**Power BI Visualization Tools**

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

Power BI is a business analytics tool developed by Microsoft that enables users to visualize data, share insights, and make data-driven decisions through interactive dashboards and reports.

1. **Explain the concept of Data Modeling in Power BI.**

**Tables**: Imported datasets or queries from different sources.

**Relationships**: Connections between tables based on common fields (like primary and foreign keys).

**Measures**: Calculated values using DAX (Data Analysis Expressions), such as Total Sales or Average Profit.

**Calculated Columns**: New Columns added using DAX to enrich existing data.

**Hierarchies**: Logical grouping of fields (e.g., Year>Quarter > Month).

**Data Types**: Correct assignment of data types like text, number, or date for accuracy in analysis.

1. **What are the different types of connections available in Power BI?**

Import Mode (Default)

Direct Query Mode

Live Connection

Composite Model (Hybrid)

1. **How do you handle data transformation in Power BI?**

Power BI handles data transformation primarily through **Power Query Editor**, a powerful tool for cleaning, reshaping, and preparing data **before analysis**.

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

**DAX** is a **formula language** used in Power BI, Excel Power Pivot, and SQL Server Analysis Services (SSAS) to **create custom calculations** and **aggregations** on data.

1. **Can you explain the difference between calculated columns and measures in Power BI?**

**Calculated Columns:**

**What it is:** A new column **added to the table**.

**Evaluated:** **Row-by-row** (row context).

**Stored:** Physically stored in the data model.

**Used in:** Rows, slicers, axes of visuals, filters.

**Measures:**

**What it is:** A **calculation** that **returns a single value**, like total, average, count.

**Evaluated:** At **query time** (filter context).

**Stored:** Not stored; computed on demand.

**Used in**: Values section of visuals (cards, charts, tables).

1. **How do you handle relationships between tables in Power BI?**

In Power BI, relationships between tables are crucial for data analysis and reporting. They allow you to connect related data from different tables, enabling you to perform calculations and create visualizations based on those connections. You can manage these relationships either automatically, by letting Power BI infer them, or manually by defining them yourself.

1. **What is the purpose of a Power BI Gateway?**

A **Power BI Gateway** is a **bridge** that connects **on-premises data sources** (like SQL Server, Excel files, Oracle databases, etc.) to **Power BI Service in the cloud**.

To enable **secure, automatic, and real-time refreshes** or live queries of data stored **inside your organization’s network** from **Power BI in the cloud**.

1. **How can you schedule data refresh in Power BI service?**

Scheduling refreshing data ensures your **Power BI reports and dashboards** reflect the most **up-to-date data** without manual intervention.

1. **Explain the concept of Row-Level security in Power BI.**

**Row-Level Security (RLS)** in Power BI is a feature that allows you to **control access to specific rows of data** in your reports and dashboards **based on the viewer’s identity**.

1. **What is the Power BI Desktop and how does it differ from Power BI Service?**

**Power BI Desktop:**

**Power BI Desktop** is a **free Windows application** that allows users to:

Connect to various data sources

Perform data transformation (via Power Query)

Create data models

Build visual reports and dashboards

**Power BI Services:**

**Power BI Service is a cloud-based platform where users can:**

Publish, view, and share reports created in Power BI Desktop

Schedule data refreshes

Collaborate with teams via workspaces

Use features like dashboards, alerts, subscriptions, and apps

1. **Explain the concept of Direct Query in Power BI.**

**Direct Query** is a data connectivity mode in Power BI that allows you to **connect directly to a data source** without importing the data into Power BI's in-memory engine. Instead of storing data, Power BI sends **live queries** to the source **each time** you interact with a visual.

1. **What are Power BI templates and how are they useful?**

Power BI templates are pre-designed files (with the .pbit extension) that allow users to quickly create reports with similar layout, formatting, and data models, streamlining report creation and promoting standardization. They contain the structure of a report, including data connections, queries, visuals, and other elements, but exclude the actual data.

1. **How do you handle incremental data refresh in Power BI?**

**Incremental data refresh** in Power BI allows you to **update only the new or changed data**, rather than refreshing the entire dataset every time. This is **especially important for large datasets**, improving performance, reducing resource usage, and speeding up refresh times.

