PL-300: Power BI Data Analyst - Practice Exams

Resources:

Skillcerptro
https://skillcertpro.com/microsoft-power-bi-pl-300-practice-tests/

https://www.examtopics.com/exams/microsoft/pl-300/view/

Examprepper

Reddit - for latest news , resources , experiences

https://learn.microsoft.com/en-us/credentials/certifications/data-analyst-associate/?practice-assessment-type=certification#certification-prepare-for-the-exam

https://learn.microsoft.com/en-us/training/modules/get-started-data-science-fabric/3-explore-prepare-data

Improvement Areas:

Syllabus:

1.Prepare the data (25–30%)

Get or connect to data

- Identify and connect to data sources or a shared semantic model
- Change data source settings, including credentials and privacy levels
- Choose between DirectQuery and Import
- Create and modify parameters

Profile and clean the data

- Evaluate data, including data statistics and column properties

- Resolve inconsistencies, unexpected or null values, and data quality issues
- Resolve data import errors

Transform and load the data

- Select appropriate column data types
- Create and transform columns
- Group and aggregate rows
- Pivot, unpivot, and transpose data
- Convert semi-structured data to a table
- Create fact tables and dimension tables
- Identify when to use reference or duplicate queries and the resulting impact
- Merge and append queries
- Identify and create appropriate keys for relationships
- Configure data loading for queries

2. Model the data (25–30%)

Design and implement a data model

- Configure table and column properties
- Implement role-playing dimensions
- Define a relationship's cardinality and cross-filter direction
- Create a common date table
- Identify use cases for calculated columns and calculated tables

Create model calculations by using DAX

- Create single aggregation measures
- Use the CALCULATE function
- Implement time intelligence measures
- Use basic statistical functions
- Create semi-additive measures
- Create a measure by using quick measures
- Create calculated tables or columns
- Create calculation groups

Optimize model performance

- Improve performance by identifying and removing unnecessary rows and columns
- Identify poorly performing measures, relationships, and visuals by using Performance Analyzer and DAX query view
- Improve performance by reducing granularity

3. Visualize and analyze the data (25–30%)

Create reports

- Select an appropriate visual
- Format and configure visuals
- Apply and customize a theme
- Apply conditional formatting
- Apply slicing and filtering
- Configure the report page
- Choose when to use a paginated report
- Create visual calculations by using DAX

Enhance reports for usability and storytelling

- Configure bookmarks
- Create custom tooltips
- Edit and configure interactions between visuals
- Configure navigation for a report
- Apply sorting to visuals
- Configure sync slicers
- Group and layer visuals by using the Selection pane
- Configure drill through navigation
- Configure export settings
- Design reports for mobile devices
- Enable personalized visuals in a report
- Design and configure Power BI reports for accessibility
- Configure automatic page refresh

Identify patterns and trends

- Use the Analyze feature in Power BI
- Use grouping, binning, and clustering
- Use AI visuals
- Use reference lines, error bars, and forecasting
- Detect outliers and anomalies

4. Manage and secure Power BI (15–20%)

Create and manage workspaces and assets

- Create and configure a workspace
- Configure and update a workspace app
- Publish, import, or update items in a workspace
- Create dashboards
- Choose a distribution method
- Configure subscriptions and data alerts
- Promote or certify Power BI content
- Identify when a gateway is required
- Configure a semantic model scheduled refresh

Secure and govern Power BI items

- Assign workspace roles
- Configure item-level access
- Configure access to semantic models
- Implement row-level security roles
- Configure row-level security group membership
- Apply sensitivity labels

Power BI Desktop:

Power BI Connectivity Modes

1. Import Mode

- **Key Characteristics**
    - Data is imported into Power BI Desktop and stored in its in-memory engine (VertiPaq).
    - Provides **fast performance** since data is cached in memory.
    - Full access to DAX & **Power Query** for ETL transformations.
    - Allows combining multiple data sources.
    - Refresh required to sync with source database.
- **Advantages**
    - Best performance due to in-memory compression.
    - Rich modeling, transformations, and DAX support.
    - Can handle multiple data sources together.
    - Works offline once data is imported.
- **Limitations**
    - Dataset size is restricted (1 GB per dataset in free license, higher with Premium/Pro).
    - Refresh schedules required (not real-time).
    - Not suitable for extremely large datasets.
- **When to Use**
    - Small to medium datasets.
    - Reports that require heavy transformations and modeling.
    - Scenarios where **fast performance** is more important than real-time data.

2. Direct Query

- **Key Characteristics**
    - Data is **not imported**; queries run directly on the source database.
    - No caching in memory; results fetched at runtime.
    - Limited Power Query and limited transformations.
    - Report and Model view available, but modeling is restricted.
    - Relies on database performance (indexes, optimization).
- **Advantages**
    - Suitable for **large datasets** that cannot fit in memory.
    - Provides **near real-time** data.
    - No dataset size limit in Power BI.
- **Limitations**
    - Slower report performance (depends on database and network).
    - Limited transformations and calculated columns.
    - Heavy load on source system with many users/queries.
    - Requires gateway for on-premises data.
- **When to Use**
    - Very large datasets (billions of rows).
    - Need near real-time analytics.
    - Source database is optimized for query performance.

3. Live Connection

- **Key Characteristics**
  - Data remains in the source system (commonly **SSAS Tabular/Multidimensional models** or Azure Analysis Services).
  - No dataset is created in Power BI; it acts as a **visualization layer**.
  - No transformations, no Power Query.
  - Only **report-level measures** can be created in Power BI.
  - Cannot combine multiple data sources.
- **Advantages**
  - Quick development if models already exist.
  - Supports complex business logic prebuilt in SSAS cubes.
  - No data size limit.
- **Limitations**
  - No Power Query, no transformations.
  - Restricted modeling (depends on source model).
  - Cannot blend multiple sources.
  - Entirely dependent on SSAS model design.
- **When to Use**
  - Enterprise environments where SSAS cubes/models are already built.
  - Teams that want **centralized governance** and **standardized measures**.
  - Scenarios where IT controls the data model and Power BI is just a visualization layer.

Decision Factors

When choosing among **Import, Direct Query, and Live Connection**, consider:

1. **Data Source Type**
   - Excel, CSV → Import
   - Relational databases (SQL Server, Oracle, etc.) → Direct Query
   - SSAS / Azure Analysis Services → Live Connection
2. **Data Size**
   - Small to Medium → Import
   - Huge → Direct Query or Live Connection
3. **Performance**
   - Import → Best performance (in-memory)
   - Direct Query → Depends on database and queries
   - Live Connection → Depends on SSAS model performance
4. **Data Freshness**
   - Import → Data as per refresh schedule
   - Direct Query → Near real-time
   - Live Connection → Real-time from SSAS models
5. **Transformation Needs**
   - Heavy transformations → Import
   - Minimal transformations → Direct Query
   - Prebuilt models (no transformation) → Live Connection

Quick Recommendation Guide

- Use **Import Mode** for **most scenarios** unless data size or freshness forces another choice.
- Use **Direct Query** if dataset is very large and needs near real-time access.
- Use **Live Connection** if you already have enterprise SSAS/Azure Analysis Services models in place.
- Use **Composite Models** (mix of Import + Direct Query) for balancing performance and data freshness.

Microsoft Learn

Components of Analytics

Analytics is divided into the following categories:

1. **Descriptive**
   Understands what has happened using historical data.

2. **Diagnostic**
   Understands why something happened.

3. **Predictive**
   Predicts what is likely to happen in the future.

4. **Prescriptive**
   Recommends actions to influence future outcomes.

5. **Inferential**
   Draws conclusions about the larger population based on sample data.

Building Blocks of Power BI

1. **Data sets**
   The collection of data that is used to create visuals and reports.

2. **Visuals**
   Graphical representation of data (charts, graphs, KPIs, etc).

3. **Dashboard**
   A single page that holds multiple visuals to monitor metrics at a glance.

4. **Tile**
   A single visual on a dashboard.

5. **Reports**
   A collection of visuals across one or more pages built on the same dataset.

Power BI Tools

1. **Power Query**
   Used to connect and transform data.

2. **Power View**
   Used to visualize and interact with data.

3. **Power Pivot**
   Used to model data and create calculations.

4. **Power Maps**
   Used for geospatial 3D visualizations.

5. **Power Q&A**
   Used to ask questions about your data in natural language.

Flow of Power BI

1. Connect to data with Power BI Desktop.

2. Transform and model data with Power BI Desktop.

3. Create visualizations and reports with Power BI Desktop.

4. Publish report to Power BI service.

5. Distribute and manage reports in the Power BI service.

Semantic Model

A **semantic model** consists of all connected data, transformations, relationships, and calculations.

Dashboards

Dashboards consist of a **single page** made up of **tiles**.

Lineage View in Power BI

Power BI's **lineage view** provides a visual representation of the relationships between artifacts within a workspace, including:

- Data sources
- Dataflows
- Datasets
- Reports
- Dashboards

Drill-Down vs Drill-Through Reports

- **Drill-Down** focuses on accessing deeper levels of information **within the same report or visualization**.
- **Drill-Through** focuses on navigating to a **related report or view** with more detailed information.

Workspaces in Power BI

Workspaces are containers for dashboards, reports, datasets, and dataflows. There are two types:

1. **My Workspace**
   Personal space for individual use.
2. **Workspaces**
   Shared spaces for collaboration and publishing content.

What is an App in Power BI?

An **App** is a collection of dashboards and reports built to deliver key metrics to the Power BI consumers in your organization.

Power BI Reports

- A **Power BI report** is **one or more pages** of visualizations, such as line charts, maps, and other elements.

- Reports are interactive and built using datasets to explore and analyze data.

Report Viewing Modes

1. **Reading View**
   Used when a report is opened by a user. The visuals are interactive but cannot be edited.

2. **Editing View**
   Available to users with edit permissions. Allows modification of visuals, filters, layout, and design elements.

Power BI Dashboards

- A **dashboard** is a **single canvas** that contains **zero or more tiles and widgets**.

- Each **tile** is pinned from a report or Q&A and displays a **single visualization** created from a dataset.

- Dashboards are **not multi-page** like reports and are used for **monitoring key metrics at a glance**.

Microsoft Fabric

- **Fabric** is a **unified SaaS platform** where all data is stored in a **single open format** in **OneLake**.

- It provides a centralized platform to access, analyze, and govern data without having to switch tools or move data between systems.

OneLake (Fabric’s Storage Foundation)

- **OneLake** is the **centralized data storage architecture** in Microsoft Fabric.

- Purpose:
  Enables **collaboration** by eliminating the need to **move or copy** data across tools or environments.

- Functions as a **single logical data lake** across regions and clouds without actual duplication.

Key Features of OneLake

- **Built on**: Azure Data Lake Storage (ADLS)

- **Supports multiple formats**:

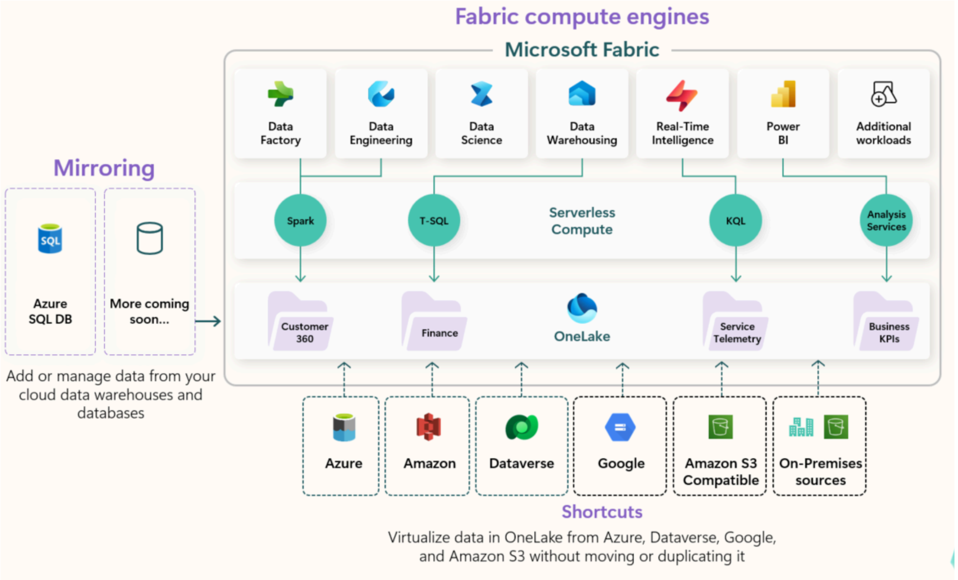
  - Delta

  - Parquet

  - CSV

  - JSON

- Acts as a **unified data fabric layer**, allowing users from different teams to access consistent data views from different tools.



Workspaces in Microsoft Fabric

- **Workspaces** are **collaborative environments** where you can create and manage items like:
  - **Lakehouses**
  - **Warehouses**
  - **Reports**
- They allow multiple users to **co-develop, publish, and maintain** data assets in one organized space.

Fabric Workloads

Fabric offers multiple specialized workloads that support different types of data activities:

1. **Data Engineering**
   Create **lakehouses** and **operationalize workflows** to build, transform, and share your entire data estate.

2. **Data Factory**
   Used to **ingest, transform, and orchestrate** data pipelines at scale.

3. **Data Science**
   Apply **machine learning** to:

   - Detect trends
   - Identify outliers
   - Predict values

4. **Data Warehouse**
   Combine data from **multiple sources** in a **traditional analytical warehouse** format.

5. **Databases**
   Tools to:

   - Create and manage databases
   - Insert, query, and extract data for both OLTP and analytical purposes.

6. **Industry Solutions**
   Access **out-of-the-box, domain-specific solutions** tailored for industries like finance, retail, healthcare, etc.

7. **Real-Time Intelligence**
   Designed to **process, monitor, and analyze streaming data** in real time for event-driven decision-making.

8. **Power BI**
   Use Power BI to **create reports and dashboards** that support **data-driven decisions** at every level.

1. SUM, SAMEPERIODLASTYEAR, TOTALYTD, USERRELATIONSHIP, CALCULATE: multiple formula questions

- **SUM**: Adds up all values in a column.
  Example: `SUM(Sales[Amount])` gives total sales amount.

SAMEPERIODLASTYEAR: Shifts a date column back by exactly one year to get last year’s same period.
Example:

```
Sales LY = CALCULATE(SUM(Sales[Amount]), SAMEPERIODLASTYEAR('Date'[Date]))
```

- Used for year-over-year comparisons.

