**Creating Dashboard with Visualization Tool (April 2023)**

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

Microsoft Power BI is a data visualization platform used primarily for business intelligence purposes. Power BI stands for Power Business Intelligence and refers to a set of software tools and connectors that help you transform data from multiple sources into actionable insights.

Both PowerBI and Microsoft Excel are data visualisation tools that execute similar functions, yet differ in features and applications. Excel is an excellent tool for small to medium-sized data sets with a lower budget. Whereas, PowerBI caters to large data sets, real-time action, and cloud capabilities.

**Q.2 Explain the concept of data modelling in Power BI.**

Data modelling is the process of analysing and defining all the different data types your business collects and produces, as well as the relationships between those bits of data. By using text, symbols, and diagrams, data modelling concepts create visual representations of data as it’s captured, stored, and used at your business. As your business determines how data is used and when, the data modelling process becomes an exercise in understanding and clarifying your data requirements.

**Q.3 What are the different types of connections available in Power BI?**

As far as I know, there are three kinds of connection modes in Power BI, Import/Direct Query and Live connection.

Import: Power BI will load all data into data model.

Direct Query: Power BI will only load metadata like column header into data model.

Live connection: Power BI will connect to data source by living and won't load anything into data model. You will need to create the data model in data source.

For the data source which support Direct Query/Live connection, you can convert the connection mode to Import.

This transformation of the connection model is irreversible.

Power BI only supports the composite model of Import and Direct Query.

**Q.4 What is DAX (Data Analysis Expressions) and why is it important in Power BI?**

Data Analysis Expressions (DAX) is a formula expression language used in Analysis Services, Power BI, and Power Pivot in Excel. DAX formulas include functions, operators, and values to perform advanced calculations and queries on data in related tables and columns in tabular data models.

**Q.5 Can you explain the difference between calculated columns and measures in Power BI?**

In Power BI, calculated columns and measures are both used to calculate data, but they differ in how they are evaluated, stored, and used:

* Calculated columns

These are fields in a dataset that are calculated once when the process refreshes. They are stored in the model and are evaluated row by row, so they don't depend on filters. Calculated columns are useful for putting calculated values in slicers or as axes in chart visuals.

* Measures

These are dynamic aggregations or calculations that are applied to data in real-time during visualization. They are computed at query time and exist as source code in the model. Measures are useful for aggregating data or performing up-to-the-minute calculations. They can be applied to other tables and moved as needed. Measures are typically created using Data Analysis Expressions (DAX).

The choice between calculated columns and measures depends on the analysis needs and how the data will be interacted with.

**Q.6 How do you handle relationships between tables in Power BI?**

To handle relationships between tables in Power BI, We can:

* Create a relationship

Go to the Modelling tab, select Manage relationships, then New. In the Create relationship dialog box, select a table and column for the first table, then select a table and column for the second table.

* Handle tables with multiple columns

If tables have multiple columns for primary and foreign keys, you can combine the values into a single key column before creating the relationship.

* Handle many-to-many relationships

For many-to-many relationships between dimension-type tables, you can:

* + Add each related entity as a model table with a unique ID column
  + Add a bridging table to store associated entities
  + Create one-to-many relationships between the three tables
  + Configure a bi-directional relationship

**Q.7 What is the purpose of a Power BI Gateway?**

A Power BI Gateway connects on-premises data to Microsoft cloud services, like Power BI, Power Apps, and Azure Analysis Service. It acts as a bridge between the two, allowing users to access data from on-premises sources without having to move the data.

**Q.8 How can you schedule data refresh in Power BI Service?**

There are various ways to refresh data in power Bi But, I used to refresh your data immediately by selecting Refresh now in the All tab.

**Q.9 Explain the concept of row-level security in Power BI.**

Row-level security (RLS) in Power BI is a feature that allows users to control access to rows in a database table based on group memberships. This means that different users can access the same items but see different data. RLS can be used to create reports that target specific users' data, such as only showing data related to a specific business line.

**Q.10 What is the Power BI Desktop and how does it differ from Power BI Service?**

The biggest advantage of Power BI Service is its ability to provide real-time data updates and enhance collaboration. While Power BI Desktop excels at crafting individual reports, opting for Power BI online promotes teamwork by enabling multiple users to collaborate on the same dataset utilizing workspaces.

**Q.11 Explain the concept of Direct Query in Power BI.**

Direct Query is a feature in Power BI that allows users to connect to and query data directly from a data source, without the need to import the data into Power BI's memory. This approach is particularly useful for working with large datasets or real-time data where importing and storing the data in memory would be impractical or inefficient.

**Q.12 What are Power BI templates and how are they useful?**

Power BI templates are pre-designed Power BI files (.pbit) that contain a report structure, including visuals, formatting, and in some cases, connections to data sources, but without the actual data. These templates are useful for quickly creating consistent reports across multiple projects, teams, or organizations, ensuring that reports adhere to a standard design and layout.

Here's a breakdown of what Power BI templates are and how they can be useful:

1. Contents of a Power BI Template:

* Report Layout and Design: Templates include all the visual elements, such as charts, graphs, tables, and other visuals, arranged in a specific layout.
* Formatting and Themes: The template preserves the report’s formatting, including colors, fonts, and overall theme, ensuring a consistent look and feel.

Power BI templates are a powerful tool for ensuring consistency, saving time, and standardizing report creation across an organization. They are particularly useful in scenarios where multiple reports need to adhere to the same guidelines and where quick deployment of reports is necessary.

