Microsoft Dynamics AX 2012 R3

Entity store

This document describes the primary scenarios and features of Entity store. Entity store is a database that is used for analytical scenarios such as near-real-time Microsoft Power BI reporting and integration with Microsoft Cortana Intelligence Suite.

White paper

April 2016

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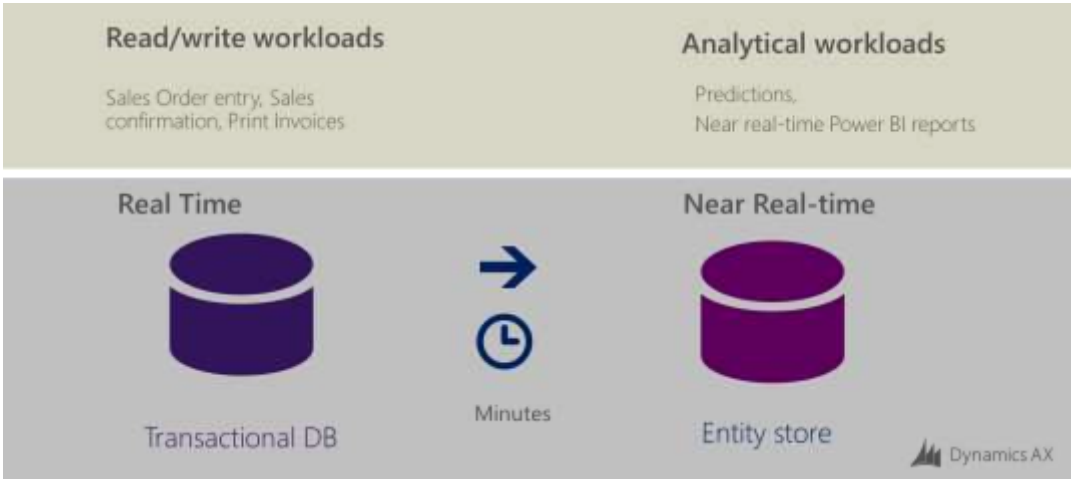
Entity store

Entity store is a database that is used for analytical scenarios such as near-real-time Microsoft Power BI reporting and integration with Microsoft Cortana Intelligence Suite (CIS). Data management capabilities within Microsoft Dynamics AX 2012 R3 enable continuous update (refresh) of the data in Entity store, so that the database remains synchronized with the transactional database.

Entity store is supported on Microsoft Azure SQL Database, and also on Microsoft SQL Server 2016 and Microsoft SQL Server 2014 BI editions or higher. Entity store can be hosted on a separate database server from the server that hosts the transactional database. Therefore, you do not have to upgrade the transactional database to the latest versions of Microsoft SQL Server to deploy Entity store.

The following illustration provides a conceptual view of Entity store.



Entity store is available in Microsoft Dynamics AX 2012 R3 hotfix KB3147499 and will also be available in Microsoft Dynamics AX 2012 R3 Cumulative Update 11 (CU11).

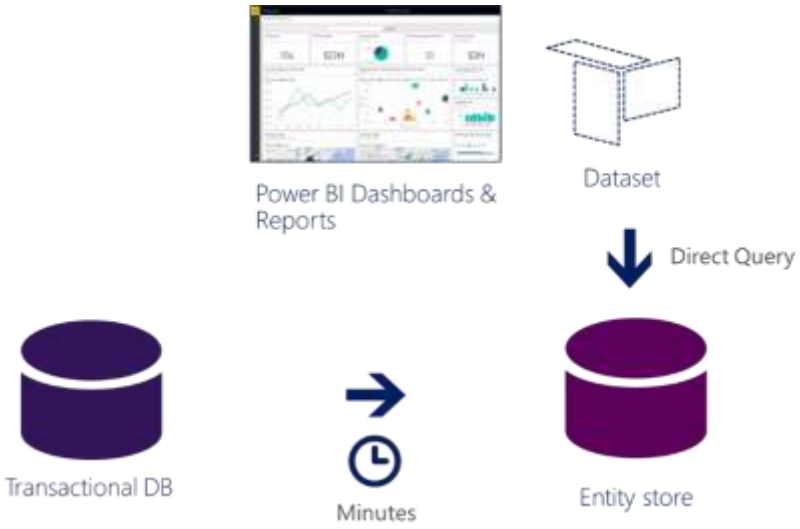
Primary scenarios

This section describes the primary scenarios that Entity store is intended for.

High-volume, near-real-time Power BI reporting

Customers can use Power BI together with Entity store to enable high-volume, near-real-time analytical reporting over large volumes of data.

The following illustration shows this integration.