TOTALYTD: Computes the year-to-date total up to a date in the year.
Example:

```
YTD Sales = TOTALYTD(SUM(Sales[Amount]), 'Date'[Date])
```

-

USERELATIONSHIP: Activates an inactive relationship in a CALCULATE context.
Example:

```
Sales by Ship Date = CALCULATE(SUM(Sales[Amount]), USERELATIONSHIP('Sales'[Ship Date], 'Date'[Date]))
```

-

CALCULATE: Changes filter context. Core DAX function to re-define what you want to sum, count, etc., with new filters.
Example:

```
Sales West = CALCULATE(SUM(Sales[Amount]), Region[Name] = "West")
```

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Key Tip: Remember CALCULATE is the only function that modifies filter context.

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2. Key Influencer visual: usage and questions from image

- It explains what drives a selected metric (like sales or churn).
- Automatically shows factors influencing a field.
- Used for “why” analysis: “What influences high sales?”
- You choose the metric to analyze and the explanatory variables.
- Power BI runs regression-like tests under the hood.

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3. Errors related to columns not present (two different errors while loading Excel in Power BI)

- **Error 1**: Column not found in source.
  Cause: Source file changed (column renamed or deleted).
  Solution: Go to Power Query, update or fix the step referencing the missing column.

- **Error 2**: Column not found in Applied Steps.
  Cause: A step earlier dropped or renamed the column but a later step still tries to use the old name.
  Solution: Check Applied Steps and correct or delete the problematic step.

Key concept: Power Query steps depend on sequence.

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4. Case scenarios (~6 questions all yes/no type)

Examples of typical Yes/No case questions:

- Can you use DirectQuery with all sources? **No**.
- Can a Power BI report have both Import and DirectQuery tables? **Yes**.
- Can you edit a certified dataset? **No**, only the owner or admin can.
- Does Personalization work in published apps? **Yes**, if enabled.

Key approach: Read scenario carefully, pick the technically accurate Yes or No.

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5. Personalization of visuals and dark mode theme

- **Personalization of visuals**: Lets end-users change visuals in reading view.
  Example: swap a bar chart for a table.
  Enabled in report settings.

- **Dark mode theme**: Available in Power BI Desktop UI, affects design experience but not published report appearance unless you design with a dark theme.

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6. Dataset endorsement: promoted versus certified

- **Promoted**: Anyone can promote. Signals it is recommended but not strictly governed.
- **Certified**: Requires admin-approved process. Means it is verified and trustworthy.

Exam answer: Certified is higher trust and restricted approval.

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7. DirectQuery, Import, Dual

- **Import**: Loads data into PBIX. Best performance. No live connection needed.
- **DirectQuery**: Queries source live on user interaction. Best for real-time, but slower.
- **Dual**: Acts as Import in some contexts, DirectQuery in others. Optimizes composite models.

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8. Visual images: “What visual is this?”

Typical question: Identify chart from image.

- Column chart: vertical bars.
- Line chart: connected dots.
- Combo chart: bars + line.
- Waterfall: incremental changes.
- Tree map: nested rectangles.
- Scatter: X-Y dot plot.

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9. Fabric workspace

Fabric is Microsoft’s unified SaaS for data engineering, data warehouse, and Power BI.

Fabric workspace: Place in Microsoft Fabric for storing all Fabric items (not just reports, but also pipelines, notebooks, warehouses).

Key difference: classic Power BI workspace has only Power BI artifacts.

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10. Visual or page background formatting, conditional formatting

- **Background formatting**: Change color/image of entire page or visual.
- **Conditional formatting**: Color scales, rules, or field values to format visuals based on data.
  Example: Color sales cells red if below target.

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11. Append and unpivot: two questions

- **Append**: Stacks tables vertically (same columns). Like UNION.

- **Unpivot**: Converts columns to rows.

Example:

Month	Sales_Jan	Sales_Feb

To

Month	MonthName	Sales
1	Jan	...

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12. Unpivot table example: steps drag-and-drop question

- Select columns to unpivot.
- Use “Unpivot Columns” in Power Query.
- Result is Attribute-Value pairs.

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13. Analytics lines: median, constant line

- **Median line**: Shows median value across axis.
- **Constant line**: Fixed value line you set.
  Example: Target sales = 50000.

Added in Analytics pane.

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14. RLS and USERPRINCIPALNAME

- **RLS** (Row-Level Security): Filters data per user.

USERPRINCIPALNAME(): DAX function returning logged-in user's email.
Example:

```
Salesperson Filter = Sales[Email] = USERPRINCIPALNAME()
```

- Used in RLS roles.

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15. Query folding, bookmarks, gateway

- **Query folding**: Pushing transformations back to source for efficiency. Stops when unsupported steps used.
- **Bookmarks**: Capture report state (filters, visuals) for easy navigation or storytelling.
- **Gateway**: Bridge for on-premises data to Power BI Service.

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16. Sharing reports with two different teams (based on Power BI Apps, not roles)

- Use **Power BI Apps** to distribute the same report in two versions with different permissions or audiences.
- Different from RLS, which filters data per user.

17. Power Query profiling: column distribution, profile, quality (3–4 questions)

- **Column distribution**: Histogram of unique values.
- **Column profile**: Stats like count, min, max, distinct.
- **Column quality**: % valid, error, empty.

Bottom Line (Plain and Honest)

- **Data Alerts** = Conditional triggers. *"Tell me when this number crosses X."*
- **Subscriptions** = Scheduled snapshots. *"Send me this report every day."*

Feature	Data Alert	Subscription
Purpose	Notify when a metric crosses a threshold	Send report/dashboard on a schedule
Trigger	Data value changes beyond limit	Fixed time schedule
Scope	Dashboard tiles (single value visuals only)	Full report page or dashboard
Recipients	Only you (unless automated with Power Automate)	Yourself and others (if permissions allow)
Email content	Simple alert message with tile link	Snapshot of report or dashboard
Setup location	Only on dashboards	Reports and dashboards

Visuals:

1. KPI Card

- Purpose: Single metric with target comparison. Shows current value vs target with indicator of status (e.g. up/down arrow, color).

- Use case: Business targets (sales quota, production target).

- Best practices: Keep it minimal. Use goals for clarity.

- Power BI: Supports goal formatting and conditional formatting.

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2. Card / Multi-Row Card

- Card: Single number, clean display.

- Multi-Row Card: Multiple measures in one visual (but no interactivity between them).

- Limitation: No categories (for multi-row card only measures).

- Best practices: Use sparingly for key highlights.

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3. Scatter Chart / Bubble Chart

- Purpose: Relationship between two numerical measures (scatter) with size encoding for third measure (bubble).

- Use case: Correlation analysis (e.g. Sales vs Profit), market sizing.

- Features: Play Axis can animate over time.

- Best practices: Avoid too many bubbles; use tooltips wisely.

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4. Gauge Chart

- Purpose: Shows progress toward target with needle or filled arc.
- Use case: Performance vs goal (KPIs).
- Limitation: Limited to one measure.
- Best practices: Do not overuse. Works best for executive dashboards.

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5. Decomposition Tree

- Purpose: Drill-down visual with dynamic, hierarchical splits.
- Use case: Root cause analysis (e.g. sales by region then by product).
- Features: AI splits suggest best next split.
- Limitations:
    - No AI splits for Azure Analysis Services or Power BI Report Server.
    - Publish to web not supported.
    - Complex measures and extension schemas not supported in Analyze.
    - Q&A support limited.

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6. Tree Map

- Purpose: Hierarchical data visualization using nested rectangles.
- Use case: Sales by category and subcategory.
- Best practices: Use for part-to-whole comparisons in hierarchy.

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7. Pie Chart

- Purpose: Parts of a whole.
- Use case: Market share.
- Best practices: Max 3-5 slices; avoid when many categories.

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8. Smart Narrative

- Purpose: AI-powered text summary of visuals and data.
- Use case: Dynamic report explanations.
- Limitations:
  - Publish to web unsupported.
  - Power BI Report Server unsupported.
  - Azure Analysis Services unsupported.
  - Maps with non-aggregated lat/lon unsupported.
  - Multi-row card with >3 categorical fields unsupported.
  - Cards with non-numeric measures unsupported.
  - Calculation groups unsupported.
- Best practices: Use for storytelling.

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9. Chiclet Slicer

- Purpose: Custom image-enabled slicer.
- Use case: Filter using icons or branded images.

- Limitation: Can't customize default slicer. Extra configuration needed.
- Best practices: Use when images aid recognition.

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10. Matrix Visual

- Purpose: Pivot-table like layout. Hierarchies in rows/columns.
- Features: Drill-down, stepped layout, conditional formatting.
- Use case: Sales by region and product.
- Best practices: Avoid clutter; test drill-downs.

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11. Line Chart

- Purpose: Track change over time.
- Use case: Time series trends.
- Features: Forecasting, analytics lines.
- Best practices: Time on x-axis; avoid multiple scales.

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12. Tree Visual with Parent-Child

- Purpose: Visualize parent-child hierarchies.
- Use case: Organizational charts.
- Features: Requires DAX PATH function to define hierarchy.

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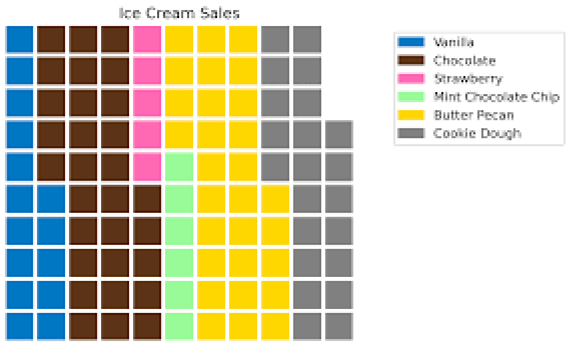
13. Waffle Chart

- Purpose: Grid of 100 squares showing % of whole.
- Use case: Simple proportion visual.
- Best practices: Avoid if % precision needed.

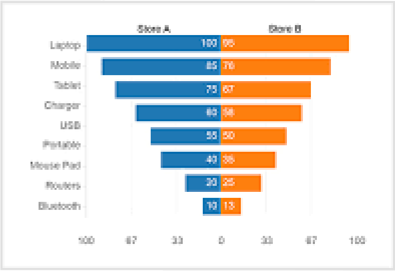


14. Infographic Designer

- Purpose: Custom designed infographics in Power BI.
- Use case: Marketing dashboards.
- Best practices: Use sparingly to avoid performance issues.

15. Tornado Chart

- Purpose: Sensitivity analysis. Compares positive and negative contributions.
- Use case: Cost drivers analysis.
- Best practices: Sorted by impact.



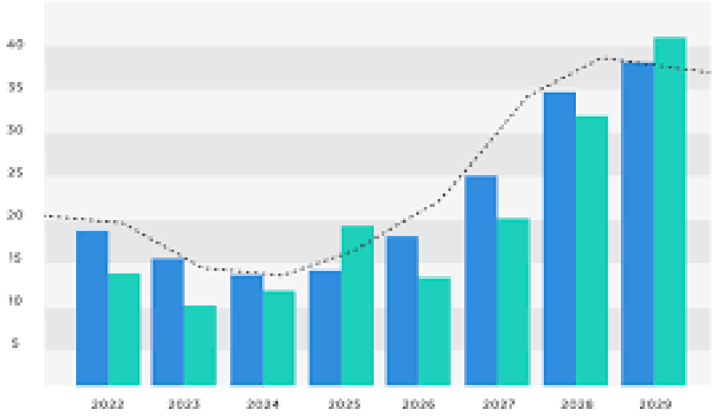
How to Create a Tornado Chart in Excel? A Complete Guide

16. Play Axis

- Purpose: Animate visuals over time without user clicking.
- Use case: Showing change over time in scatter/bubble/map.
- Best practices: Ensure clarity in animation speed.

17. Combo Charts

- Purpose: Line and column charts together.
- Use case: Compare actual vs target.
- Features: Secondary y-axis support.
- Best practices: Clearly label axes.



18. Table Visual

- Purpose: Detailed, flat data display.
- Use case: Transaction lists.
- Features: Conditional formatting, icons.

- Best practices: Use paginated reports for large tables.

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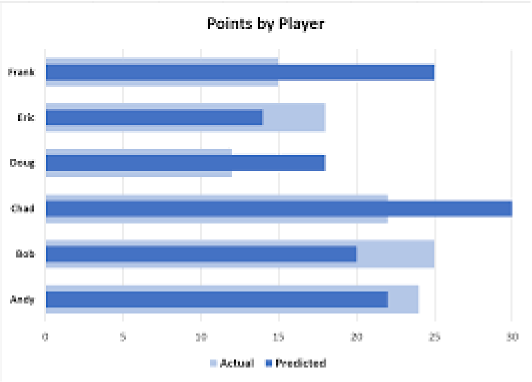
19 .Bar Charts with Overlap

- Purpose: Overlapping bars to compare series directly.
- Use case: Actual vs target in same category.
- Best practices: Avoid confusion with stacked or clustered.



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20. Text Slicers

- Purpose: Filter data using text values.
- Best practices: Keep list short and clear.

21.Pareto Chart

- Purpose: 80/20 analysis.
- Use case: Cumulative contribution.
- Features: Combines columns with cumulative line.

- Best practices: Used for prioritization.

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22. Clustered Column and Bar Chart

- Purpose: Compare values across categories.
- Use case: Sales by region, cost by department.
- Best practices: Clear axis labels, avoid too many categories.

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23. Stacked Column and Bar Chart

- Purpose: Show part-to-whole across categories.
- Use case: Sales by product and region.
- Best practices: Limit stack count to 3-4 for readability.

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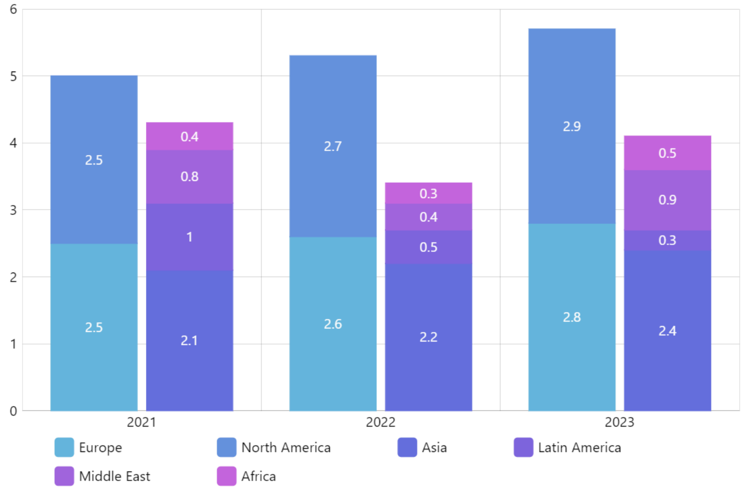
24. 100% Stacked Column and Bar Chart

- Purpose: Normalize parts-to-whole comparison across categories.
- Use case: Market share by product.