1. **What is the role of Power Query in Power BI?**

Power Query plays a **critical role in Power BI** as it handles the **data ingestion, transformation, and preparation** stages before data is visualized.

* Data Connection
* Data Transformation
* No-Code/Low-Code Interface
* Data Refresh and Automation
* Foundation for Data Modeling

1. **Explain the difference between calculated columns and calculated tables in Power BI.**

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| --- | --- |
| **Calculated Columns** | **Calculated Tables** |
| **What it is:**   * A **new column** added to an existing table, where each row's value is calculated based on DAX logic. | **What it is:**   * A **new table** created using a DAX expression, independent of existing tables or derived from them. |
| **Use Cases:**   * Add row-level data such as **"Profit = Sales - Cost"** * Create categories, flags, or conditional logic (e.g., High/Medium/Low) | **Use Cases:**   * Create summary or filtered tables * Create disconnected tables for slicers * Perform intermediate steps in complex models |

1. **How do you create custom visuals in Power BI?**

Creating **custom visuals** in Power BI allows you to go beyond the built-in charts and tailor visualizations to your specific business needs. You have two main ways:

* Using Pre-Built Custom Visuals from AppSource
* Creating your own Custom Visuals (Advanced)

1. **What are the best practices for optimizing performance in Power BI?**

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| **Area** | **Optimization Tips** |
| Data Modeling | * Star schema, reduce cardinality, remove unused data |
| DAX | * Use measures, optimize filters, avoid row-by-row ops |
| Power Query | * Use query folding, disable load for temp queries |
| Relationships | * Prefer single direction, avoid M:M where possible |
| Visuals | * Limit visuals per page, use aggregated data |
| Refresh Strategy | * Use incremental refresh, prefer Import mode |
| Monitoring | * Use Performance Analyzer & dataset metrics |

1. **How can you integrate Power BI with other Microsoft products like Azure and Office 365?**

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| **Integration with Azure** | **Integration with Power BI** |
| Azure SQL Database | Microsoft Excel |
| Azure Data Lake Storage | Microsoft Teams |
| Azure Analysis Services | SharePoint Online |
| Azure Machine Learning | Power Automate |
| Azure Functions | Outlook/Microsoft 365 Groups |

1. **Explain the concept of aggregations in Power BI.**

**What: -**

* + Aggregations allow Power BI to use a **smaller, summarized version of a large table** (like a fact table) to answer queries faster, rather than scanning the entire dataset.

**Why: -**

* + Boost **query performance** (especially on large models with billions of rows)
  + Reduce **memory usage**
  + Improve **user experience** with faster visuals and reports

1. **How do you handle error handling and data quality in Power BI?**

It is essential for building reliable, accurate, and trustworthy reports. This process typically happens in **Power Query, DAX**, and through **data validation strategies.**

* **Error Handling in Power Query**
  + Remove Errors
  + Replace Errors
  + Try… Otherwise Expression
* **Data Quality Techniques in Power Query**
  + Remove Duplicates
  + Check for Null Values
  + Data Type Validation
  + Add Flags
* **DAX Level Error Handling**
* **Monitoring and Validating Data**
  + Data Profiling Tools (Power Query)
  + Add Validation Layers
* **Automation and Alerts**

1. **What is the purpose of Power BI Embedded and when would you use it?**

**Main Purpose: -**

* **Provide analytics as part of your application** (white-labeled or branded)
* **Embed rich, interactive Power BI visuals** in custom apps or SaaS platforms
* Allow **non-Power BI users** (e.g., external customers) to view and interact with dashboards **without logging into Power BI directly**

**When we Use: -**

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| --- | --- |
| **Scenario** | **Use Cases** |
| SaaS Application | * Embed reports inside a software product for customers (e.g., CRM, ERP) |
| Portals and Websites | * Show visual insights to external users (e.g., vendor, client dashboards) |
| Multi-Tenant Platforms | * Customize report access and visibility per customer or user |
| Custom Internal Tools | * Embed analytics in internal applications without exposing the full Power BI Service |