Case

Assumptions:

- Source data contains a *DeptCode* field with 2-character codes.
- Each department has a container to which new user objects should be directed.

```
Select Case DTM.Source("DeptCode")
Case "SA"
    DTM.Result =
    "CN=Sales,CN=Users,DC=dc2000,DC=imanami,DC=biz"
Case "EN"
    DTM.Result =
    "CN=Engineering,CN=Users,DC=dc2000,DC=imanami,DC=biz"
Case "AD"
    DTM.Result =
    "CN=Administration,CN=Users,DC=dc2000,DC=imanami,DC=biz"
Case Else
    DTM.Result = "CN=Users,DC=dc2000,DC=imanami,DC=biz"
End Select
```

Object Routing via an XML File

Assumptions:

- Source data contains a *DeptCode* field.
- Each department has a container to which new user objects should be directed.
- The XML file, *DeptCodes.xml* contains root element with `<Department>` child elements, each of which contains `<DeptCode>` and `<Container>` attributes, specifying the desired location for user objects belonging to each department.

```
Dim dsDeptCodes As System.Data.DataSet = New
System.Data.DataSet
dsDeptCodes.ReadXml("C:\temp\DeptCodes.xml")
Dim Rows As System.Data.DataRow() =
dsDeptCodes.Tables[0].Select("DeptCode='" &
DTM.Source("DeptCode") & "'")
```

```

If Rows.Length > 0 Then
DTM.Result = Rows(0)("Container").ToString()
Else
DTM.Result = "CN=Users,DC=dc2000,DC=imanami,DC=biz"
End If

```

Object Routing using an Excel File

Assumptions:

- Source data contains a *DeptCode* field.
- Each department has a container to which new user objects should be directed.
- The Excel file, DeptCodes.xls contains columns: DeptCode and Container, specifying the desired location for user objects belonging to each department.

```

Dim dtDeptCodes As System.Data.DataTable = New
System.Data.DataTable
Dim sConnString As String =
"Provider=Microsoft.Jet.OLEDB.4.0;" & _
"Data Source=C:\temp\DeptCodes.xls;" & _
"Persist Security Info=false;" & _
"Extended Properties='Excel 8.0;HDR=YES'"
Dim sCmdString As String = "SELECT * FROM [Sheet1$]"
Dim daExcel As System.Data.OleDb.OleDbDataAdapter = _
New System.Data.OleDb.OleDbDataAdapter(sCmdString,
sConnString)
daExcel.Fill(dtDeptCodes)
daExcel.Dispose()
Dim Rows As System.Data.DataRow() = _
dtDeptCodes.Select("DeptCode='" & _
DTM.Source("DeptCode") & "'")

If Rows.Length > 0 Then
DTM.Result = Rows(0)("Container").ToString()
Else
DTM.Result = "CN=Users,DC=dc2000,DC=imanami,DC=biz"
End If

```

Visual Basic .NET for GroupID

This topic discusses some points of information relevant to DTM scripting in GroupID. More information is available at MSDN online: [Visual Basic Language Reference](#).

Differences between Visual Basic .NET and other Visual Basic versions

Visual Basic .NET is largely a superset of Visual Basic 6. If you are familiar with Visual Basic before the advent of .NET technology, you may wish to refer to [Language Changes in Visual Basic](#), and particularly to [Programming Element Support Changes Summary](#). For the most part, statements and constructs that worked in Visual Basic 6, Visual BasicScript, and Visual BasicA continue to work in Visual Basic .NET.

A key difference, however, is that the Set keyword is no longer used to assign a value to an object. Simply omit it!

Declaring variables

Variables must be declared via the Dim keyword prior to, or concurrent with, their first use. Optionally, you can indicate the data type of the variable in the declaration.