- Best practices: Ensure audience understands % scale.



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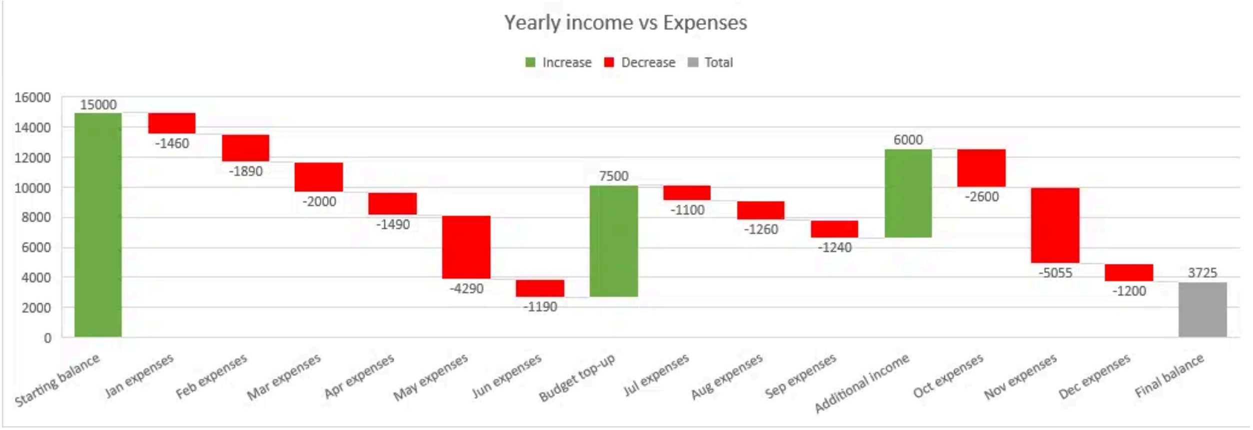
25. Waterfall Chart

- Purpose: Show incremental changes leading to final value.
- Use case: Profit bridge (revenue to net profit), cost analysis.
- Features: Subtotals, increase/decrease colors.
- Best practices: Use for storytelling of change over time or components.



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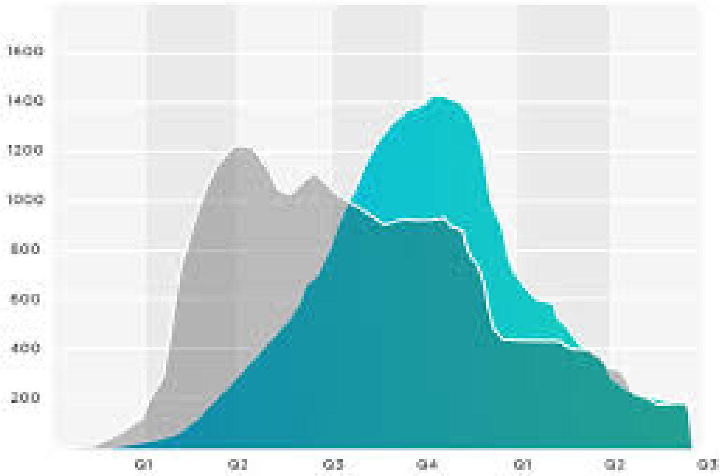
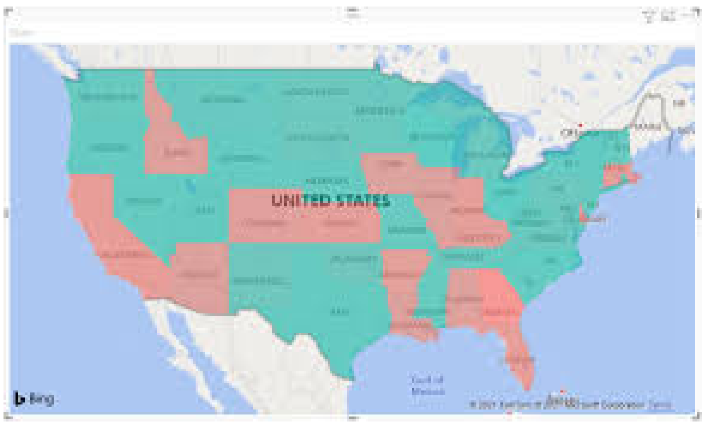
26. Area Chart

- Purpose: Like line chart but filled, emphasizing volume.
- Use case: Cumulative sales over time.
- Best practices: Avoid using with multiple categories as it can get cluttered.



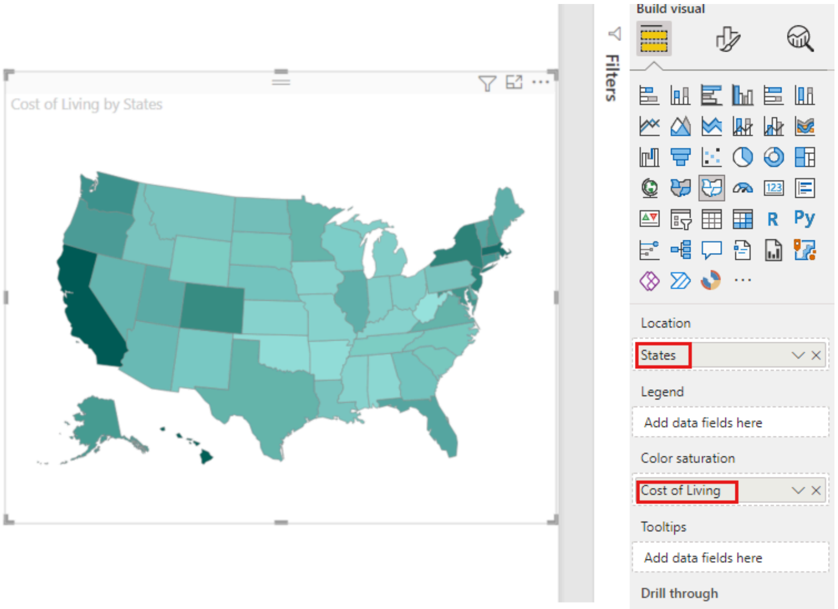
27. Filled Map

- Purpose: Choropleth-style mapping with shading.
- Use case: Sales by country.
- Limitations: Geocoding accuracy can vary.
- Best practices: Use for well-defined geographic regions.



28. Shape Map

- Purpose: Custom map shapes (state/province level detail).
- Features: Supports TopoJSON for custom maps.
- Limitation: Preview feature in some tenants.



Location
States

Legend
Add data fields here

Color saturation
Cost of Living

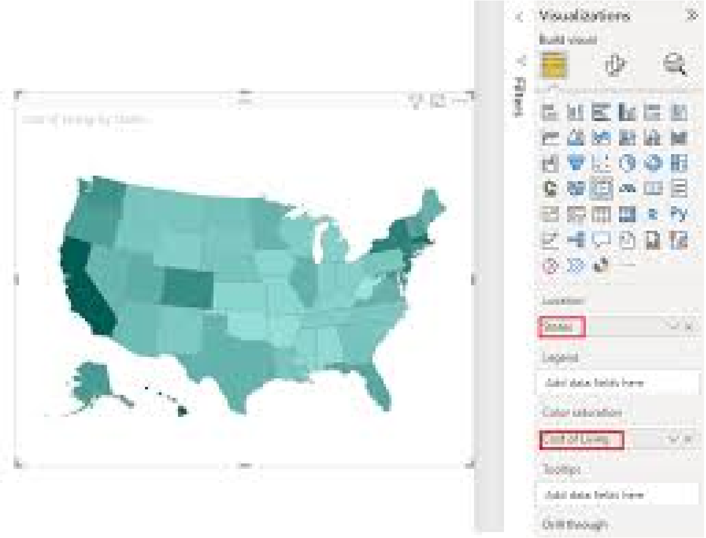
Tooltips
Add data fields here

Drill through

29. Map Visual

- Purpose: Plots data points using latitude/longitude.
- Use case: Store locations, event locations.
- Limitation: Non-aggregated lat/lon with Smart Narrative unsupported.

- Best practices: Aggregate data to reduce point clutter.



Location: State

Legend: Add data fields here

Color saturation: Cost of Living

Tooltips: Add data fields here

---

30. Slicer (General)

- Purpose: Filter other visuals on the page.
- Types: Dropdown, list, date, numeric range, relative date.
- Features: Sync slicers across pages.
- Best practices: Use visual hierarchy of filters (report/page/visual level).

---

31. Image Visual

- Purpose: Display images in reports.
- Use case: Product photos.
- Limitation: Static; for dynamic images need URL or field.

---

32. Button/Bookmark

- Purpose: Create navigation and interactivity.
- Use case: Page navigation, show/hide visuals.
- Features: Action support (bookmark, web link).

---

33. Tooltip Pages

- Purpose: Custom pages that appear when hovering.
- Use case: Contextual details without cluttering main view.
- Best practices: Keep tooltips minimal and relevant.

---

34. Report Page Tooltip

- Purpose: Entire report page as tooltip.
- Use case: Drill-into detail for single data point.

---

35. Q&A Visual

- Purpose: Natural language querying.
- Features: Supports synonyms, phrasings, terms.
- Limitation: Complex measures may not parse well.
- Best practices: Define Q&A terms in dataset.

---

36. R and Python Visuals

- Purpose: Custom advanced analytics.
- Use case: Predictive modeling, specialized charts.
- Limitation: Requires R/Python installed, Service support may be limited.

---

37. Custom Visual Marketplace

- Purpose: Extend visuals beyond built-in options.
- Use case: KPI Ticker, Word Cloud, Sankey.
- Best practices: Validate performance impact.

---

38. KPI Visual

- Different from Card:
  - Purpose: Compare actual to target over time.
  - Use case: Progress toward goal with trend line.
  - Best practices: Ensure target values are present.

---

39. Funnel Chart

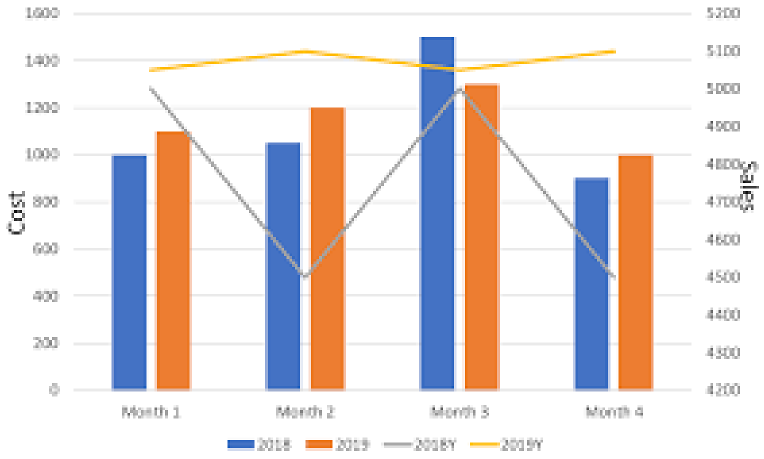
- Purpose: Show stages in a process.
- Use case: Sales funnel, recruitment stages.
- Best practices: Limited to categorical stage data.

40. Donut Chart

- Purpose: Variation of pie chart with center space.
- Use case: Part-to-whole with slight aesthetic difference.
- Best practices: Same as pie chart guidelines.

41. Multi-Axis Chart

- Purpose: Combo chart variant with two Y-axes.
- Use case: Sales vs Profit %.
- Best practices: Avoid confusing scales.



42. Forecasting and Analytics Lines

- Purpose: Add forecast, trend, min/max, average lines.
- Use case: Sales trend forecasting.

- Best practices: Clearly label lines.

---

43. Drillthrough Pages

- Purpose: Detailed page for single data point.
- Use case: Customer detail from customer summary.
- Best practices: Filter context clear to user.

---

44. Drill-down and Drill-up

- Purpose: Navigate data hierarchy.
- Use case: Year > Quarter > Month.
- Features: Enable hierarchy in visuals.
- Best practices: Explain navigation cues to users.

---

45. Conditional Formatting

- Purpose: Dynamically color visuals based on values.
- Use case: Heat maps in tables, bar color by performance.
- Features: Supports color scale, rules, field values.

---

46. Synced Slicers

- Purpose: Consistent filter across pages.
- Use case: User selects region once, all pages update.
- Features: Can control sync per page.

---

47. Page Navigation

- Purpose: User clicks button to go to another page.
- Use case: Multi-page reports with clear flow.

---

48. Bookmarks

- Purpose: Save report view state.
- Use case: Toggle between views, create presentations.
- Features: Can capture filters, slicers, visual states.

---

49. Selection Pane

- Purpose: Manage visibility of visuals.
- Use case: Show/hide for interactivity.
- Best practices: Name visuals clearly.

---

50. Performance Analyzer

- Purpose: Diagnose slow visuals.
- Use case: Optimize report performance.

DAX in Power BI

DAX (Data Analysis Expressions) is the formula language used in Power BI for data analysis and calculations. It allows users to create new information from existing data in their data models by defining calculations, logic, and enhancing data analysis within reports

Calculated Column vs Calculated Measure

Aspect	Calculated Column	Measure
Definition	Creates a new column in the table itself.	Defines a formula that returns a single value.
Storage	Stored in model, consumes memory.	Not stored, calculated on the fly.
Calculation Context	Row context. Evaluated per row in table.	Filter context. Evaluated based on filters in report.
Use Case	Pre-calculated values needed for each row.	Aggregated summaries (sums, averages, ratios).
Example	Profit = Sales - Cost (per row).	Total Profit = SUM(Sales - Cost).
Performance Impact	Increases model size.	Lighter on storage.
Visualization	Used as any column in visuals or slicers.	Used as values in visuals (cards, charts).
Relationships	Can be used in relationships.	Cannot create relationships.
Row-level Security	Can be used in RLS rules.	Typically not used directly in RLS.
Dependency	Static after refresh.	Dynamic with filters, slicers, visuals.

Analytical Capability	Limited logic (row-level only).	Rich DAX functions (time intelligence, filters).

What is Row Context and Filter Context in Power BI DAX ?

Row Context (What It Is)

Row context means **Power BI evaluates a formula *one row at a time***.

When you create a **calculated column** or use certain iterator functions (like SUMX, FILTER), DAX knows which row it is on.