A combination of two factors enables faster query response:

- Entity store is a denormalized database, and its schema corresponds to entity definitions in AX 2012 R3. Entity definitions in Microsoft Dynamics AX 2012 (which can be based on views that join multiple tables) are staged as tables within the Entity store tables, so that table joins are minimized for optimal query performance.
- Tables are defined by using Microsoft SQL Server clustered columnstore indexes (CCIs), which are a set of in-memory indexes that are used for faster query response. CCI technology was introduced in Microsoft SQL Server 2012, and was greatly improved in SQL Server 2014 and SQL Server 2016.

Enhancements to Microsoft Dynamics AX Data Import Export Framework (DIXF) enable Power BI to report on near-real-time data from Microsoft Dynamics AX by using Direct Query mode. Power BI Direct Query mode enables direct connection to data in an Azure SQL database or a SQL Server database, so that queries are run on the database where the data resides.

Intelligent business processes through Cortana Intelligence Suite

CIS is a collection of tools and services from Microsoft that transforms data into intelligent actions. CIS offers predictive capabilities and a set of tools that are focused toward business users and developers, and that enable learning from data. For an overview of the capabilities that are offered by CIS, see https://www.microsoft.com/en-us/server-cloud/cortana-intelligence-suite/overview.aspx.

CIS works on data: data in Azure stores such as Azure SQL Database, Azure SQL Data Warehouse, or Azure Data Lake, and also data in on-premises data sources such as SQL Server. Although Microsoft Dynamics AX data is stored in a SQL database (a SQL Server database in the case of AX 2012, and an Azure SQL database or SQL Server database in the case of the current version of Microsoft Dynamics AX), we do not recommend that you use the operational database for heavy analytical workloads, because large analytical compute jobs might degrade the response times of business apps in the front office that is running Microsoft Dynamics AX.

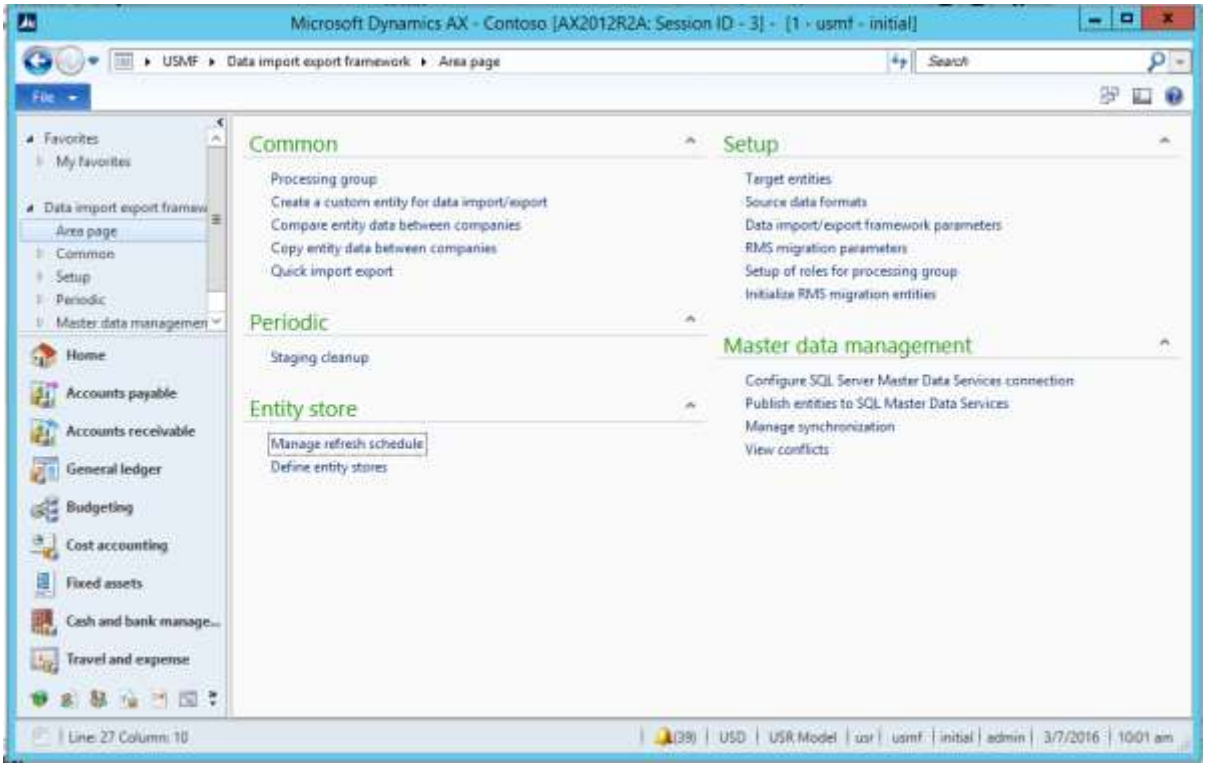
Entity store lets Microsoft Dynamics AX customers effectively work with their data by using CIS capabilities. Customers no longer have to develop extraction, transformation, and loading (ETL) scripts, transform data, and stage

or restage it. Entity store, together with CIS tools, lets customers complement Microsoft Dynamics AX data with data from devices (such as manufacturing execution systems [MES] and sensors) and also from other systems (such as Microsoft Dynamics CRM).

