

# OVERVIEW

## What is Power BI?

"It is Microsoft's Self-Service Business Intelligence tool for processing and analyzing data."

## Components

- › **Power BI Desktop**—Desktop application
  - › **Report**—Multi-page canvas visible to end users. It serves for the placement of visuals, buttons, images, slicers, etc.
  - › **Data**—Preview pane for data loaded into a model.
  - › **Model**—Editable scheme of relationships between tables in a model. Pages can be used in a model for easier navigation.
  - › **Power Query**—A tool for connecting, transforming, and combining data.  
*"Apart from the standard version, there is also a version for Report Server."*
- › **Power BI Service**—A cloud service enabling access to, and sharing and administration of, output data.
  - › **Workspace**—There are three types of workspaces: **Personal, Team, and Develop a template app**. They serve as storage and enable controlled access to output data.
  - › **Dashboard**—A space consisting of **tiles** in which visuals and report pages are stored.\*
    - › **Report**—A report of pages containing visuals.\*
    - › **Worksheet**—A published Excel worksheet. Can be used as a tile on a dashboard.
    - › **Dataset**—A published sequence for fetching and transforming data from **Power BI Desktop**.
    - › **Dataflow**—Online Power Query representing a special dataset outside of Power BI Desktop.\*
    - › **Application**—A single location combining one or more reports or dashboards.\*
    - › **Admin portal**—Administration portal that lets you configure capacities, permissions, and capabilities for individual users and workspaces.  
*"Can be created and edited in the Power BI Service environment."*
  - › **Data Gateway**—On-premises data gateway that lets you transport data from an internal network or a custom device to the **Power BI Service**.
  - › **Power BI Mobile**—Mobile app for viewing reports. Mobile view is applied, if it exists, otherwise the desktop view is used.
  - › **Report Server**—On-premises version of Power BI Service.
  - › **Report Builder**—A tool for creating page reports.

## Built-in and additional languages

### Built-in languages

- › **M/Query Language**—Lets you transform data in Power Query.
- › **DAX** (Data Analysis Expressions)—Lets you define custom calculated tables, columns, and measures in Power BI Desktop.  
*"Both languages are natively available in Power BI, which eliminates the need to install anything."*

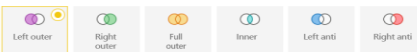
### Additional languages

- › **Python**—Lets you fetch data and create visuals. Requires installation of the Python language on your computer and enabling Python scripting.
- › **R**—Lets you fetch and transform data and create visuals. Requires installation of the R language on your computer and enabling R scripting.

## Power Query

Works with data fetched from data sources using connectors. This data is then processed at the Power BI app level and stored to an **in-memory** database in the program background. This means that data is not processed at the source level. The basic unit in Power Query is **query**, which means one sequence consisting of **steps**. A step is a data command that dictates what should happen to the data when it is loaded into Power BI. The basic definition of each step is based on its use:

- › **Connecting data**—Each query begins with a function that provides data for the subsequent steps. E.g., data can be loaded from **Excel, SQL database, SharePoint** etc. Connection steps can also be used later.
- › **Transforming data**—Steps that modify the structure of the data. These steps include features such as Pivot Column, converting columns to rows, grouping data, splitting columns, removing columns, etc. Transformation steps are necessary in order to clean data from not entirely clean data sources.
- › **Combining data**—Data split into multiple source files needs to be combined so that it can be analyzed in bulk. Functions include merging queries and appending queries.
- › **Merge queries**—This function merges queries based on the selected key. The primary query then contains a column which can be used to extract data from a secondary query. Supports typical join types:



- › **Append query**—Places the resulting data from one or more selected queries under the primary query. In this case, data is placed in columns with names that are an exact match. Non-matching columns form new columns with a unique name in the primary query.
- › **Custom function**—A query intended to apply a pre-defined sequence of steps so that the author does not need to create them repeatedly. The custom function can also accept input data (values, sheets, etc.) to be used in the sequence.
- › **Parameter**—Values independent of datasets. These values can then be used in queries. Values enable the quick editing of a model because they can be changed in the Power BI Service environment.

## Dataflow

The basic unit is a **table** or **Entity** consisting of columns or **Fields**. Just like Queries in Power Query, Entities in Dataflows consist of sequences of steps. The result of such steps is stored in native Azure Data Lake Gen 2.

*"You can connect a custom Data Lake where the data will be stored."*

There are three types of entities:

- › **Standard entity**—It only works with data fetched directly from a data source or with data from non-stored entities within the same dataflow.
- › **Computed entity\***—It uses data from another stored entity within the same dataflow.
- › **Linked entity\***—Uses data from an entity located in another dataflow. If data in the original entity is updated, the new data is directly passed to all linked entities.

*\*Can only be used in a dedicated Power BI Premium workspace.*

*"It supports custom functions as well as parameters."*

## DAX

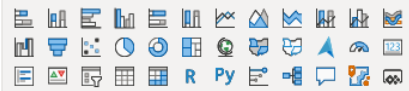
Language developed for data analysis. It enables the creation of the following objects using expressions:

- › **Measures**
  - › **Calculated Columns**
  - › **Calculated Tables**
- Each expression starts with the = sign, followed by links to tables/columns/functions/measures and operators. The following operators are supported:
- › **Arithmetic** { +, -, /, \*, ^ }
  - › **Comparison** { =, <, >, <=, >=, <> }
  - › **Text concatenation** { &, &&, ||, IN }
  - › **Precedence** { (, ) }

Operators and functions require that all values/columns used are of the same data type or of a type that can be freely converted; such as a date or a number.