Think of it as **looping over the table**. Each iteration has *row context*

Filter Context (What It Is)

Filter context means **the filters applied to calculate a value**.

When you use a **measure** in a visual, Power BI considers:

- Report/page/visual level filters
- Slicers
- Cross-filtering
- Row-level security

It evaluates the measure *with all these filters in place*.

Key Difference

- **Row Context**: Which row am I on? Used in calculated columns, iterators.
- **Filter Context**: Which filters are active? Used in measures

CALCULATE: Evaluates an expression modified by filters

What is Sum and SumX ?

SUM
Definition:

Adds up a single column of numbers.

SUMX
Definition:
An iterator function. It goes row by row through a table and evaluates an expression for each row, then sums those results

MTD QTD YTD

Purpose

Business users want to see:

- Sales so far this month (MTD).
- Sales so far this quarter (QTD).
- Sales so far this year (YTD).

TOTALYTD

Purpose: Calculate cumulative value from start of year to selected date.

Syntax:

```
TOTALYTD(<expression>, <dates>, [<filter>], [<year_end_date>])
```

TOTALQTD

Purpose: Cumulative value from start of quarter to selected date.

Syntax:

```
TOTALQTD(<expression>, <dates>, [<filter>])
```

TOTALMTD

Purpose: Cumulative value from start of month to selected date.

Syntax:

```
TOTALMTD(<expression>, <dates>, [<filter>])
```

Optional Filters

You can add filters inside these functions to refine calculation.

Example with filter:

```
Sales YTD = TOTALYTD(SUM(Sales[Amount]), Dates[Date], Sales[Channel] =
"Online")
```

Non-Calendar Year End

You can specify year-end date.

```
Sales YTD = TOTALYTD(SUM(Sales[Amount]), Dates[Date], , "06-30")
```

This treats fiscal year ending June 30.

SamePeriodLastyear

SAMEPERIODLASTYEAR shifts the filter context back by exactly one year for the same period.

It returns a table of dates from the same period in the previous year.

You use it to compare current period data to last year's equivalent period

PARALLELPERIOD:

PARALLELPERIOD shifts the dates in your filter context by a specified number of periods (months, quarters, years).

- It is absolute shifting.
- It does not care about the current period's granularity (e.g. month or day).
- It just moves the dates back or forward in fixed blocks

Basic Syntax

```
PARALLELPERIOD(<dates>, <number_of_intervals>, <interval>)
```

Arguments:

- `<dates>`: Column with dates (from your Date table).
- `<number_of_intervals>`: Positive or negative number of periods to shift.
- `<interval>`: The unit to shift by (MONTH, QUARTER, YEAR).

1. PARALLELPERIOD

What it does
Returns a table shifted by a specified number of periods at a specific granularity.

Typical use-case
You want *offset comparisons* that aren't locked to "one year," or you want to change the offset easily.

Example

- Compare sales this month to three months ago.
- Compare revenue this quarter to last quarter.
- Compare this year to two years back.

Formula example

```
Sales Last Quarter = CALCULATE([Total Sales],
PARALLELPERIOD('Date'[Date], -1, QUARTER))
```

When to choose it

- You need to shift by N periods of a given granularity (MONTH, QUARTER, YEAR).
- You want more control over the offset.

Bottom line
Use PARALLELPERIOD when you want a fixed-period shift at a specified granularity, such as "last 2 quarters" or "next year." It is predictable but *rigid to the chosen period level*.

---

2. DATEADD

What it does
Returns a table shifted by N intervals, respecting your current filter context, but is the most flexible in irregular date filtering scenarios.

Typical use-case
You want rolling or moving period comparisons, and you need *fine-grained flexibility*.

Example

- Compare this month's sales to the prior month even if your visual has a non-standard filter (e.g., custom date range).
- Calculate rolling-12-month sales.
  Handle situations with incomplete months or broken calendars.

Formula example

```
Sales Previous Month = CALCULATE([Total Sales], DATEADD('Date'[Date],
-1, MONTH))
```

When to choose it

- You need flexibility across any date table filtering.
- Your date table has gaps or non-contiguous dates.
- You want to use rolling windows or handle dynamic selections.

Custom date ranges picked by the user
Imagine someone wants to see sales from *March 5 to April 12*.
That is not "March" or "April" as a whole.
It is just the weird range they care about

What are filters in Power BI?

1. Filters apply conditions to display only essential data in rows and columns.
2. Manual filters
3. Auto filters
4. Include/Exclude filters
5. Drill-down filters
6. Cross Drill filters
7. Drill through filters

Do you have access to a premium Power BI Account?

Pro Account

1. Supports Small or Medium datasets (up to 1GB per dataset).
2. Sharing reports and dashboards with other Pro users.
3. Exporting data to PowerPoint, Excel, or PDF.
4. Creating app workspaces for collaboration.
5. Allows up to 8 scheduled refreshes per day.
6. Small to medium-sized organizations needing essential BI features.

Premium Account

1. Supports large datasets (up to 400 GB per dataset).
2. Enables Paginated Reports for pixel-perfect formatting.
3. Offers AI Insights for automated data analysis using machine learning models.
4. Provides higher processing power and dedicated capacity in the cloud.
5. Supports Unlimited Sharing: Share content with users who do not have Pro licenses.
6. Allows up to 48 scheduled refreshes per day

Top Strategies to Optimize Power BI File Performance?

1. Use measure instead Calculated Column.
2. Import only those tables which are needed from the database.
3. Use Import Mode rather than Direct Query Mode.
4. Use of Reference rather than Duplicate.
5. Use Light Custom Visuals, also check with Performance Analyzer Option.
6. Use of Switch DAX, Field Parameters to consume less space.
7. Less use of slicers is a must.
8. Disable Date Hierarchy Keys.
9. Will not connect 2 Fact Table and avoid many to many relationships.
10. Will avoid Quick Measures.
11. Try to avoid use of "Text" data type of columns.
12. Disable auto date and time.
13. Use of Bookmarks and Buttons.
14. Use of Star schema as 1st preference, 2nd preference as Snowflake schema. Don't use Galaxy schema.
15. Avoid too many visuals per page.

What are some ways to optimize an SQL query for better performance?

1. • Use Indexes: Add indexes to frequently searched or joined columns.
2. • **Avoid SELECT ***: Only retrieve the columns you need.
3. • Optimize Joins: Use the correct join type and ensure join columns are indexed.
4. • Write Simple Queries: Avoid complex subqueries; use joins or Common Table Expressions (CTEs).
5. • Filter Efficiently: Use indexed columns in WHERE, avoid functions on them, and replace multiple OR with IN or BETWEEN.

6. • Limit Data: Use LIMIT or TOP to fetch only necessary rows.

Good Practices in Power BI?

1. • Data modelling: Use star schema, avoid direct queries if possible.
2. • Naming conventions: Use meaningful names for tables, columns and measures.
3. • Reduce dataset size: Remove unnecessary columns and rows.
4. • Use measure instead of calc columns for better performance.
5. • Use variables in DAX: to enhance readability and performance.

🔐 What Are Sensitivity Labels in Power BI?

Sensitivity labels classify and protect Power BI content using Microsoft Purview Information Protection. These labels help prevent unauthorized sharing, exporting, or misuse of sensitive business data.

📂 Types of Sensitivity Labels

These are **organization-defined** via Microsoft Purview and typically include labels like:

Label Type	Purpose
Public	For data that can be freely shared with no restrictions.
General/Internal	Default classification for internal use, minimal restrictions.
Confidential	For data that should be limited to specific teams or functions.
Highly Confidential	Most restricted; typically used for financials, PII, or strategic assets.

> Labels can have protection policies attached such as encryption, watermarking, and export restrictions.

🧾 Power BI Items Where Labels Can Be Applied

Sensitivity labels can be **manually applied** or **inherited** by the following items in **Power BI Service**:

Item	Description
Dataset	Protects core data model used in reports.
Report	Protects visuals and data content in the report.
Dashboard	Inherits label from linked reports/datasets.
Dataflow	Labels govern intermediate/staging data.
Paginated Report	Used for pixel-perfect formatted reports, can be labeled.
Excel Workbook	Uploaded Excel files with embedded data can carry labels.
Semantic Model	From migrated Azure Analysis Services models; labels apply here too.

🔄 Label Inheritance Logic

- Labels can **flow downstream** from dataset → report → dashboard
- If multiple upstream sources have different labels, **the most restrictive one wins**

❌ What Cannot Be Labeled?

- Individual visuals inside a report
- Entire Power BI Apps (you need to label internal components instead)

Fabric Endorsement:

What Is It?

Fabric's endorsement is a way to mark certain datasets, reports, or data items as "**trusted**" so people know which ones are reliable. The goal is to help users find high-quality, reliable data fast instead of digging through junk.

Types of Endorsement

1. Promoted

- Anyone with edit rights can tag an item as “Promoted.”
- Means “I made this, I think it’s good. Please use.”

2. Certified

- Only special reviewers chosen by admins can certify.
- Means “This meets company standards. You can trust it.”
- You can request certification, but you cannot self-certify.

3. Master Data

- For data considered the official source (like master customer list).
- Only assigned data stewards or admins can set this.
- Very limited, intended for core datasets only.

How Does It Show Up?

- Badges (Promoted, Certified, Master Data) are visible right next to item names in the interface.
- Endorsed items appear higher in search, lists, and catalog views.

❌ Visuals That Do Not Support Data Alerts:

1. **Tables**
2. **Matrices**
3. **Charts (bar, column, line, pie, scatter, etc.)**
4. **Maps**
5. **Decomposition tree**
6. **Any custom visuals**
7. **Any report visuals that have not been pinned as a tile to a dashboard**

DAX Notes: `PATH` and `PATHITEM`

✅ 1. What is `PATH()`?

Definition:
`PATH(<Child_ID>, <Parent_ID>)` returns a delimited text string showing the full lineage of a row from the top-level (root) node to the current node in a parent-child hierarchy.

Returns: A text string like `"1|5|12"`
Delimiter: Default is pipe `|`

✅ 2. What is `PATHITEM()`?

Definition:
`PATHITEM(<path>, <position>, [<type>])` extracts a specific node from a path string created using `PATH`.

- `<path>` is the string output from `PATH`
- `<position>` is 1-based index (starting from root)

- `<type>` (optional): 1 for number (default), 0 for text

Returns: A single node value at the given position

⚙️ When and Why to Use

Task	Function	Use Case Example
Construct full hierarchy chain	`PATH`	Category Level: Home > Furniture > Office Chairs
Extract specific level value	`PATHITEM`	Get just "Furniture" or "Office Chairs" from above

---

🔍 Real-World Example: Category Tree in eCommerce

Let’s assume you are working with a table like this:

CategoryID	CategoryName	ParentID
1	Home	NULL
2	Furniture	1
3	Office Chairs	2
4	Gaming Chairs	3

➢ Step 1: Create PATH column

DAX
CopyEdit

```
CategoryPath = PATH(CategoryID, ParentID)
```

This will return:

CategoryName	CategoryPath
Home	1
Furniture	1

Office Chairs	1
Gaming Chairs	1

➤ Step 2: Create helper columns using `PATHITEM`

To get 2nd level category from the path:

DAX
CopyEdit

```
Level2CategoryID = PATHITEM(CategoryPath, 2, 1)
```

To convert the ID into a readable name, create a related column:

DAX
CopyEdit

```
Level2CategoryName = LOOKUPVALUE(CategoryName, CategoryID,
PATHITEM(CategoryPath, 2, 1))
```

🧪 Debug Tip

To see max levels in hierarchy:

DAX
CopyEdit

```
MaxDepth = PATHLENGTH(CategoryPath)
```

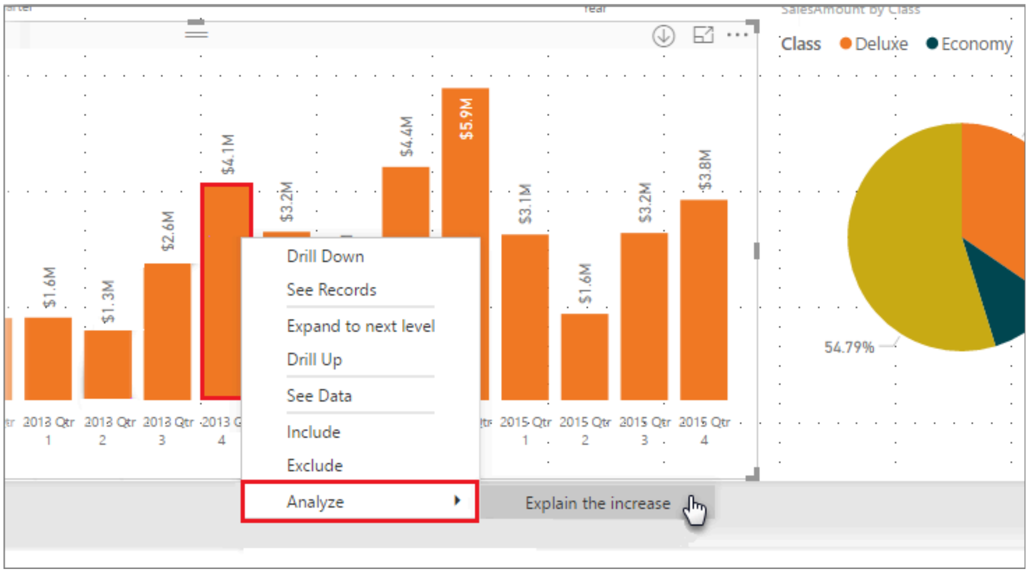
📌 Common Use Cases

Use Case	Function Used	Why it Helps
Org charts	PATH + PATHITEM	Track reporting structure
Category or taxonomy mapping	PATH + LOOKUP	Break down deep categories
Access control hierarchies	PATHCONTAINS	Check if a user belongs to a given node

Visualizing level-wise structure	PATHITEM	Slice path into levels for visuals

⚠️ Caveats

- `PATH()` only works on columns that are numeric and not GUID or string.
- `PATHITEM()` is 1-indexed, not 0-indexed.
- Missing ParentIDs (nulls) will break the path, so you must clean those before building hierarchies.



The following list is the collection of currently unsupported scenarios for explain the increase/decrease:

- TopN filters
- Include/exclude filters
- Measure filters
- Non-numeric measures
- Use of "Show value as"
- Filtered measures - filtered measures are visual level calculations with a specific filter applied (for example, Total Sales for France) and are used on some of the visuals created by the insights feature

- Categorical columns on X-axis unless it defines a sort by column that's scalar. If using a hierarchy, then every column in the active hierarchy has to match this condition
- RLS or OLS enabled data models

In addition, the following model types and data sources aren't currently supported for insights:

- DirectQuery
- Live connect
- On-premises Reporting Services
- Embedding

Remove Errors vs Replace Errors

1. Remove Errors

- **Definition**: Deletes rows where the selected column contains an error.
- **Effect**: The entire row is removed from the dataset.
- **Use case**: When error rows are irrelevant or unrecoverable.