Entity store also has benefits for many independent software vendors (ISVs) and partners who specialize in vertical solutions that are built on Microsoft Dynamics AX. Instead of investing in ETL capabilities to map and move data out of Microsoft Dynamics AX, they can focus on building vertical solutions.

Overview of features

The **Data import and Export framework** area page contains a set of features that enable Entity store, as shown in the following illustration.



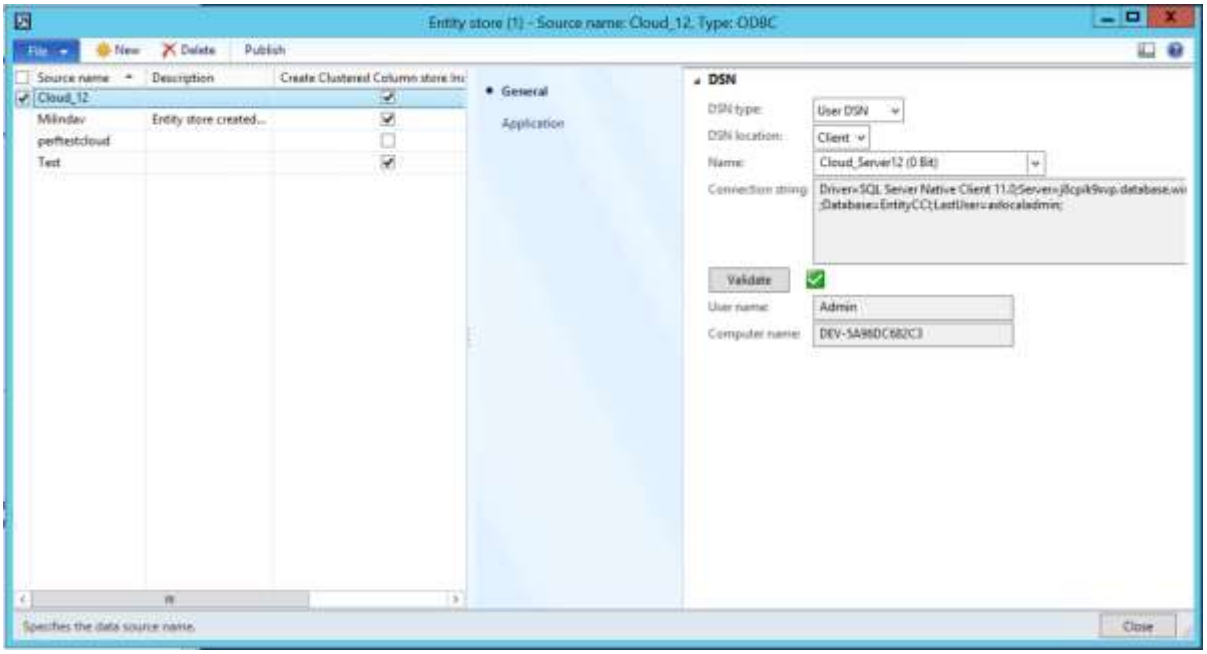
Define an Entity store

In the **Entity store** form, an administrator can define one or more Entity stores. Entity stores require a data source name (DSN) definition. The DSN is used to define the target of the database that is used to stage the Entity store.

Currently, the following types of databases are supported for Entity store:

- Azure SQL Database
- SQL Server 2016
- SQL Server 2014

Note: Entity store functionality takes advantage of SQL Server CCI technology. Currently, CCI is supported only in Premium editions of Azure SQL Database, and in BI editions or higher of SQL Server versions.



To define a new Entity store, click **New**, and enter a source name and description. Here are descriptions of some of the other controls that are available in the **Entity store** form:

- **Name** – You must define a DSN to specify the data connection that the Entity store definition uses. Select the name of the DSN that is used to identify the data connection to the entity store. When you select the DSN name, other values are automatically entered in the form.
- **Validate** – Validate the connection string. You might be asked for the password to connect to the database.
- **Create Clustered Column store index** – A selected check box indicates that the Entity store can take advantage of CCI technology.

