

1) What is Power BI and how does it differ from Excel?

Power BI: A business analytics tool by Microsoft used for interactive data visualization, transforming raw data into meaningful insights using dashboards, reports, and charts.

Key Differences from Excel:

- **Data Visualization:** Power BI is optimized for creating advanced visualizations and dashboards, while Excel primarily supports spreadsheet-based analysis.
 - **Data Handling:** Power BI can handle larger datasets using its in-built data model and uses compression technology.
 - **Automation:** Power BI provides features for scheduled data refresh and live data connections, unlike Excel.
 - **Ease of Sharing:** Power BI Service allows easy sharing of reports and dashboards with users, whereas Excel relies on file sharing.
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2) Explain the concept of data modeling in Power BI.

Data modeling: The process of organizing and structuring data in Power BI by creating relationships between tables, defining calculated columns, measures, and hierarchies to ensure data is logically connected. It ensures efficient data retrieval for reporting and analysis.

3) What are the different types of connections available in Power BI?

1. **Import Mode:** Imports data into Power BI for processing and storage in memory.
 2. **DirectQuery:** Connects directly to the data source without importing data, fetching data in real time.
 3. **Live Connection:** A live connection to online analytical processing (OLAP) models like SSAS or Power BI datasets.
 4. **Composite Mode:** Combines Import and DirectQuery modes for flexibility.
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4) How do you handle data transformation in Power BI?

Data transformation is handled using the **Power Query Editor**, which provides tools to:

- Remove duplicates.
- Replace or clean data.
- Perform column splitting or merging.
- Change data types.
- Apply filters.
- Add calculated columns and custom transformations.

5) What is DAX (Data Analysis Expressions) and why is it important in Power BI?

DAX: A formula language in Power BI used to create custom calculations and aggregations.

Importance:

- Allows creating measures and calculated columns.
- Facilitates complex data analysis and dynamic reporting.
- Supports functions for time intelligence, filtering, and ranking.

6) Can you explain the difference between calculated columns and measures in Power BI?

1. Calculated Columns:

- Created at the row level in a table.
- Stored as part of the dataset, increasing its size.
- Used when calculations are needed for individual rows.
- Example: Profit = [Sales] - [Cost].

2. Measures:

- Calculated at query time and are not stored in the dataset.
- More efficient and dynamic.
- Used for aggregated values.
- Example: Total Sales = SUM([Sales]).

7) How do you handle relationships between tables in Power BI?

- Define relationships using **Manage Relationships** in the Data or Model view.
- Types of relationships:
 - **One-to-One (1:1)**
 - **One-to-Many (1:N)**
 - **Many-to-Many (M:N)**
- Specify **Cardinality** (e.g., single or bidirectional filtering).
- Ensure relationships are created on key columns to maintain data integrity.

8) What is the purpose of a Power BI Gateway?

A **Power BI Gateway** connects Power BI Service to on-premises data sources, enabling secure data transfer for live connections or scheduled refreshes.

9) How can you schedule data refresh in Power BI Service?

1. Publish the report to the **Power BI Service**.
2. Navigate to the **Settings** for the dataset.
3. Configure the **Scheduled Refresh** by:
 - Setting refresh frequency (e.g., daily, hourly).
 - Specifying data source credentials.

10) Explain the concept of row-level security in Power BI.

Row-Level Security (RLS): A feature in Power BI that restricts access to data based on user roles.

- Define roles in **Power BI Desktop** using DAX filters.
- Assign roles to users in **Power BI Service**.
Example: A sales manager sees data only for their region.

11) What is the Power BI Desktop and how does it differ from Power BI Service?

- **Power BI Desktop:** A Windows application used to create, transform, and model data, and build reports.
- **Power BI Service:** A cloud-based platform for sharing, managing, and viewing reports and dashboards.

Key Differences:

- Desktop focuses on report creation, while Service focuses on collaboration and distribution.
- Service enables scheduled refresh and live dashboards.

12) Explain the concept of DirectQuery in Power BI.