Example:
Before:

javascript
CopyEdit

```
100
200
Error
150
Error
```

After Remove Errors:

CopyEdit

```
100
200
150
```

-
- **Risk**: Loss of potentially useful data.

---

2. Replace Errors

- **Definition**: Keeps the row but substitutes the error with a specified value.
- **Effect**: Error value is replaced; row remains in dataset.
- **Use case**: When the rest of the row has useful data, or you can provide a fallback value.

Example:
Before:

javascript
CopyEdit

```
100
200
Error
150
Error
```

After Replace Errors with 0:

```
100
200
0
150
0
```

- **Risk**: Introduces artificial values which may affect analysis if not handled carefully.

---

1. Featured

- **Meaning**: A report or dashboard that a user marks as "Featured" will show up as the default landing page when they log into the Power BI service.

- **Scope**: **Personal** — it applies only for the user who marks it, not for all workspace members.
- **Use case**: If you have a key dashboard you want to see first every time you log in, you mark it as featured.
- **Exam angle**: If the question says *"User wants a specific dashboard to be their default home page"*, the answer is **Featured**.

---

2. Certified

- **Meaning**: Certification is an **organizational-level endorsement** that the content is trustworthy and meets certain internal quality checks.
- **Configured by**: Power BI Admin (only admins can define what "certified" means and who can certify).
- **Scope**: Visible to all users, shows a **Certified badge** in the UI.
- **Use case**: Official company-wide datasets or dashboards that multiple teams rely on for business decisions.
- **Exam angle**: If a question mentions *"Company wants to mark a dataset as reliable for enterprise use"*, the answer is **Certified**.

---

3. Promoted

- **Meaning**: Promoted is a **self-service endorsement** done by dataset/report owners or creators to signal that the content is ready for wider use.
- **Configured by**: The workspace content owner — no admin approval required.
- **Scope**: Also visible to everyone with access, shows a **Promoted badge** in the UI.
- **Use case**: Department-level datasets or reports that are good quality but do not yet have enterprise certification.

- **Exam angle**: If the scenario says *"Creator wants to mark content as recommended but without admin approval"*, the answer is **Promoted**.

---

4. Data Classification

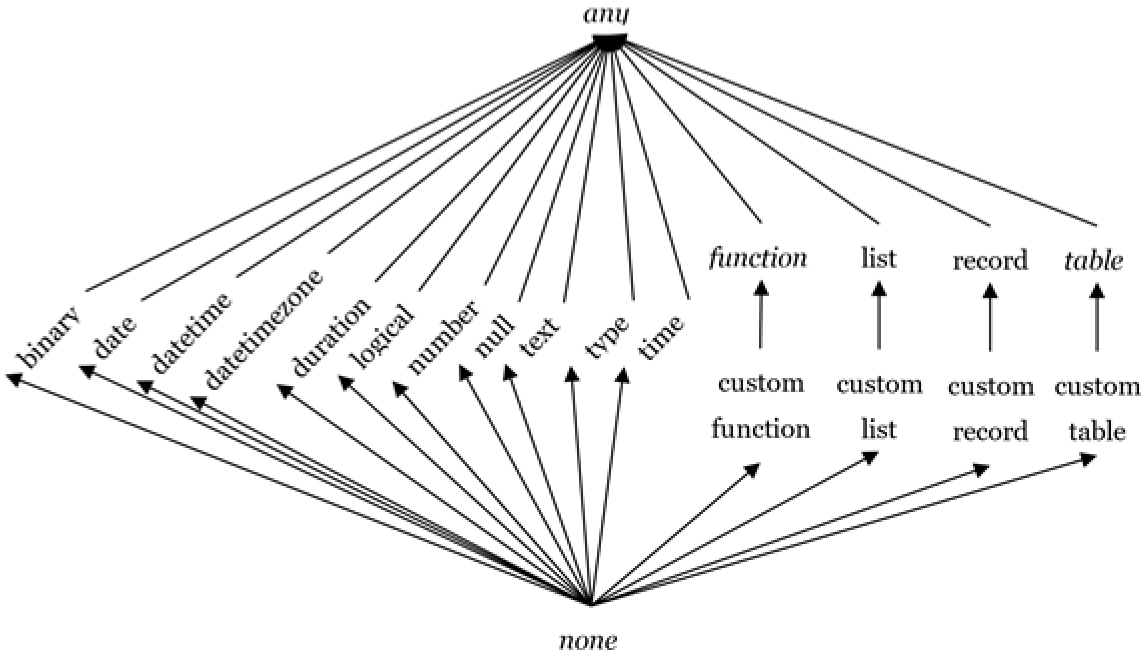
- **Meaning**: Labels applied to dashboards in the Power BI Service to indicate the **sensitivity level** of the data.
- **Configured by**: Power BI Admins set the classification categories (e.g., Confidential, Public, Highly Confidential).
- **Scope**: Visible to users on dashboards and helps guide proper data handling.
- **Use case**: A dashboard showing employee salaries may be marked as "Confidential".
- **Exam angle**: If the scenario says *"Company wants to label dashboards based on sensitivity"* — this is **Data Classification**.

Workspace Creation Permissions

- Even if users are in **WorkspaceCreator** security group in Azure AD,
  they cannot create new workspaces **unless** that group is explicitly added under:
  Admin Portal → Tenant Settings → Create the new workspaces.

Featured Reports in Power BI

- **Featured** marking makes a report appear on **Power BI Home page** for easy discovery.
- Useful for highlighting important or commonly used reports for the organization.



M Programming Language – Valid Types

In Power Query's M language, the following **type categories** exist:

1. **Record Types**
   - Classify **record values** based on field names and their value types.
   - Example: `{ Name = text, Age = number }`
2. **List Types**
   - Classify **lists** using a single base type for all items.
   - Example: `{1, 2, 3}` is `list of number`.
3. **Function Types**
   - Classify **functions** based on parameter types and return value type.
   - Example: `(text) => number`
4. **Table Types**

    - Classify **table values** by column names, column types, and keys.
    - Example: `table [Name = text, Age = number]`

5. **Nullable Types**
    - Classify `null` plus all values of a base type.
    - Example: `nullable number` allows numbers and null.
6. **Type Types**
    - Classify values that themselves are **types**.
    - Example: `type number` is a value of type `type`.

Power BI Bookmarks – What They Save

When you create a **bookmark** in Power BI, it stores the following **page state elements**:

1. **Current Page** – Which page is active.
2. **Filters** – All applied report-level, page-level, and visual-level filters.
3. **Slicers** – Including slicer type (dropdown, list) and current selection.
4. **Visual Selection State** – Such as cross-highlighting results.
5. **Sort Order** – Applied to visuals.
6. **Drill Location** – The current drill-down or drill-through level.
7. **Object Visibility** – Controlled via the Selection pane.
8. **Focus or Spotlight Mode** – For any active visual.

Bookmark Options in Power BI

When you click the ellipsis (`...`) next to a bookmark name, you can:

- **Update** – Save current report state (page, filters, visuals) to the existing bookmark.
- **Rename** – Change the bookmark’s name.
- **Delete** – Remove the bookmark.
- **Group** – Organize bookmarks into folders for navigation.
- **Data** – Save the current state of filters, slicers, and other data-related settings.
- **Display** – Save visibility and formatting of visuals.
- **Current page** – Save which page is active.
- **All visuals** – Save state for all visuals on the page.
- **Selected visuals** – Save state only for visuals currently selected when creating/updating the bookmark.

Lineage View in Power BI

Purpose:
The Lineage View provides a visual representation of the flow of data from its **source** through datasets, reports, and dashboards.

Key Benefits:

1. **Simplifies Troubleshooting**
   - Shows the complete path data takes from source to destination.
   - Helps identify pain points and bottlenecks.
2. **Impact Analysis and Workspace Management**
   - Enables tracking of dependencies between datasets, reports, and dashboards.

  - Helps understand the impact of changes in one dataset on other artifacts.

3. **Refresh Monitoring**
   - Quickly identifies reports and dashboards that have not been refreshed.
   - Saves time by avoiding manual checks.

Cardinality refers to the number of unique or distinct values in a column after duplicates are removed.

Using parameters
https://learn.microsoft.com/en-us/power-bi/create-reports/desktop-automatic-page-refresh#restrictions-on-refresh-intervals

Automatic page refresh in Power BI:
https://learn.microsoft.com/en-us/power-query/power-query-query-parameters

Refresh Types in Automatic Page Refresh

1. Fixed Interval

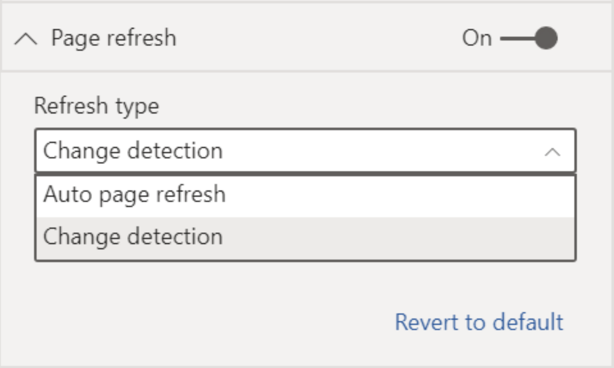
- Refreshes the page **at a constant time gap**.
- Example: Every **1 second**, **5 seconds**, or **5 minutes**.
- Suitable when data updates at a predictable frequency.
- Supported in both **Power BI Desktop** and **Power BI Service** (interval limits depend on capacity type).

---

2. Change Detection

- Refresh is triggered **only when a specific measure's value changes**, instead of a fixed time interval.
- Helps reduce unnecessary queries when data changes irregularly.

- **Supported only** in:
    - Workspaces on **Premium capacity**
- **Not supported** for:
    - LiveConnect sources such as **Analysis Services** and **Power BI semantic models**.



Page refresh On

Refresh type

Change detection

Auto page refresh

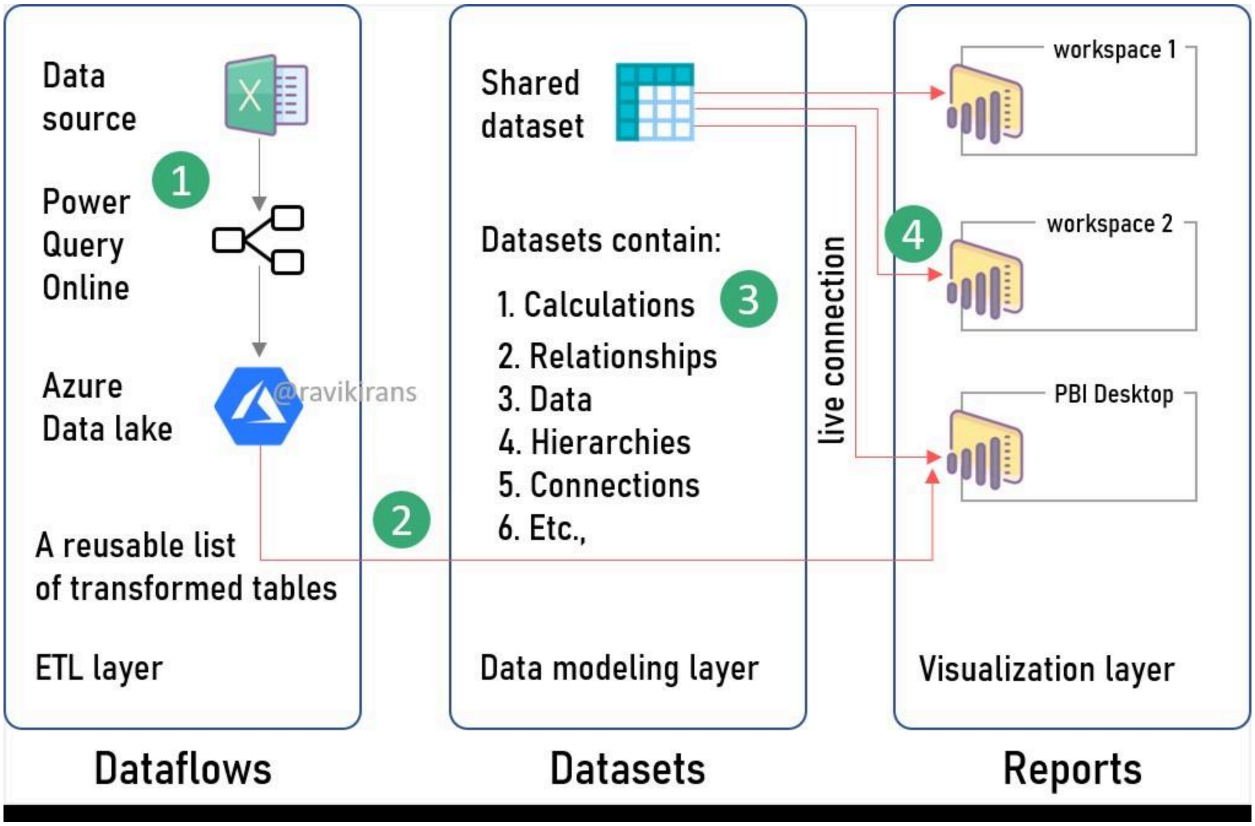
Change detection

Revert to default

Where to use parameters
A parameter can be used in many different ways, but more commonly used in two scenarios:

- **Step argument:** You can use a parameter as the argument of multiple transformations driven from the user interface (UI).
- **Custom function argument: Y**ou can create a new function from a query and reference parameters as the arguments of your custom function.

Datasets vs Dataflows:



1. What They Are

- **Shared Dataset**
  A dataset published to a Power BI workspace that can be used as the source for multiple reports. It already contains the data model, relationships, measures, and sometimes pre-aggregated data.
  Think of it as the "finished dish" ready to serve.

- **Dataflow**
  A set of tables created in Power BI service that uses Power Query to extract, transform, and load (ETL) data, stored in the Azure Data Lake storage (behind the scenes). It is raw or semi-transformed data, **without** a Power BI model.
  Think of it as the "prepared ingredients" ready to be cooked in various ways.