Define a DSN

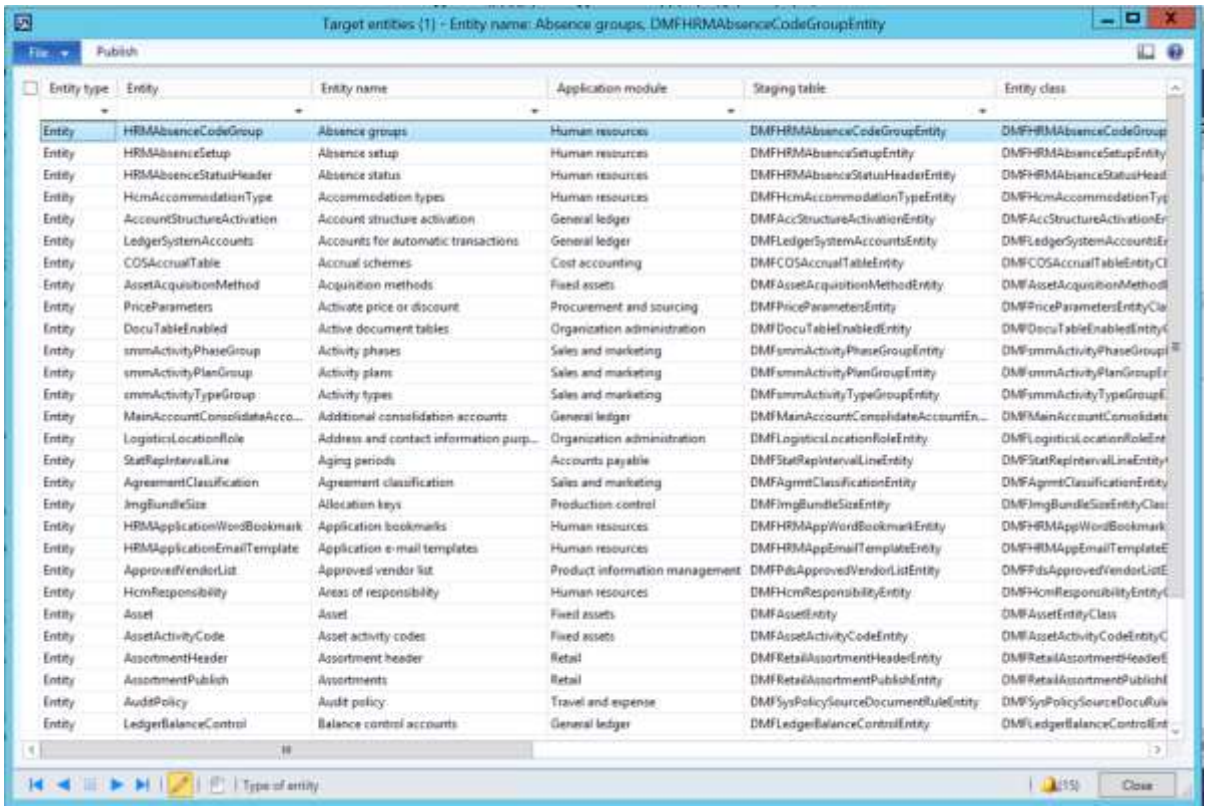
You define a DSN in the **Data source definition** form on a client computer. On a computer that runs Windows 10, you can define a DSN by going to **Settings** > **Define ODBC data source**.

Note: Underlying refresh jobs might not use the Open Database Connectivity (ODBC) data source definitions to perform the actual refresh. DSNs are used to identify destination databases. Therefore, you can use a DSN definition on the client computer to define an Entity store.