DirectQuery: A connection mode in Power BI where no data is imported into Power BI's storage. Instead, queries are sent directly to the data source whenever a report is refreshed or interacted with.

- **Advantages:**
 - Handles large datasets without data import.
 - Provides real-time data access.
- **Limitations:**
 - Performance depends on the data source.

- Some DAX functions are restricted.

13) What are Power BI templates, and how are they useful?

Power BI templates (.pbix files): Save report designs, queries, and model structures without saving the actual data.

Usefulness:

- Enable reusability for similar reports.
- Simplify sharing report frameworks.
- Reduce effort for standardization.

14) How do you handle incremental data refresh in Power BI?

Incremental refresh allows processing only new or changed data rather than refreshing the entire dataset.

Steps:

1. Enable **Incremental Refresh** in the **Power BI Desktop** under table properties.
2. Define parameters for **RangeStart** and **RangeEnd** for filtering data.
3. Publish the report to Power BI Service and configure it with a **Premium workspace** or **Power BI Pro** license.

15) What is the role of Power Query in Power BI?

Power Query: A data transformation and preparation engine in Power BI.

- Used to connect, clean, transform, and load data.
- Features a no-code interface and M Language for advanced transformations.
- Supports merging, appending, and applying complex data transformations.

16) Explain the difference between calculated columns and calculated tables in Power BI.

1. Calculated Columns:

- Created at the row level within an existing table.
- Example: FullName = [FirstName] & " " & [LastName].

2. Calculated Tables:

- Create a new table based on DAX expressions or existing data.
- Example: TopSales = FILTER(Sales, Sales[Amount] > 1000).
- Useful for creating custom subsets of data or aggregations.

17) How do you create custom visuals in Power BI?

1. Use **Power BI Developer Tools** (Node.js and TypeScript).
2. Install and configure the **Power BI Visuals SDK**.
3. Write code to define the visual using JavaScript and JSON.
4. Package the visual as a .pbviz file.
5. Import the custom visual into Power BI Desktop or Service.

Alternatively, download custom visuals from the **Microsoft AppSource**.

18) What are the best practices for optimizing performance in Power BI?

- Use **Import Mode** for better performance.
 - Optimize data model by reducing unused columns and rows.
 - Create **aggregations** for large datasets.
 - Optimize DAX calculations and avoid calculated columns when measures suffice.
 - Use **DirectQuery** sparingly and ensure the data source is performant.
 - Limit visuals on dashboards and use **filters** wisely.
 - Implement **Incremental Refresh** where applicable.
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19) How can you integrate Power BI with other Microsoft products like Azure and Office 365?

1. **Azure Integration:**
 - Use Azure SQL Database, Azure Synapse Analytics, or Azure Data Lake as data sources.
 - Enable machine learning integration via Azure ML.
 2. **Office 365 Integration:**
 - Embed Power BI reports in Microsoft Teams or SharePoint.
 - Use Excel for dataset import/export and pivot analysis.
 - Integrate with **Power Automate** for workflow automation.
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20) Explain the concept of aggregations in Power BI.

Aggregations summarize large datasets at a higher level to improve performance.

- **Example:** Summing sales data by region rather than storing individual transactions.

- **Types:**
 - **Pre-Aggregated Tables:** Created in the source or Power BI.
 - **Dynamic Aggregations:** Created via measures using DAX functions like SUM, AVERAGE, etc.
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21) How do you handle error handling and data quality in Power BI?

- **Error Handling:**
 - Use **Power Query** to detect and fix errors (e.g., replace errors, check nulls).
 - Implement validation steps in the data transformation pipeline.
 - **Data Quality:**
 - Profile data using Power Query's **Data Profiling Tools**.
 - Standardize and clean data (e.g., format inconsistencies, remove duplicates).
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22) What is the purpose of Power BI Embedded and when would you use it?

Power BI Embedded: A Microsoft Azure service used to embed Power BI reports into custom web or mobile applications.

When to Use:

- For ISVs or developers creating applications with embedded analytics for end-users.
- Provides seamless integration without requiring users to access Power BI directly.
- Supports branding and custom experiences.