---

2. Key Differences in Use

Aspect	Shared Dataset	Dataflow
Stage in Pipeline	Final modeled dataset, ready for analysis	Raw or transformed tables, before modeling

Purpose	Share a complete semantic model with measures and relationships	Reuse cleaned and transformed data across datasets
Storage	Stored as part of the dataset in the workspace	Stored in Azure Data Lake (underlying Power BI service)
Who Benefits	Analysts building reports without redoing modeling	Data modelers and analysts who need reusable ETL steps
Refresh	Dataset refresh schedules	Dataflow refresh schedules (datasets still need refresh if connected)

3. When to Choose Each

Choose a Shared Dataset when

- You already have a well-built **data model** with measures, relationships, and KPIs and you want other reports to use it consistently without rework.
- You want to enforce **a single source of truth** for calculated logic like DAX measures (for example: Gross Margin %).
- Business teams just need **ready-to-analyze data** without worrying about ETL steps.
- Example: The Finance team builds a dataset with a “Net Profit Margin” measure. The Sales and Marketing teams use this dataset to create their own dashboards without recreating logic.

Choose a Dataflow when

- You want to **centralize and reuse ETL transformations** so multiple datasets can pull from the same cleaned data tables.
- You have multiple datasets that require the **same dimension or fact tables** (e.g., a “Date Table” or “Customer Master”).
- You need to connect **other tools or Power Platform components** to the cleaned data (Power Apps, Power Automate, etc.).
- You want to separate **data prep** from **data modeling**, so data engineers can handle transformations while analysts model and visualize.

- Example: You create a dataflow for "Product Master" that cleans product names and attributes. Multiple datasets (Sales Analysis, Inventory Tracking, Marketing Campaigns) use this dataflow so that any corrections update everywhere.

---

4. How They Can Work Together

In many mature setups:

- **Dataflow** = central place for raw data ingestion and cleaning.
- **Dataset** = connects to the dataflow, applies modeling, relationships, and DAX measures, and is then published as a **shared dataset** for reports.

TMDL view

- **TMDL** = Tabular Model Definition Language.
- It is a **human‑readable scripting language** for describing semantic model metadata (tables, columns, measures, relationships, hierarchies, partitions, perspectives, translations, etc.).
- Introduced in Power BI Desktop as a **Preview feature** to allow scripting and editing model objects as text.

---

2. Purpose

- To **create, modify, and manage** model objects through code instead of only using the graphical Model view.
- To **improve productivity** for complex models by enabling:
    - Bulk edits
    - Search and replace
    - Copy‑paste between models

- Version control integration

---

3. Key Benefits

Benefit	Description
Bulk editing	Rename multiple tables/columns/measures quickly
Access hidden properties	e.g. `IsAvailableInMDX`, `DetailRowsDefinition`
Advanced editing	Modify Power Query M scripts for partitions without opening Query Editor
Collaboration	Share scripts, integrate with Git or other VCS
Reusability	Copy objects to other models easily
Diagnostics	Error highlighting, autocomplete, semantic hints

---

4. How to Enable

1. Go to **File** → **Options and settings** → **Options** → **Preview features**.
2. Turn on **TMDL view**.
3. Restart Power BI Desktop.

---

5. How to Use

1. Open **TMDL View** from the left navigation bar.
2. Drag a model object (table, column, measure, relationship, calculation group) into the editor or right-click → **Script TMDL**.
3. Edit the script using TMDL syntax.
4. Use **Preview changes** to review a diff.

5. Click **Apply** to update the model metadata.

---

6. Syntax

- Uses `createOrReplace` for defining or updating objects.
- Supports `delete` for removing objects.
- Example (Measure):

```
createOrReplace measure Sales[Total Sales] {
    formatString: "$#,##0";
    expression: SUM(Sales[Amount]);
}
```

---

7. Supported Objects

- Tables, columns, measures, hierarchies, calculation groups
- Relationships, perspectives, partitions
- Power Query M expressions (via partition scripting)
- Model-level properties (some not in UI)

---

8. Limitations (Preview phase)

- Does not refresh data automatically when changing M queries (must refresh manually).
- Changes apply to **model definition only**.
- Not all UI features are scriptable yet.
- Advanced users only—misuse can break model metadata.

REMOVEFILTERS: Wipes away existing filters (start fresh).

KEEPFILTERS: Adds more filters without erasing the existing ones

---

🔁 DUPLICATE QUERY

Creates a **completely independent copy** of a query.

✅ Use When:

- You want to **experiment or make changes** to a query without affecting the original one.
- You need a **starting point** and will **diverge** the logic.
- You want to **isolate transformations**

🔗 REFERENCE QUERY

Creates a **linked query** that **depends on the original**.

✅ Use When:

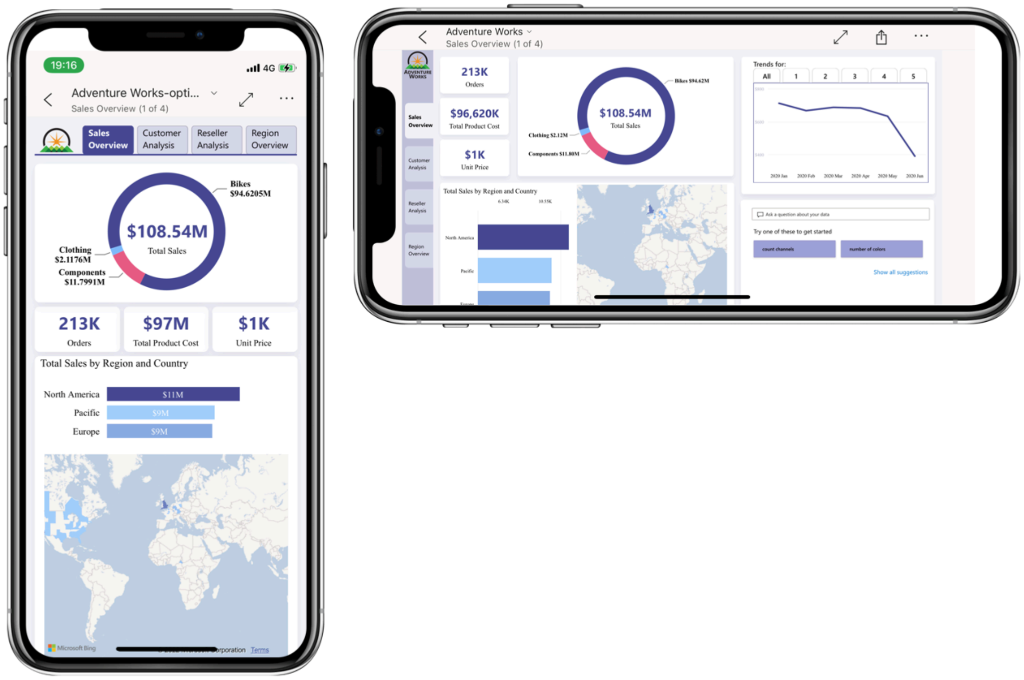
- You want to **reuse** a base query's transformations.
- You need to build **multiple layered transformations**.
- You want to **split logic** into multiple steps for clarity.
- You want to **optimize performance** by keeping heavy transformations in one base query.

Power BI Mobile:

- iPhones
- iPads
- Android phones
- Android tablets

Organizations can use **Microsoft Intune** to manage devices and applications, including Power BI mobile apps for Android and iOS.

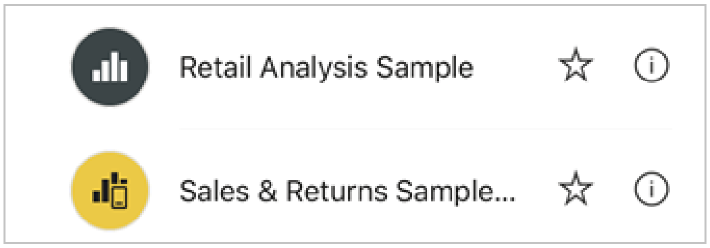
About mobile-optimized Power BI reports



Mobile-optimized view

Regular, non-optimized view

In the Power BI mobile app, reports that have mobile-optimized pages are indicated with a special icon:



Non-optimized report

Optimized report

Retail Analysis Sample ☆ ⓘ

Sales & Returns Sample... ☆ ⓘ

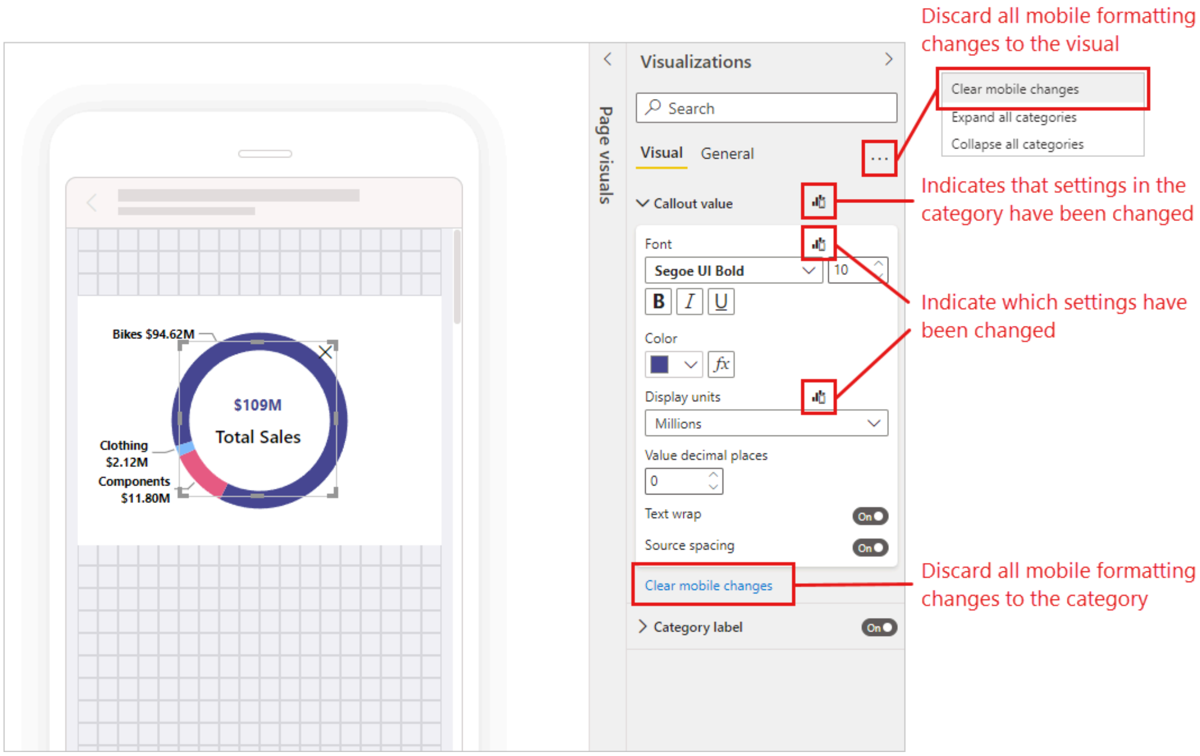
Considerations and limitations

- Tooltips are disabled on the mobile layout canvas; they're available when viewing in the mobile app, however.
- Metric visuals aren't interactive on the mobile layout canvas.
- Slicer selections made on the mobile layout canvas don't carry over when you switch to web layout. Also, when you switch back from web layout to mobile layout, any slicer selections will come from the web layout. Likewise, when the report is published, any slicer selections will be those that were defined in web layout, regardless of whether the report is being viewed in the regular desktop-view or a mobile-optimized view.

Mobile authoring features

Power BI provides several features to help you create mobile-optimized versions of your reports:

- A **mobile layout view** where you create mobile-optimized reports either automatically or by dragging and dropping visuals onto an interactive phone emulator canvas. The interactive canvas enables you to test out how buttons, slicers, and visuals will behave in your mobile-optimized report while you're designing it.
- An **auto-create mobile layout** option in the mobile layout view that automatically generates a mobile-optimized version of your report on the layout canvas. You can use the auto-generated layout as is or as a starting point for your edits.
- A **formatting pane** that enables you to precisely format your report visuals by changing their format settings.
- **Visuals and slicers** that can be optimized for use on small, mobile screens.



Discard all mobile formatting changes to the visual

Indicates that settings in the category have been changed

Indicate which settings have been changed

Discard all mobile formatting changes to the category

Font: Segoe UI Bold, 10

Display units: Millions

Value decimal places: 0

Text wrap: On

Source spacing: On

Category label: On

Data alerts on an iPhone or iPad

1. Tap a number or gauge tile in a dashboard to open it in focus mode.
2. Screenshot of a dashboard, showing the gauge tile in focus mode.
3. Tap the bell icon to add an alert.
4. Tap Add alert rule.
5. Screenshot of the alert rule, showing no alerts set.
6. Choose to receive alerts above or below a value, then set the value.
7. Screenshot of the alert settings, showing the alert title and value to set
8. Decide whether to receive hourly or daily alerts, and whether to also receive an email when you get the alert.
9. You can change the alert title, too.

10. Tap Save.
11. A single tile can have alerts for values both above and below thresholds. In Manage alerts, tap Add alert rule.
12. Screenshot of the Manage alert, showing a pointer to add an alert rule.

Note

- You don't receive alerts every hour or every day unless the data has actually refreshed in that time.
- Alerts only work on data that is refreshed. When data refreshes, Power BI looks to see if an alert is set for that data. If the data has reached an alert threshold, an alert is triggered.

Tips and troubleshooting

- Alerts currently aren't supported for Bing tiles or card tiles with date/time measures.
- Alerts only work with numeric data.
- Alerts only work on data that is refreshed. They don't work on static data.
- Alerts don't work with tiles that contain streaming data.
- To create a subscription for a Power BI report on your Android device, you'll need to use the Power BI service (the web-based platform) and then access it through the Power BI mobile app

Data alerts in the Power BI service

Set alerts to notify you when data in your dashboards changes beyond the limits you set.

- Alerts can be set on visuals created from streaming datasets that you pin from a report to a dashboard.
- Alerts can't be set on streaming tiles created directly on the dashboard by using Add tile > Custom streaming data.
- *Dashboard → Add tile → Custom streaming data → select your streaming dataset, you cannot set alerts on it.*
- Only you can see the alerts you set, even if you share your dashboard.
- Similarly, the dashboard owner can't see alerts you set on your view of their dashboard. Data alerts are fully synchronized across platforms.

Considerations and troubleshooting

- Alerts aren't supported for card tiles with date or time measures.
- Alerts only work with numeric data types.
- Alerts only work on refreshed data. They don't work on static data.
- Because alerts are only sent if your data changes, you don't receive duplicate alerts for an unchanged value.
- Alerts only work on streaming datasets if you build a KPI, card, or gauge report visual and then pin that visual to the dashboard.