Define a new Entity store and publish entities

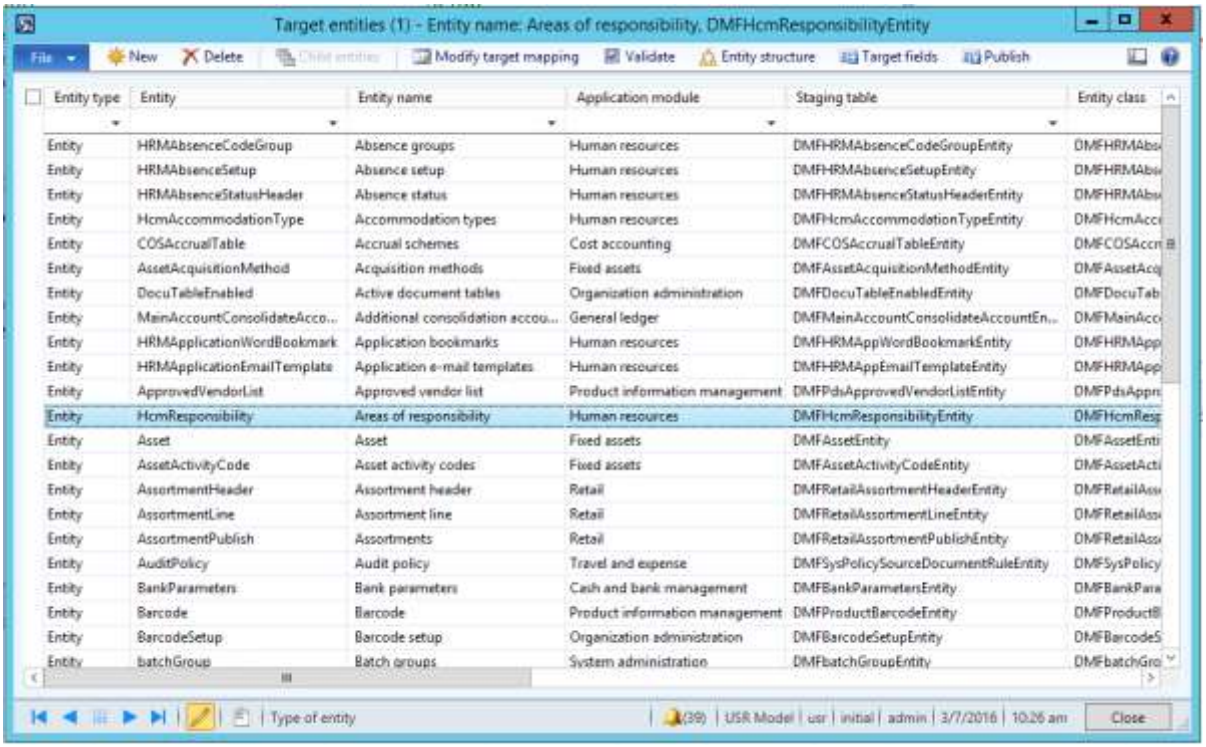
By clicking the **Publish** button in the **Entity store** form, you can publish entities to the newly defined Entity store. You can use this method to publish multiple entities at the same time.

The **Publish** command creates table definitions in the Entity store. However, data refresh does not occur until you create a data refresh schedule.



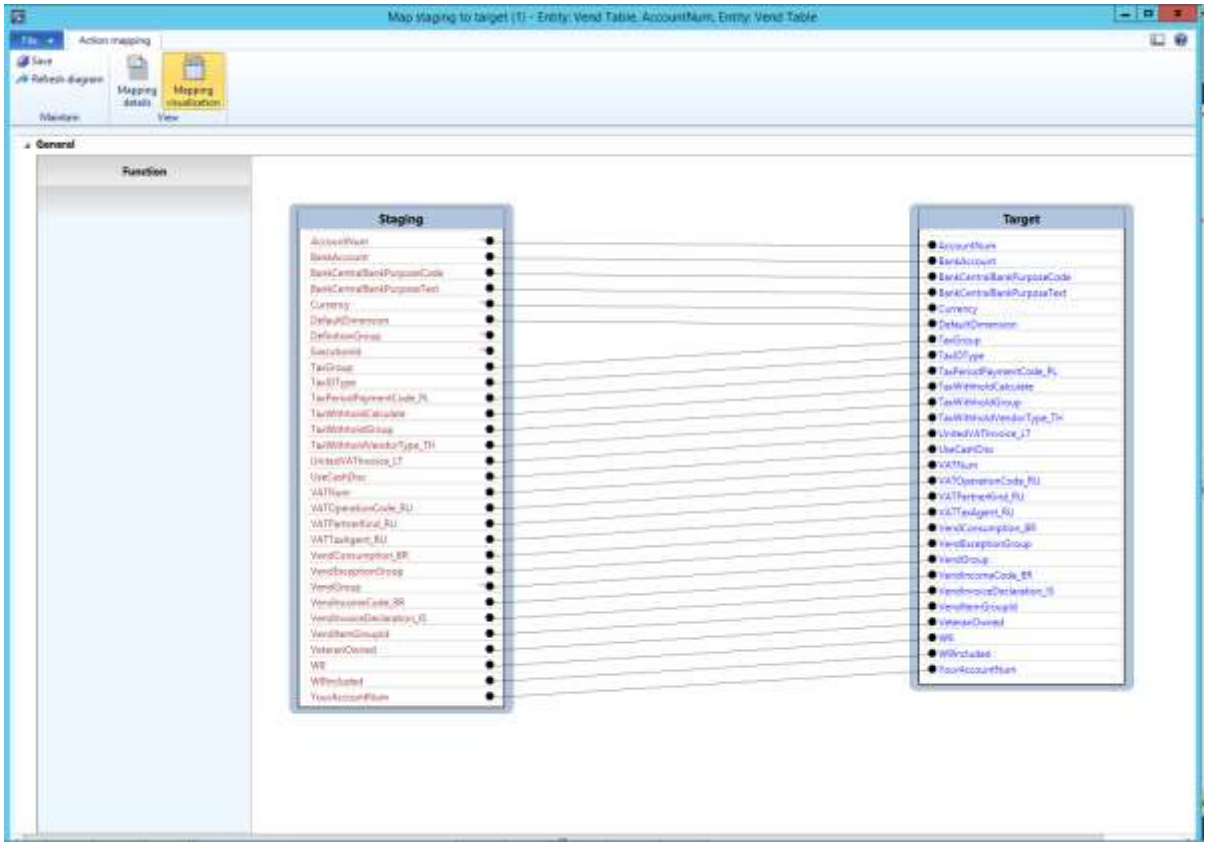
Publish entities to multiple Entity stores

