


Dataset design for the Power BI Connector for Azure DevOps

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Each Analytics view defines a dataset in Power BI. Datasets are the tables and properties used to create visualizations. The datasets generated by the [Power BI Data Connector for Azure DevOps](#) have the following characteristics:

- The entities and associated fields available from Analytics are flattened (denormalized) into a single table. For example, the user name in "Created By" is modeled as a string (User Name), rather than the user ID. This eliminates the need to create relationships between tables to create reports.
- Historical data is modeled as snapshots for each time period, so trending reporting is extremely simple.

To learn more about Power BI and datasets, see [Power BI - basic concepts for Power BI service](#).

Flattening the Analytics OData endpoint

The Analytics OData endpoint provides a normalized representation of the Analytics service data. The data is normalized primarily to support reporting on the "many-to-many" relationships that exist between the data, such as work items and associated tags.

The Power BI Data Connector represents this data as a single table so that the relationships shown in our [Analytics service data model](#) do not need to be recreated in Power BI. This allows you to filter immediately on complex fields, such as work item tags.

The process greatly simplifies getting your reports up and running. However, not all of the fields available through the Analytics OData endpoint are available for selection in an Analytics view.

Selectable fields in Analytics views

The fields you can select in an Analytics view correspond to regular work tracking fields and Analytics data store fields.

Work tracking fields

You can select all work tracking fields in an Analytics view, except for the following fields:

- Fields that aren't part of the *project* where the view was created
- Long text fields such as Description, History, and other fields with an HTML data type
- Work item link count fields such as ExternalLinkCount, HyperLinkCount, AttachedFileCount,

RelatedLinkCount

- Specific REST API Fields, such as Watermark, IsDeleted
- Fields with *many-to-many* relationships, such as Team, Board Column, Board Name

ⓘ Importante

Identity or person-name fields, such as Created By, Assigned To, etc., are selectable fields, however you can't select these fields at this time as field criteria for the purposes of filtering work items.

For a description of each work item tracking fields, see [Work item field index](#).

Analytics data store fields

You can select the following Analytics-based fields in an Analytics view:

Field	Description
Cycle Time	Time for a work item to move from a state category of "In Progress" to "Completed"
Date (included automatically with history)	Supports viewing the daily, weekly, or monthly history of the filtered set of work items
Is Current (included automatically with history)	Supports filtering the data to view the most recent snapshot of the filtered set of work items by setting the value to <input type="checkbox"/> True
Lead Time	Time for a work item to move from a state category of "Proposed" to "Completed"
Parent Work Item Id	The Work Item Id for the parent of a work item
Project Name	Equivalent to the project field
Revision	A number that is assigned to the historical revision of a work item
Tags	Semicolon delimited list of Tags
WorkItemRevisionSK	The Analytics unique key for the work item revision, used to join related entities

For information about state categories, see [Workflow states and state categories](#). For more detailed information on the Analytics service data model, see [Data model for the Analytics service](#).

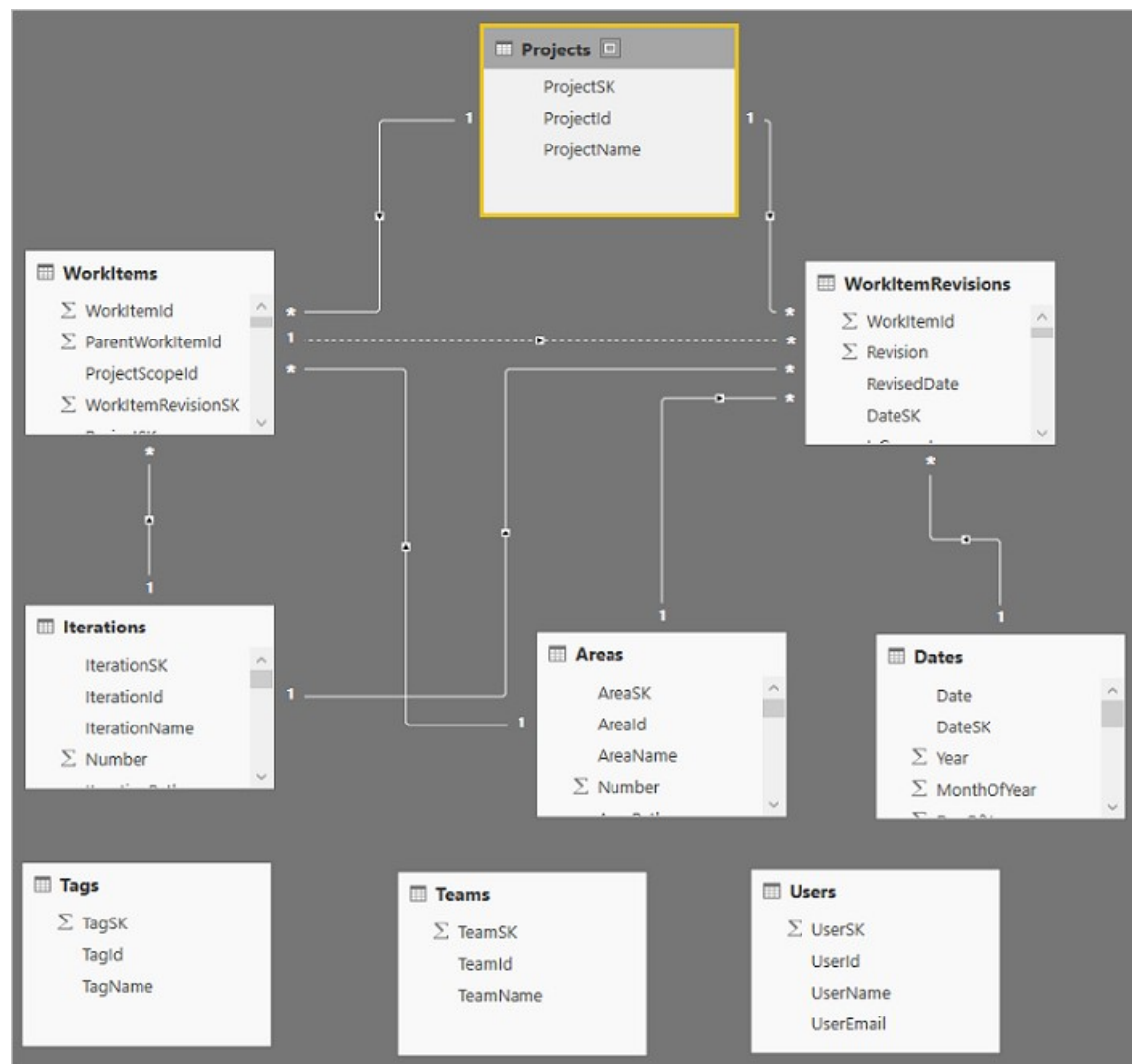
To access any additional fields available through the [Analytics service](#), include the corresponding Surrogate Keys(SK) or Work Item Id in the Analytics view and create the necessary mapping tables based on the Analytics Navigational Property.