- You can create up to **250** alerts across all your models.
- Alerts don't have support for co-ownership. If you need to transfer ownership between users, you need to create a new alert. If you're integrating your alerts with Power Automate, you also need to recreate the flow.

Collaborate, share, and integrate across products with Power BI - documentation

You need a Power BI Pro or Premium Per User (PPU) license to share content, unless the content is in a Premium capacity.

Ways to collaborate and share

- Share from My Workspace or other workspaces (with the right role or permissions).
- Share from the Power BI mobile apps.
- Share from Power BI Desktop with OneDrive and SharePoint integration.
- Publish reports from Power BI Desktop to the Power BI service.

1. In the **Send link dialog**, choose how to share:
    - **People in your organization:** Anyone in your org with the link can view (not for external/guest users).
    - **Specific people:** Enter names or emails to share directly (can include Microsoft Entra B2B guests).
    - **People with existing access**: Send a link to someone who already has access.
2. Set permissions:
    - **Reshare:** Allow recipients to share with others.
    - **Build:** Allow recipients to build their own reports based on the data
3. Copy the link or send it directly via email, Outlook, PowerPoint, or Teams.

1. Workspaces
2. Publish apps
3. Microsoft Teams integration
4. Share outside your organization
    - Enter the external user's email address (Microsoft Entra B2B guests recommended).
    - Recipients must sign in to Power BI to view shared content.

- Only direct recipients can access the shared content; forwarding the link does not grant access.
- If RLS is implemented, external users only see data they're permitted to view.

Each report can't have more than 1,000 sharing links. If you reach this limit, remove links for "Specific people" and grant those users direct access.

Considerations and limitations

- Only reports can be shared via links that grant access; dashboards require direct access.
- Sharing a report or dashboard also shares the underlying semantic model unless RLS is applied.
- Recipients can interact with content in Reading view but can't edit unless granted build permissions.
- Analyze in Excel access can be restricted by admins.
- You can't share reports distributed to you in an app; ask the app owner to add users and republish.
- Distribution groups can be used for sharing, but Microsoft 365 Unified groups are not supported for direct sharing.
- If coworkers already have access, you can send a direct link by copying the URL.
- Email notifications are only sent to individual users, not groups.

Workspaces in Power BI

Workspaces are places to collaborate with colleagues to create collections of dashboards, reports, semantic models, and paginated reports

Auditing

Power BI audits the following activities for workspaces.

Friendly name	Operation name

Created Power BI folder	CreateFolder
Deleted Power BI folder	DeleteFolder
Updated Power BI folder	UpdateFolder
Updated Power BI folder access	UpdateFolderAccess

Considerations and limitations

Limitations to be aware of:

- The total number of semantic models and reports in a workspace can't exceed a thousand.
- Power BI publisher for Excel isn't supported.
- Certain special characters aren't supported in workspace names when using an XMLA endpoint. As a workaround, use URL encoding of special characters, for example, for a forward slash /, use %2F.
- A user or a service principal can be a member of up to 1,000 workspaces.
- The semantic model may exhibit slight differences in behavior regarding the display name of the owner, as it assumes a single-owner model for operations like setting credentials.

Service principals are a Microsoft Entra ID app registration you create within your tenant to perform unattended resource and service level operations. They're a unique type of user identity with an app name, application ID, tenant ID, and client secret or certificate for a password.

Collaborate in Microsoft Teams

Prerequisites for using Power BI in Microsoft Teams

- The Power BI app for Microsoft Teams is available to all users in commercial cloud.
- In the Team Admin center, ensure Power BI is Allowed. You can search for Power BI in the Manage apps list under Teams apps.

Organizations rely on Microsoft Teams, Microsoft Outlook, and Microsoft Office to enable remote work and keep employees in sync. This article outlines options for sharing and collaborating on interactive Power BI content in Microsoft Teams, Outlook, and Office.

- Add the Power BI app to Microsoft Teams: Integrate the Power BI service experience into Microsoft Teams.
- Add the Power BI app to Microsoft Outlook and Office: Integrate the Power BI service experience into Microsoft Office products.
- Embed interactive reports in Teams channels and chats with a Power BI tab: Help your colleagues find and discuss your team's data.
- Create a link preview in the Teams message box when you paste links to your reports, dashboards, and apps.
- Chat in Microsoft Teams directly from the Power BI service: Share a filtered view of your reports and dashboards and start conversations.
- View all the Power BI tabs you have in Microsoft Teams: Select the In Teams tab on the Power BI app home page.
- Get notified in the Teams activity feed when important things happen in Power BI.
- Discover and use Power BI in Teams mobile.

After we install power bi app in microsoft team we can do the following:

- Create, view, and edit dashboards, reports, and apps.
- Create and participate in workspaces.
- Share content, either through email or through Microsoft Teams.

Requirements

Install the Power BI app in Microsoft Teams to ensure the following elements are in place:

- Power BI app is enabled in the Teams Admin center apps list.
- Your users with Fabric (Free) licenses can access content that's shared with them from a workspace that's part of a Power BI Premium capacity (P SKU) or Fabric F64 or greater capacity.
- Your users with a Power BI Pro or Premium Per User (PPU) license can share content with others or build content in workspaces.
- Users signed in within the Power BI app for Teams or the Power BI service and activated their Power BI license.
- Users meet the requirements to use the Power BI tab in Microsoft Teams.

Known issues and limitations

- Some options in the Power BI service aren't available in Microsoft Teams. These options include:
    - Notifications.
    - Downloading apps such as Power BI Desktop and Power BI Paginated Report Builder.
    - Sending feedback.
    - Settings such as managing personal storage and accessing the admin portal.
- Power BI doesn't support the same localized languages that Microsoft Teams does. As a result, you might not see proper localization within a report.
- Search experience isn't available in US GCC.
- To automatically take you back when navigating back to the app, your navigation history is saved approximately every 15 seconds. The history is stored locally on your computer or in your web browser window. If you navigate to a place and filter, then quickly switch to another part of Teams, such as to Chat, Calendar, or Teams, your navigation may not be captured. If you change computers or start a new browser window, the history isn't available.

Publish an app in Power BI

Here are the steps to publishing an app in Power BI:

- Create the app
- Add content to the app
- Create and manage multiple audiences
- Publish the app

Business users get your apps in a few different ways:

- They can find and install apps from **Apps marketplace or AppSource**.
- You can send them a direct link.
- If your **Fabric admin** has given you permissions, you can install the app automatically in users' Power BI accounts.
- If you distribute your app to external users, those users receive an email with a direct link. Power BI doesn't send any email to internal users when you distribute or update an app

Licenses for apps

To create or update an app, you need a Power BI Pro or Premium Per User (PPU) license. For app users, there are two options.

- If the workspace for this app is not in a Power BI Premium capacity: All business users need **Power BI Pro or Premium Per User (PPU) licenses** to view your app.

- If the workspace for this app is in a **Power BI Premium capacity/F64 or higher Fabric** capacity: Business users without Power BI Pro or Premium Per User (PPU) licenses in your organization can view app content. However, users can't copy the reports, or create reports based on the underlying semantic models

You can create up to 25 audience groups in one app.

Note

- The advanced settings apply to all the audiences, including the workspace users. They can share the semantic models and build content with the semantic models in this app as long as they have at least a Viewer role in the workspace. See Roles in workspaces for more about roles.
- Build permissions only apply to semantic models in the same workspace as the app. If semantic models are in other workspaces, you must explicitly grant build permissions on those semantic models, or at least add the users to the Viewer role in the other workspace.
- Build permissions don't apply to Paginated Reports. For semantic models associated with Paginated Reports, you must explicitly grant build permissions on those semantic models, or at least add the users to the Viewer role in the workspace.

Publish the app to your entire organization is disabled in these three scenarios:

- You've selected Install this app automatically on the Setup tab. Automatic installation of an app for an entire organization isn't allowed.
- You're a guest user who has been assigned a workspace role.
- Your admin doesn't allow you to assign an app to your entire organization. You can ask your admin to change this setting in the App tenant settings section of tenant settings in the Admin portal.

Note:
Custom messages aren't supported in **Power BI mobile apps for iOS and Android**. If you choose to show a custom message to users who don't have access to your Power BI app, users on mobile still see the default access request flow.

Important

When you hide content from an audience in a published app, they won't see or access it normally.
But if you turn on "Allow access to hidden content", anyone with a direct link can still open it — even if it's hidden from the navigation menu.
Things to remember:

1. Dashboard tiles that link to reports not added to the app (or added but hidden) will break and show an error:
   "The report shown in this tile doesn't exist or you don't have permission to view it."

2. If you only add dashboards with report tiles (but don't add the actual reports), nothing will show to the audience.

   - Fix: Add the reports and make them visible or turn on "Allow access to hidden content."

3. In paginated reports with subreports, hidden subreports will not display.

4. In drillthrough reports, users can't navigate to the target report if it's hidden.

How to avoid problems:

- Add all the related or dependent reports to the app.

- Make them visible to the audience or enable "Allow access to hidden content."

Important

- If your app relies on semantic models from other workspaces, make sure that all app users have access to the underlying semantic models.
- If the app or report is in the same workspace as the semantic model, make sure you add the report associated with the semantic model to the app as well.

Items you can copy a link to

You can copy a link to these items in an app:

- A Power BI report
- A paginated report
- A dashboard
- A scorecard

You can't copy a link to an Excel workbook in an app.

How to publish an app automatically to end users

After the admin has assigned permissions to you, you have a new option to install the app automatically. When you check the box and select Publish app (or Update app), the app is published to all audience groups defined in the Audience tab of the app.

App Limitations & Rules

- **1 app per workspace** only.
- **Publish/update time limit:** 1 minute. If updates fail due to timeout, reduce the number of items in the app.
- If the app is **too large to update**, you'll see a "Can't update the app" message. To fix:
    - Remove some items from the app.
    - Convert reports to formats like Power BI enhanced report format.
    - Recreate the app as an org app.
    - Keep optimizing until the update works.

Audience Groups & Access

- **Max 25 audience groups per app**
- **Max 10,000 total users & user groups** per app.
    - Each user group counts as **1** towards the 10,000 limit.
- **Max 1,000 users/user groups per audience group** (but still within the 10,000 total limit).
- If a user already has access via the workspace, they **won't appear** in the app's audience list.
- **Counting example:**
    - If you have 4 workspace users & 5 audience groups → counted as **4 × 5 = 20** users against the 10,000 limit.
- You might hit the **10,000 limit** before reaching 25 audience groups. Example:
    - 10 audience groups × 1,000 users each → 10,000 limit reached → no more audience groups possible.

Reports & Data Models

- If using **chained semantic models** (DirectQuery/Analysis Services):
  - Give access to **all models in the chain**.
  - Use **Microsoft Entra Security Groups** for easier permission management.
- If using **semantic models from another workspace** → give permissions there too.
- If a **paginated report** uses a semantic model → give permissions to that model.

Other Access Rules

- **Guest users** need the *Directory Readers* role to update.
- **Custom access requests/messages** → not supported in reports, but supported in Power BI apps.

Publishing & App Content

- **AppSource** = public apps.
  - For internal apps → use the *Apps Marketplace*.
- **Pinning visuals to dashboards:**
  - *Live pin*: Pin whole report pages.
  - Pin single visuals as tiles.
  - Clicking a tile opens the report (only if the report is included in the app).
- To see drill-down/live-pinned reports → the report must be included in the audience group.
- **Support site URL** appears on the item info card

- **Newly added content** to an already published app = invisible by default → must unhide manually for each audience group.
- **Multiple audiences** not fully supported in deployment pipelines → visibility still needs manual management.
- **"Add a Link"** → can only open embed links in content area.
  Max 200 dashboards per app.
- **Subscriptions from scorecards in apps** not supported → create from the workspace instead.

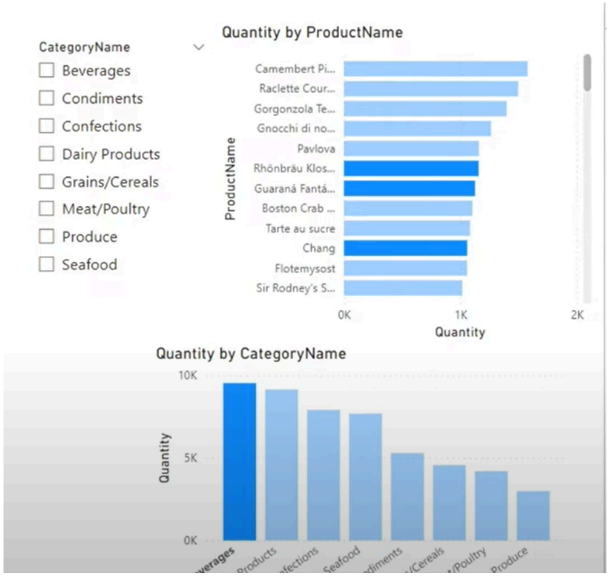
Onedrive
SharePoint
Dataverse
Data flows
Shared Dataset
Power BI set

Get Data:

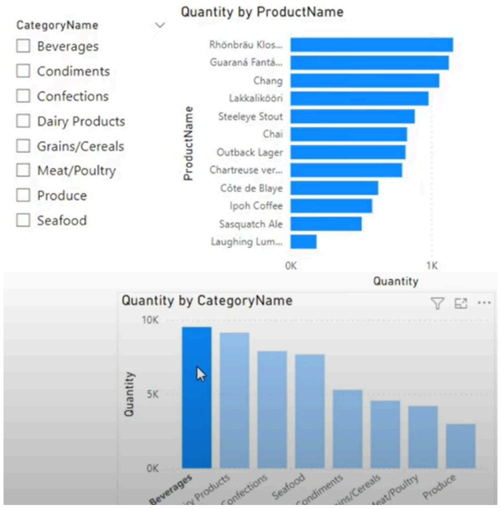
- All
- File
- Database
- Microsoft Fabric
- Power Platform
- Azure
- Online Services
- Other

CROSSHIGHLIGHT and CROSSFILTER

CROSSHIGHLIGHT: Cross-highlighting dims the unrelated data points, keeping them visible but less prominent