You use the **Target entities** form to publish the entity schema to an Entity store. The **Publish** command creates table definitions in the Entity store. However, data refresh does not occur until you create a data refresh schedule.



Here are descriptions of some of the buttons in the **Target entities** form:

- **Publish** – Publish the selected entities to the Entity store. The system overwrites any entity definitions that already exist.
- **Validate** – Validate that the entity definition is accurate, and that it can be used in a refresh job.
- **Modify target mapping** – The table that is published in the Entity store is based on the entity definition in Microsoft Dynamics AX. However, you can select the fields that are published. When you click this button, the **Map staging to target** form is displayed, as shown in the following illustration.



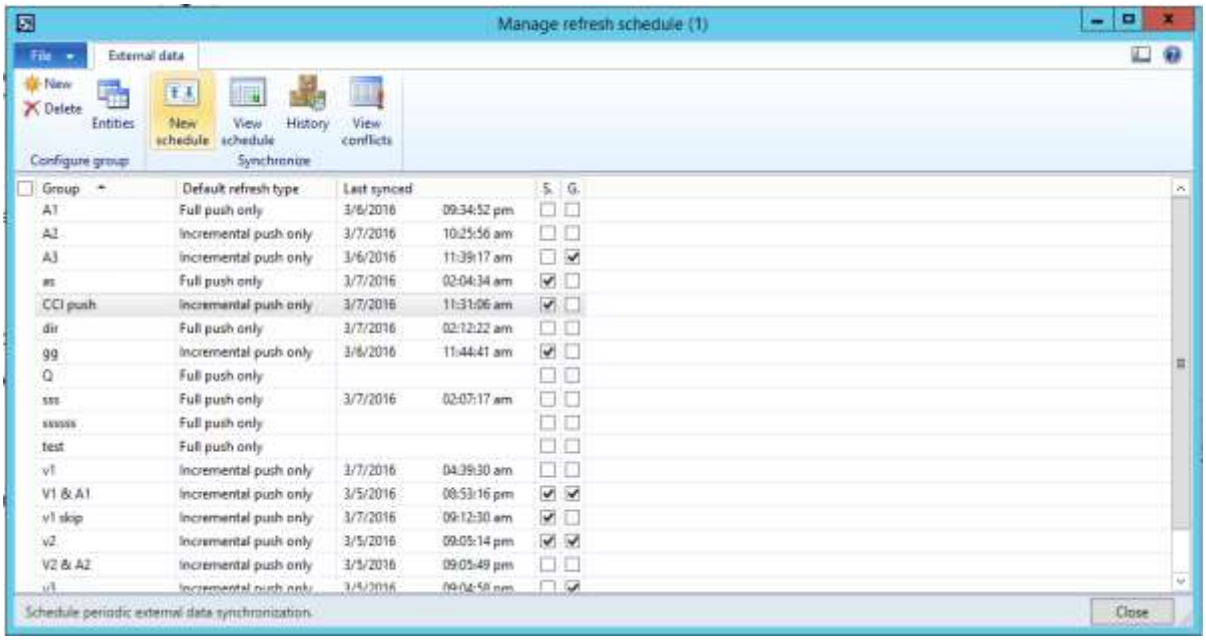
Manage the refresh schedule

The **Manage refresh schedule** form lets an administrator define the schedule for refreshing the Entity store with data from AX 2012.

You can define one or more refresh schedules, each of which can have one or more entities. These entities can be refreshed as either an incremental update or a full refresh.

A refresh schedule defines the refresh frequency of entities within a group. A refresh schedule can be triggered either one time or on a recurring basis. You can define one or more schedules for a given set of entities.

Note: The **Manage refresh schedule** form is company-specific. In other words, when you add company-specific entities to a refresh schedule, it is assumed that you want to refresh only records that are related to the current company. If you want to include records from other companies in the refresh schedule, you must add the same entity while you are signed in to the other companies.