The following declarations are valid:

- Dim Lastname
- Dim Lastname, Firstname
- Dim Lastname, Firstname As String
- Dim Lastname = DTM.Source("sn")
- Dim Lastname As String = DTM.Source("sn")

Manipulating Strings

The most common use of Synchronize scripting is to dissect and combine strings. String literals are always enclosed in quotes, and Visual Basic provides the & operator for concatenating strings.

```
Dim Fullname = Lastname & ", " & Firstname
```

Visual Basic also provides a host of global functions that perform various string manipulations, for example:

- Len(Str): e.g., Dim LengthOfName = Len(Fullname)
- Left(Str, Length): e.g., Dim MiddleInitial = Left(DTM.Source("middleName"), 1)

- Mid(Str, Start, Length): e.g., Dim SeventhCharacter = Mid(Fullname, 7, 1)
- LCase(Str): e.g., Dim LowerCaseName = LCase(Fullname)

For a list of such string functions, see [String Manipulation Summary](#).

As an alternative to global functions (which are handed down from Visual Basic before the advent of .NET technology) you can instead use the .NET string class and related classes. These methods can only be applied to a variable if you declare the data type of the variable to be As String (*as in Dim Lastname As String*). Unlike global functions, positions within a string are 0-based (that is, the first character occupies position 0) instead of 1-based (the first character occupies position 1).

- String.Length: e.g., Dim LengthOfName As Integer = Fullname.Length
- String.Substring(Start, Length): e.g., Dim MiddleInitial As String = DTM.Source("middleName").Substring(0, 1)
- String.ToLower(): e.g. Dim LowerCaseName As String = Fullname.ToLower()

For a list of such string methods, see [.NET String Methods](#).

Line Continuation

With extensive string manipulation, statement lines frequently become quite long. In order to break a statement into two or more lines, insert a space followed by an underline ("_") just prior to each line break.



Be sure to insert the line break characters ("_") outside of a string literal.

Example:

```
Dim DistinguishedName =
"cn=Sales,CN=SF,CN=WestCoast,CN=Users," _
& "OU=corporation,DC=dc2000,DC=imanami,DC=biz"
```

Decision Structures

You can make decisions in your script using the If-Then or If-Then-Else constructs. These require a condition clause that evaluates to true or false.

Example 1:

```
Dim Fullname = DTM.Source("sn")
If Len(DTM.Source("givenName")) > 0 Then
Fullname = Fullname & ", " & DTM.Source("givenName")
End If
```

Example 2:

```
If DTM.Source("Department") = "Sales" Then
DTM.Result =
"cn=Sales,CN=Users,DC=dc2000,DC=imanami,DC=biz"
Else
DTM.Result = "CN=Users,DC=dc2000,DC=imanami,DC=biz"
End If
```

To perform one of a number of alternative actions based on the value of a variable, the Select Case construct comes in handy. In this example, note the use of the global LCase function. This example illustrates a how to make case-insensitive string comparisons.

```
Select Case LCase(DTM.Source("Department"))
Case "sales"
DTM.Result =
"cn=Sales,CN=Users,DC=dc2000,DC=imanami,DC=biz"
Case "engineering"
DTM.Result = "cn=Eng,CN=Users,DC=dc2000,DC=imanami,DC=biz"
Case "admin"
DTM.Result =
"cn=Admin,CN=Users,DC=dc2000,DC=imanami,DC=biz"
Case Else
DTM.Result = "CN=Users,DC=dc2000,DC=imanami,DC=biz"
End Select
```

Loops

It is uncommon to use loops in a DTM script, since the script itself is executed in the context of a single source row (or object) and a single destination row (or object). However, complex string manipulations may require iterating through the characters of a string. Iteration through the characters is most easily accomplished using the **For Each** construct.

Example:

Count the number of numeric digits in an alphanumeric ID source field using the IsDigit() shared function of the .Net Char class.

```
Dim Count = 0
For Each ch As Char In DTM.Source("ID")
If Char.IsDigit(ch) Then
Count = Count + 1
End If
Next
```



GroupID

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