## Visualization

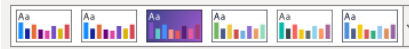
Visualizations or visuals let you present data in various graphical forms, from graphs to tables, maps, and values. Some visuals are linked to other services outside Power BI, such as Power Apps.



In addition to basic visuals, Power BI supports creating custom visuals. Custom visuals can be added using a file import or from a free Marketplace offering certified and non-certified visuals. Certification is optional, but it verifies whether, among other things, a visual accesses external services and resources.

## Themes

Serves as a single location for configuring all native graphical settings for visuals and pages.



By default, you can choose from 19 predefined themes. Custom themes can be added.

A custom theme can be applied in two different ways:

- › **Modification of an existing theme**—A native window that lets you modify a theme directly in the Power BI environment.
- › **Importing a JSON file**—Any file you create only defines the formatting that should change. Everything else remains the same. The advantage of this approach is that you can customize any single visual.

*"The resulting theme can be exported in the JSON format and used in any report without the need to create a theme from scratch."*

## Drill Down

The **Visual** that supports the embedding of hierarchies enables drilling down to the embedded hierarchy's individual levels using the following symbols:

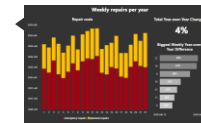
- ↑ Drill up to a higher-level hierarchy
- ↓ Drill down to a specific field
- ⇅ Drill down to the next level in the hierarchy
- ⌵ Expand next-level hierarchy

## Tooltip/Custom Tooltip

› **Tooltip**—A default detail preview pane which appears above a visual when you hover over its values.

Date: August 25, 2020  
Number of IDs: 5

› **Custom Tooltip**—A custom tooltip is a custom-designed report page identified as descriptive. When you hover over visual, a page appears with content filtered based on criteria specified by the value in the visual.



## Drill-through

**Drill-through** lets you pass from a data overview visual to a page with specific details. The target page is displayed with all the applied filters affecting the value from which the drill-through originated.

257,589	Display as a table	607
100,385	Include	12
16	Exclude	
134	Drill Through	Decomposition
358,125	Group	418
	Copy	940

## Bookmarks

**Bookmarks** capture the currently configured view or a report page visual. Later, you can go back to that state by selecting the saved bookmark. Setting options:

- › **Data**—Stores filters, applied sort order in visuals and slicers. By selecting the bookmark, you can re-apply the corresponding settings.
- › **Display**—Stores the state of the display for visuals and report elements (buttons, images, etc.). By selecting the bookmark, you can go back to the previously stored state of the display.
- › **Current page**—Stores the currently displayed page. By selecting the bookmark, you can go back to the stored page.

## License

### Per-user License

- › **Free**—Can be obtained for any Microsoft work or school email account. Intended for personal use. Users with this license can only use the personal workspace. They cannot share or consume shared content.  
*"If it is not available in Premium workspace"*

› **Pro**—It is associated with a work/school account priced at €8.40 per month or it is included in the E5 license. Intended for team collaboration. Let's users access team workspaces, consume shared content, and use apps.

› **Premium per User**—Includes all Power BI Pro license capabilities, and adds features such as paginated reports, AI, greater frequency for refresh rate, XMLA endpoint and other capabilities that are only available to Premium subscribers.

### Per-tenant License

› **Premium**—Premium is set up for individual workspaces. 0 to N workspaces can be used with a single version of this license. It provides dedicated server computing power based on license type: P1, P2, P3, P4\*, P5\*. It offers more space for datasets, extended metrics for individual workspaces, managed consumption of dedicated capacity, linking of Azure AI features with datasets, and access for users with **Free** licenses to shared content. Prices start at €4,212.30.  
*\*Only available upon special request. Intended for models larger than 100GB.*

- › **Embedded**—Supports embedding dashboards and reports in custom apps.
- › **Report Server**—Included in Premium or SQL Server Enterprise licenses.

## Administration

- › **Use metrics**—Usage metrics let you monitor Power BI usage for your organization.
- › **Users**—The Users tab provides a link to the Microsoft 365 admin center.
- › **Audit logs**—The Audit logs tab provides a link to the Security & Compliance center.
- › **Tenant settings**—Tenant settings enable fine-grained control over features made available to your organization. It controls which features will be enabled or disabled and for which users and groups.
- › **Capacity settings**—The Power BI Premium tab enables you to manage any Power BI Premium and Embedded capacities.
- › **Embed codes**—You can view the embed codes that are generated for your tenant to share reports publicly. You can also revoke or delete codes.
- › **Organization visuals**—You can control which type of Power BI visuals users can access across the organization.
- › **Azure connections**—You can control workspace-level storage permissions for Azure Data Lake Gen 2.
- › **Workspaces**—You can view the workspaces that exist in your tenant on the Workspaces tab.
- › **Custom branding**—You can customize the look of Power BI for your whole organization.
- › **Protection metrics**—The report shows how sensitivity labels help protect your content.
- › **Featured content**—You can manage all the content promoted in the Featured section.

## External Tools

They simplify the use of Power BI and extend the capabilities offered in Power BI. These tools are mostly developed by the community. Recommended external tools:

- › Tabular Editor
- › DAX studio
- › ALM Toolkit
- › VertiPaq Analyzer