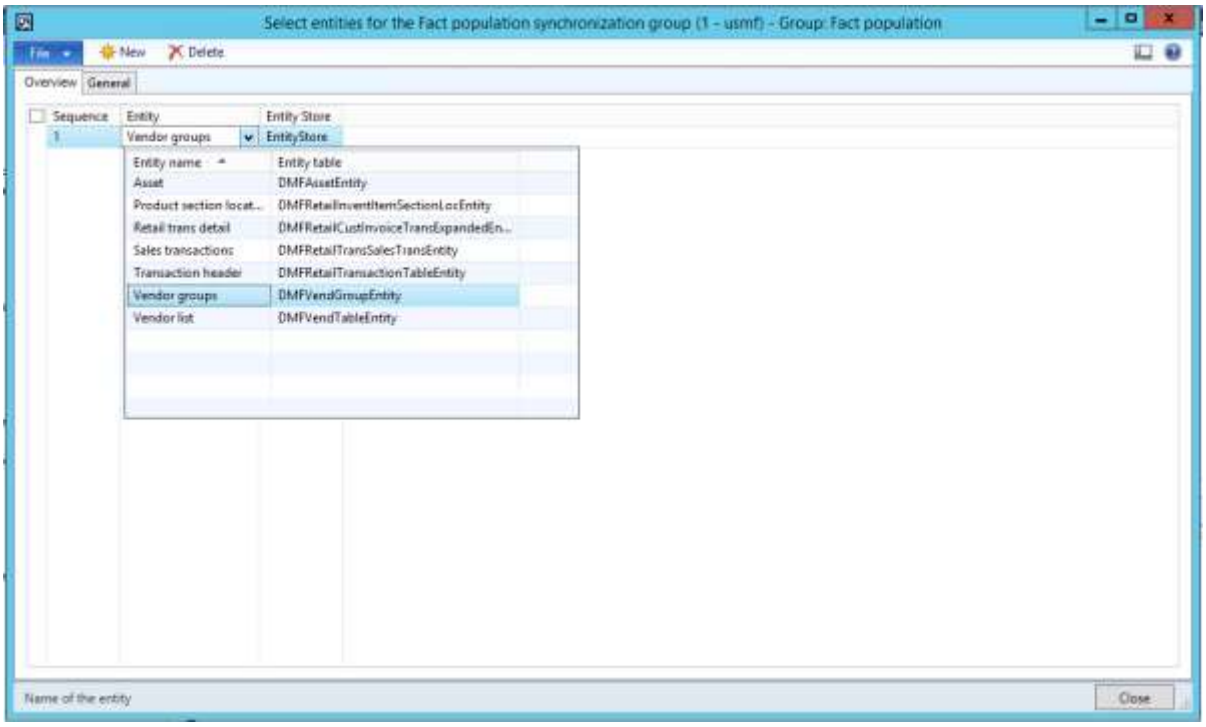
Here are descriptions of some of the fields in the **Manage refresh schedule** form:

- **Default refresh type** – The following options are available:
  - **Full push only** – Delete existing data in the selected entities, and repopulate the entities with data from the source. If an entity is company-specific, while the entity is truncated for all companies, only the data that is related to scheduled companies is added.
  - **Incremental push only** – Add only the new and modified records from Microsoft Dynamics AX.
- **Skip staging** – This option is an optimization that uses direct SQL to read the transactional database. When this check box is selected, any X++-based calculations that are defined in the entity are not performed before the insert operation.
- **Global incremental push** – You can define multiple refresh groups that refresh the same entity independently of each other. Because each refresh job occurs independently, the same entity might be refreshed multiple times within a short period, thereby wasting processing resources. This option optimizes refresh jobs across the entire Microsoft Dynamics AX instance, so that the same entity is not refreshed more than one time within one minute.

  Note: If incremental updates are used, each processing job inserts and updates only the records that have been changed since the last refresh. Nevertheless, running the same refresh job more than one time within, for example, one minute, might consume processor resources unnecessarily.

Create a new refresh schedule

When an administrator creates a new refresh schedule, he or she can select the entities to refresh in one or more Entity stores.