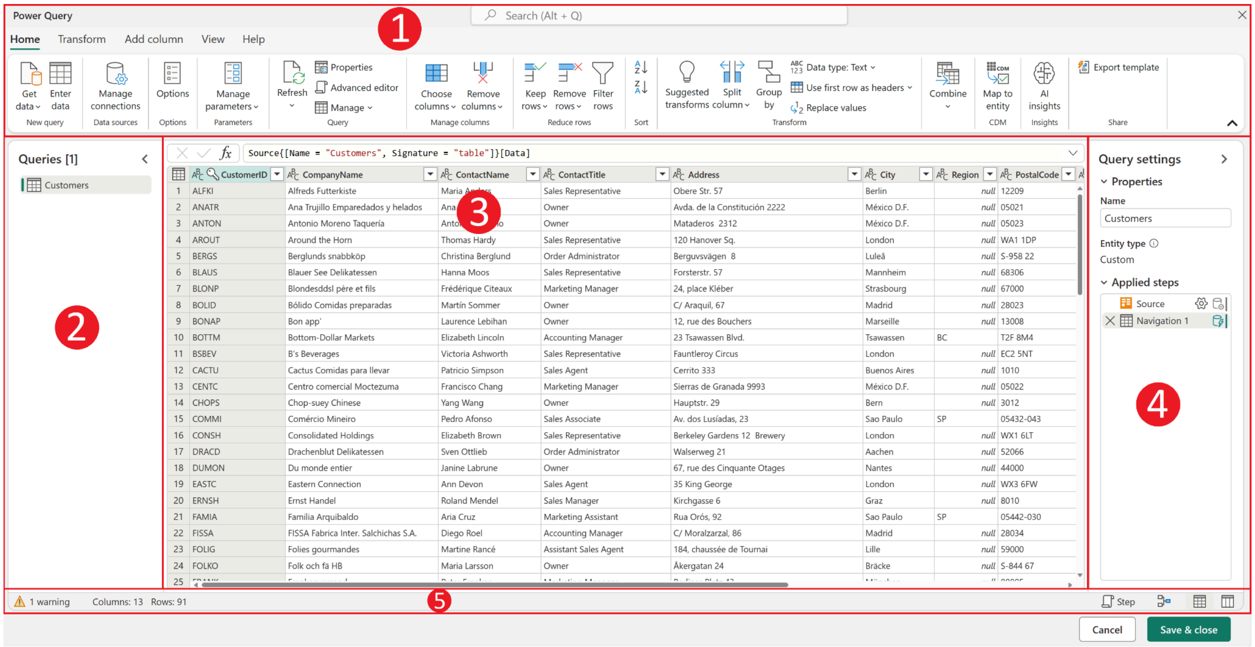


Cross Filter: Cross-filtering removes unrelated data points, leaving only the filtered results visible



Power Query:

Power Query in Power BI is a powerful tool for data transformation and preparation, allowing users to connect to various data sources, shape and clean data, and load it into Power BI for analysis and reporting. It's essentially an ETL (Extract, Transform, Load) engine embedded within Power BI.



```
Source{[Name = "Customers", Signature = "table"]}[Data]
```

	CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	PostalCode
1	ALFKI	Alfreds Futterkiste	Maria Anders	Sales Representative	Obere Str. 57	Berlin	null	12209
2	ANATR	Ana Trujillo Emparedados y helados	Ana [illegible]	Owner	Avda. de la Constitución 2222	México D.F.	null	05021
3	ANTON	Antonio Moreno Taquería	Anto[illegible]o	Owner	Mataderos 2312	México D.F.	null	05023
4	AROUT	Around the Horn	Thomas Hardy	Sales Representative	120 Hanover Sq.	London	null	WA1 1DP
5	BERGS	Berglunds snabbköp	Christina Berglund	Order Administrator	Berguvsvägen 8	Luleå	null	S-958 22
6	BLAUS	Blauer See Delikatessen	Hanna Moos	Sales Representative	Forsterstr. 57	Mannheim	null	68306
7	BLONP	Blondesddsl père et fils	Frédérique Citeaux	Marketing Manager	24, place Kléber	Strasbourg	null	67000
8	BOLID	Bólido Comidas preparadas	Martín Sommer	Owner	C/ Araquil, 67	Madrid	null	28023
9	BONAP	Bon app'	Laurence Lebihan	Owner	12, rue des Bouchers	Marseille	null	13008
10	BOTTM	Bottom-Dollar Markets	Elizabeth Lincoln	Accounting Manager	23 Tsawassen Blvd.	Tsawassen	BC	T2F 8M4
11	BSBEV	B's Beverages	Victoria Ashworth	Sales Representative	Fauntleroy Circus	London	null	EC2 5NT
12	CACTU	Cactus Comidas para llevar	Patricio Simpson	Sales Agent	Cerrito 333	Buenos Aires	null	1010
13	CENTC	Centro comercial Moctezuma	Francisco Chang	Marketing Manager	Sierras de Granada 9993	México D.F.	null	05022
14	CHOPS	Chop-suey Chinese	Yang Wang	Owner	Hauptstr. 29	Bern	null	3012
15	COMMI	Comércio Mineiro	Pedro Afonso	Sales Associate	Av. dos Lusíadas, 23	Sao Paulo	SP	05432-043
16	CONSH	Consolidated Holdings	Elizabeth Brown	Sales Representative	Berkeley Gardens 12 Brewery	London	null	WX1 6LT
17	DRACD	Drachenblut Delikatessen	Sven Ottlieb	Order Administrator	Walserweg 21	Aachen	null	52066
18	DUMON	Du monde entier	Janine Labrune	Owner	67, rue des Cinquante Otages	Nantes	null	44000
19	EASTC	Eastern Connection	Ann Devon	Sales Agent	35 King George	London	null	WX3 6FW
20	ERNSH	Ernst Handel	Roland Mendel	Sales Manager	Kirchgasse 6	Graz	null	8010
21	FAMIA	Familia Arquibaldo	Aria Cruz	Marketing Assistant	Rua Orós, 92	Sao Paulo	SP	05442-030
22	FISSA	FISSA Fabrica Inter. Salchichas S.A.	Diego Roel	Accounting Manager	C/ Moralzarzal, 86	Madrid	null	28034
23	FOLIG	Folies gourmandes	Martine Rancé	Assistant Sales Agent	184, chaussée de Tournai	Lille	null	59000
24	FOLKO	Folk och fä HB	Maria Larsson	Owner	Åkergatan 24	Bräcke	null	S-844 67

Name
Customers

Entity type
Custom

Applied steps
- Source
- Navigation 1

1 warning   Columns: 13   Rows: 91

The ribbon

1. Home Ribbon

Close & Apply

- Close & Apply → Save transformations and load into model
- Close → Exit without saving changes

New Query

- New Source → Import data from files, databases, web etc
- Recent Sources → Quickly access previously connected data
- Enter Data → Manually create a small table

Data Sources

- Data Source Settings → Manage connections, credentials, and permissions

Parameters

- Manage Parameters → Create reusable values (like a date or file path)

Query

- Refresh Preview → Reload preview of dataset
- Properties → Rename query and add description
- Advanced Editor → Edit or view M code

Manage Columns

- Choose Columns → Keep only needed columns
- Remove Columns → Delete unwanted columns

Reduce Rows

- Keep Rows → Keep specific rows (Top N, range, etc.)
- Remove Rows → Remove duplicates, blanks, or unwanted rows

Sort

- Sort Ascending / Descending → Reorder rows by values

Transform

- Split Column → Split by delimiter or fixed width
- Group By → Aggregate similar values (like SQL GROUP BY)
- Data Type → Assign correct type (text, number, date etc.)
- Use First Row as Headers → Promote or demote headers
- Replace Values → Replace text or numbers in bulk

Combine

- Merge Queries → Join tables (like SQL joins)
- Append Queries → Stack queries (like UNION)
- Combine Files → Combine multiple files from a folder

AI Insights

- Text Analytics → Sentiment analysis, key phrases
- Vision → Image analysis functions

- Azure Machine Learning → Apply trained ML models

2. **TransformRibbon**

Table group

- **Group By**
  Aggregate rows by one or more keys. Use for sales by category or returns by month.
- **Use First Row as Headers**
  Promote or demote headers.
- **Transpose**
  Flip rows and columns. Use rarely, mainly for awkward CSV layouts.
- **Reverse Rows**
  Invert current row order.
- **Count Rows**
  Return a one row table with row count. Good for quick QA checks.

Any Column group

- **Data Type**
  Set the correct type. Do this early to avoid silent errors.
- **Detect Data Type**
  Let Power Query guess types. Verify after using.
- **Replace Values**
  Replace text or numbers. Also has Replace Errors to handle error cells.
- **Fill**
  Fill Down or Fill Up. Use for header rows that repeat only on first line of each group.
- **Rename**
  Change column name.
- **Move**
  Reorder a column to beginning, end, left, or right.
- **Convert to List**
  Turn a column into a list object. Useful for parameterised filters and joins.
- **Pivot Column**
  Turn unique values in a column into separate columns. Example month names to columns with totals.
- **Unpivot Columns**
  Turn many month columns into two columns Attribute and Value. This is the tidy data move.
- **Unpivot Only Selected** and **Unpivot Other Columns**
  Choose exactly which columns to unpivot.

Text Column group

- **Split Column**
  Split by delimiter comma, space, slash or by number of characters or by positions. Example split SKU Brand123 into Brand and 123.
- **Format**
  Uppercase, lowercase, capitalize each word, trim spaces, clean non printing characters, add or remove prefix and suffix.
- **Extract**
  Before delimiter, after delimiter, between delimiters, first characters, last characters, text length.
- **Parse**
  Parse JSON or XML text into records and tables.
- **Merge Columns**
  Concatenate values with a chosen delimiter. Example City and State into City State.

Number Column group

- **Statistics**
  Sum, average, minimum, maximum, median, standard deviation, count. Returns a single value table for the selected column.
- **Standard**
  Add, subtract, multiply, divide, percentage, absolute value.
- **Scientific**
  Power, exponent, logarithm, square root.
- **Trigonometry**
  Sine, cosine, tangent and inverses.
- **Rounding**
  Round, round up, round down, round toward even, set decimal places.
- **Information**
  Sign, is even, is odd.

Date and Time Column group

- **Date**
  Date only, year, quarter, month, week, day, start or end of period, age.
- **Time**
  Hour, minute, second, time only.
- **Duration**
  Convert duration to total days, hours, minutes, seconds or to parts.

Scripts group

- **Run R script** and **Run Python script**
  Execute code that returns a table. Use when Power Query steps cannot do the transformation.

What is Query Folding?
Query folding means pushing transformations (filters, aggregations, joins, etc.) back to the source system so that the source executes them instead of your local engine.
This reduces the amount of data transferred and improves performance.

For example, if you filter WHERE Country = 'India', Power Query can fold this into the SQL statement rather than pulling all rows and filtering locally.

3. Add Columns Ribbon

General group

- **Column From Examples**
  Create a new column by typing sample output values. Power Query learns the pattern and generates the formula. Good for text cleanup or extracting pieces.

- **Custom Column**
  Write a formula using M language. Full control. Example: if [Sales] > 1000 then "High" else "Low".

- **Invoke Custom Function**
  Apply a previously defined function to each row or column.

- **Conditional Column**
  Add column with if–then logic using a simple dialog. Example: if [Age] >= 18 then "Adult" else "Minor".

- **Index Column**
  Add sequential numbers starting from 0 or 1. Can set custom starting point and increment.

- **Duplicate Column**
  Make an exact copy of a column to transform independently.

From Text group

- **Format**
  Change case, trim, clean, add/remove prefix and suffix for the new column.
- **Extract**
  Get part of a string before, after, or between delimiters. Also first characters, last characters, or text length.
- **Merge Columns**
  Combine values of two or more columns into one, with a chosen delimiter.
- **Parse**
  Convert JSON or XML text into structured columns.

From Number group

- **Statistics**
  Compute aggregate values like sum, average, min, max, median, standard deviation for a column and return a new column.
- **Standard**
  Add, subtract, multiply, divide, percentage, absolute value.
- **Scientific**
  Power, exponent, log, square root.
- **Trigonometry**
  Sin, cos, tan and inverse functions.
- **Rounding**
  Round, round up, round down, set decimal places.
- **Information**
  Functions like is even, is odd, sign.

From Date & Time group

- **Date**
  Extract year, quarter, month, week, day from a date column.

- **Time**
  Extract hour, minute, second from a time column.

- **Duration**
  Break down a duration into days, hours, minutes, seconds.

AI Insights group

- **Text Analytics**
  Sentiment analysis, key phrases from text via Azure Cognitive Services.

- **Vision**
  Apply image recognition functions.

- **Azure Machine Learning**
  Call a deployed Azure ML model to enrich the data.

4. **<u>View Ribbon</u>**

Layout group

- **Query Settings**
  Toggle the panel on the right that shows Applied Steps and Properties.

- **Formula Bar**
  Show or hide the M formula bar. Useful when you want to see or edit code directly.

- **Monospaced**
  Changes the preview grid font to a monospaced style for easier alignment of text data.

- **Show whitespace**
  Lets you see spaces in text values in the preview (shows as small dots). Helpful to catch trailing or leading spaces.

Data Preview group

- **Column distribution**
  Shows a small histogram for each column in the preview so you can see value frequency distribution. And unique and distinct %s

- **Column profile**
  Shows summary statistics and distribution for a column (min, max, average, distinct count, etc.).

- **Column quality**
  Displays data quality indicators (Valid, Error, Empty) for each column.

Columns group

- **Go to Column**
  Quick navigation to a specific column in wide tables.

Parameters group

- **Always allow**
  Lets you always enable parameters or queries that require special approval.

Advanced group

- **Advanced Editor**
  Opens a full editor for the underlying M code of the query.

- **Query Dependencies**
  Shows a diagram of how queries are connected to each other. Very useful when you have multiple queries referencing one another.

5. **Tools Ribbon**

Step Diagnostics

- **Diagnose Step**
  Lets you run diagnostics on a single applied step to see how much time and resources it takes. Helps pinpoint slow transformations.

Session Diagnostics

- **Start Diagnostics**
  Begin recording performance information for the entire Power Query session (all applied steps across queries).

- **Stop Diagnostics**
  Ends recording. After stopping, Power Query produces diagnostic tables that show query performance, timings, and data read/write activity. Useful for performance tuning.

Diagnostic Options

- **Diagnostic Options**
  Configure how diagnostics capture information, such as whether to collect detailed timings, categories of data, or resource usage.

✅ Practical usage

- When a query refresh is slow, first run **Start Diagnostics**, perform the refresh, then **Stop Diagnostics**. Review the generated diagnostic tables to see which steps consume the most time.

- Use **Diagnose Step** when you already suspect a specific transformation (for example, a Merge or Group By) and want to measure only that step.

- Adjust **Diagnostic Options** if you want more granular logging (helpful in enterprise-scale models).