- Iterations (IterationSK)
- Areas (AreaSK)
- Teams (AreaSK - generate mapping Table based on *Teams* Navigational Property)
- BoardLocations (AreaSK - generate mapping Table based on *BoardLocations* Navigational Property)
- Dates (DateSK)
- Process (AreaSK - generate mapping Table based on *Process* Navigational Property)
- WorkItemLinks (Work Item Id)

Data relationships

Understanding the [Analytics data model](#) is critical to building good relationships between entities.

By default, when basic data is returned from the Analytics service, the data is related as shown in the figure below:



You will note that **Tags**, **Teams**, and **Users** are not related to any of the other data. This is due to how those entities are related. They are related by either many-to-many relationships which are not easily handled in these models or there are multiple relationships between the entities such as between users and work items (they are related by Assigned To, Created By, Changed By, and others).

You can handle multiple relationships fairly simply. For example, in the default model you can edit the query, select the AssignedTo column of the WorkItems table and expand the column to include all of the data from the **Users** table and you can repeat this process for the Created By and Changed By columns as well. This gets you around having multiple links from one table to another which is not allowed.

Another reason for expanding columns in this way is to handle circular relationships which are also not allowed. For example, take the following path: Projects > Areas > Work Items > Projects. This presents a typical circular problem. What if you wanted to see which areas were part of a given project? The model as it is build has relationships between Areas and Work Items and Projects and Work Items but Projects cannot be related to Areas because that completes the circular relationship and so it is not allowed. To handle this, you could expand the Project column in the Areas table. To do that, take the following steps:

1. Select **Edit Queries** from the **Home** tab

2. Select the **Areas** query

3. Scroll to the **Project** column (the last column) and click the Expand icon at the top of the column

AreaLevel13	123	Level	Project
Area Level 14	13	Record	
null	1	Record	
null	10	Record	
null	6	Record	
null	7	Record	

4. Uncheck all of the columns except for the ProjectName and click OK

AreaLevel13

123

Level

Project

Search Columns to Expand

☒ (Select All Columns)

☐ ProjectSK

☐ ProjectId

☒ ProjectName

☐ Areas

☐ Iterations

☐ Teams

☐ Use original column name as prefix

OK

Cancel

Now you can list Areas by Project and get a count of Areas in each project.

Historical data modeling

The Analytics service models historical data as a **periodic snapshot fact table**. The fact table contains one row created at midnight for each work item at the end of each period. For example, history on a daily period is modeled as one row at midnight for each day, while a weekly period would be one row at midnight of the last day of the week. If the week has not completed, the snapshot value for the week is based on the current value.

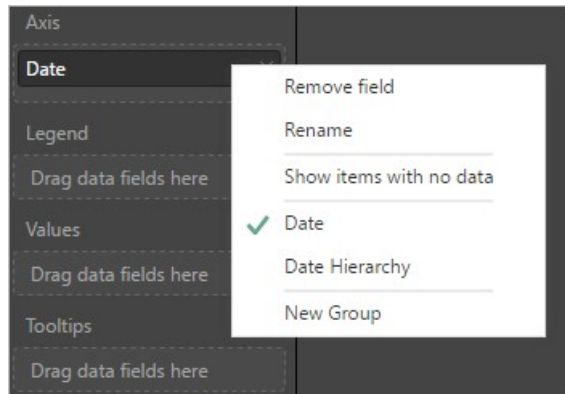
The grain of this table is the period, not the individual work item. This means that **a single Work Item will appear multiple times**, once for each historical period. Selecting the last 30 days of history will result in a single work item appearing 30 times in the data model. If the work item has not changed within the last 30 days, the most recent revision of the work item is replicated on each day.

When working with the Power BI Data Connector and historical data, we recommend using the **Date** field. **If the dataset contains historical data, but only the current values are needed, this can be setup by filtering Is Current**.

For example, if you want to show a table of work items and values for the associated fields you would use **Is Current** as a filter which is set to True. If you wanted instead to show a trend of work items based on state you would include the Date column on the Axis of the visualization.

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Always use the **Date** option when using the Date column. The Date field is not intended to support default hierarchies in Power BI.



Related articles

- [Data model for the Analytics service](#)
- [Power BI integration overview](#)
- [Work item field index](#)
- [Work item categories](#)
- [Backlogs, boards, and plans](#)
- [Connect with Power BI Data Connector](#)
- [Data Connector - Example reports](#)
- [Functions available in Power BI Data Connector](#)