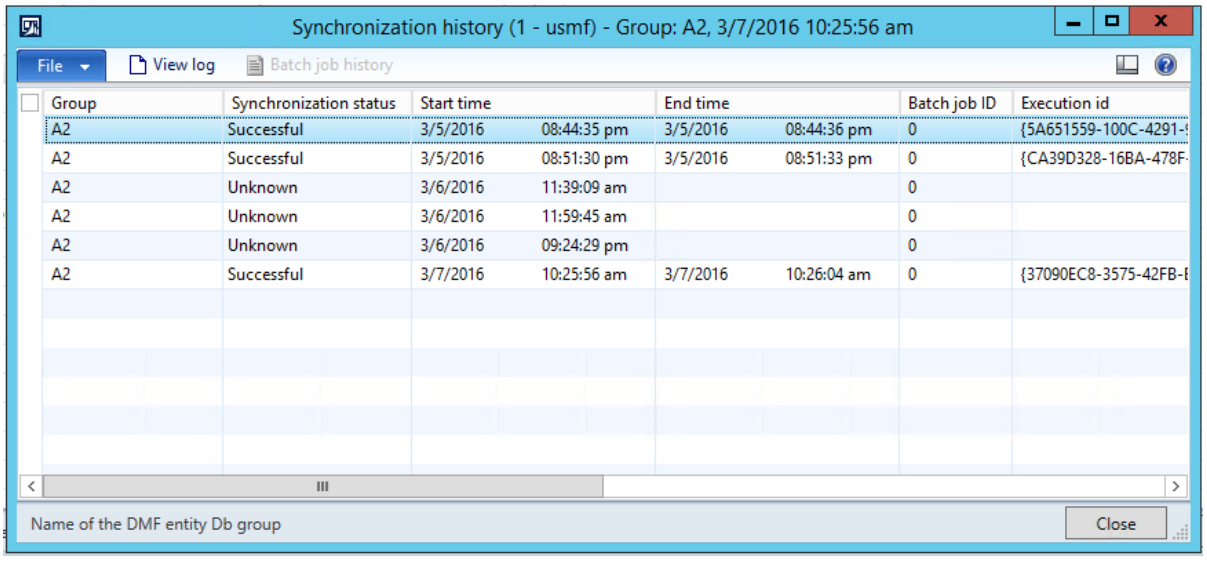
Here are descriptions of some of the fields in the **Select entities for the <Group name> synchronization group** form:

- **Entity** – Select the entities to include in the Entity store. Only published entities are available for selection in this field. The field shows both the descriptive name and the table name of each entity.
- **Entity Store** – Each entity that you select can be refreshed in a single Entity store or multiple Entity stores. However, the same entity cannot be refreshed in the same Entity store multiple times. In other words, you cannot define redundant processing steps.
- **Sequence** – This field specifies the order in which entities are refreshed within the group.

Refresh history

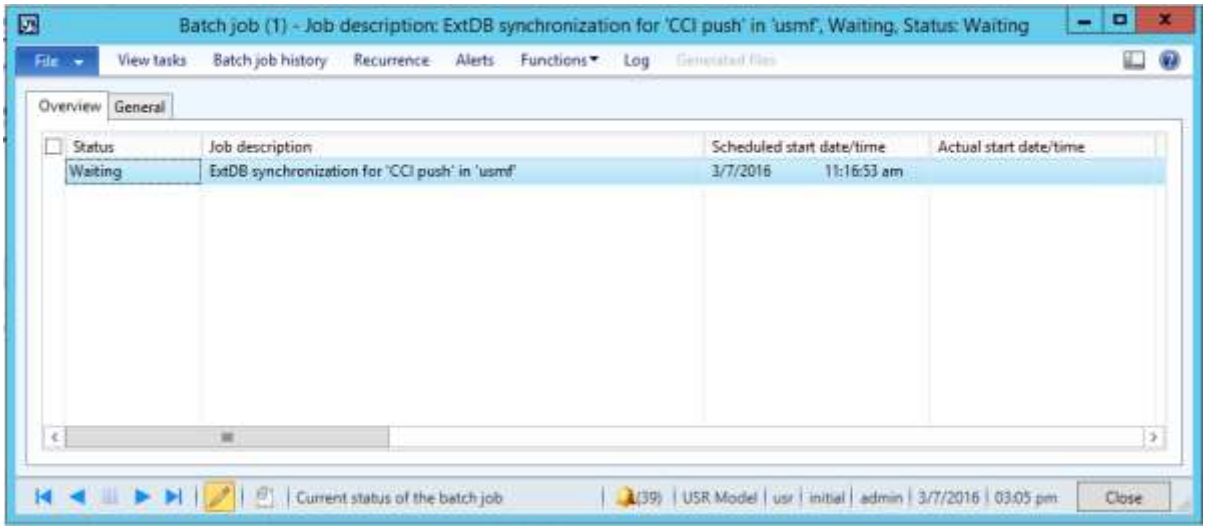
The **View refresh history** option displays the refresh history of a selected processing group. Each line in the **Synchronization history** form displays the refresh history of an entity. The form also displays the number of records that were updated and the number that were inserted.

If the refresh schedule used the Microsoft Dynamics AX batch framework to schedule refresh jobs, the form also displays the ID of the batch job.



View upcoming refresh schedules

The **View (future refresh) schedule** option lets an administrator view upcoming refresh jobs for a selected refresh schedule.



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