**Q.13 How do you handle incremental data refresh in Power BI?**

Incremental data refresh in Power BI allows you to load and refresh only the new or updated data rather than reloading the entire dataset each time. This is especially useful when working with large datasets where full refreshes can be time-consuming and resource-intensive.

**Q.14 What is the role of Power Query in Power BI?**

It is a powerful data connection technology that enables you to discover, connect, combine, and refine data across a wide range of sources before using it in your Power BI reports.

Here's a detailed look at the role of Power Query in Power BI:

i. Data Connection

ii. Data Transformation

iii. Data Integration

iv. Automation and Reusability

v. Data Loading

vi. User-Friendly Interface

**Q.15 Explain the difference between calculated columns and calculated tables in Power BI.**

In, Power BI, both calculated columns and calculated tables are used to derive new data elements from existing data. However, they serve different purposes and are used in distinct scenarios.

Calculated columns are used to add new fields to an existing table. These new columns can be used in visuals, filters, and calculations just like any other column in the table

Calculated tables are used to create new tables based on DAX formulas, which can involve filtering, aggregating, or summarizing data from one or more existing tables.

**Q.16 How do you create custom visuals in Power BI?**

**i**. Open your report in [Power BI Desktop](https://powerbi.microsoft.com/desktop/) or [Power BI service](https://app.powerbi.com/).

**ii**. Select the ellipsis from the Visualizations pane.

**iii.** Select Import a visual from a file from the menu.

**iv**. If you get a message cautioning you about importing custom files, select Import if you trust the source of the file.

**v.** Navigate to the folder that has the custom visual file (.pbiviz) and open it.

**vi.** When the visual has successfully imported, select OK

**vii.** The visual now appears as a new icon in the visualizations pane of the current report. Select the new visual icon to create the visual on the report canvas.

**Q.17 What are the best practices for optimizing performance in Power BI?**

Optimizing performance in Power BI is essential to ensure that reports and dashboards load quickly and efficiently, providing a smooth user experience.

Here are some best practices for optimizing performance in Power BI:

i. Efficient Data Modeling:

ii. Optimized Data Loading

iii. DAX Optimization:

iv. Efficient Data Visualization:

v. Data Model Size Management

vi. Efficient Use of DirectQuery:

vii. Effective Report Design

By following these best practices, I can significantly improve the performance of my Power BI reports and dashboards, ensuring that they are responsive and efficient, even with large datasets and complex data models.

**Q.19 How can you integrate Power BI with other Microsoft products like Azure and Office 365?**

Integrating Power BI with other Microsoft products like Azure and Office 365 allows you to leverage the full potential of the Microsoft ecosystem, enabling seamless data connectivity, collaboration, and enhanced analytics.

**Q.20 Explain the concept of aggregations in Power BI.**

Aggregations in Power BI are a powerful feature that helps optimize the performance of reports and dashboards by pre-summarizing large datasets into smaller, more manageable ones. Aggregations allow Power BI to query smaller tables that contain summarized data instead of always querying the full detail-level dataset, which can significantly improve query performance and reduce memory consumption.

At its core, aggregation involves summarizing data, such as calculating totals, averages, or counts, at a higher level of granularity. Instead of storing and querying every single transaction or detailed record, you store pre-aggregated values at certain levels (e.g., daily, monthly, or by category). Power BI can then use these aggregations to quickly answer queries that don't require detailed data.

**Q.21 How do you handle error handling and data quality in Power BI?**

Error handling and data quality management are crucial aspects of working in Power BI. Here’s how you can approach these:

i. Data Source Validation

* Check Data Types: Ensure that the data types in Power BI match those in your source. If data types are mismatched, you may encounter errors or data inconsistencies.
* Source Data Quality: Verify that your data source is clean and reliable. This includes checking for missing values, duplicates, and inconsistent data.

ii. Handling Errors During Data Import

* Data Transformations in Power Query: Use Power Query to handle errors like null values, unexpected data types, or missing columns. You can use conditional columns, replace errors, or filter out bad data during the transformation stage.
* Error Rows Handling: Identify and separate error rows using Power Query’s built-in functions. You can then decide to either fix these errors or exclude the problematic data.

iii. Data Quality Checks

* Data Profiling: Power Query provides data profiling tools that allow you to assess data quality. This includes checking column distribution, value distribution, and identifying null values or outliers.
* Custom Alerts: Set up conditional formatting or custom alerts in Power BI reports to flag potential data quality issues.

iv. Error Handling in DAX

* IFERROR Function: Use the IFERROR function in DAX to manage potential errors in your calculations. For example, you can provide a default value if an error occurs in a calculation.
* TRY Functions: Use TRY functions like TRY.CONVERT to handle errors gracefully by returning a blank or a default value when an error occurs.

v. Data Validation in Reports

* Visual-Level Validation: Ensure that your visuals are accurately representing the data. Use slicers, filters, and cross-highlighting to test different scenarios and validate that the data behaves as expected.
* Consistency Checks: Regularly compare your Power BI reports with source data to ensure consistency. This helps in identifying any data discrepancies early on.

By incorporating these practices, you can effectively manage error handling and data quality in Power BI, ensuring that your reports are accurate, reliable, and useful for decision-making.

**Q.22 What is the purpose of Power BI Embedded and when would you use it?**

Power BI Embedded is a service provided by Microsoft that allows developers and organizations to embed Power BI reports, dashboards, and visualizations into their own applications, websites, or portals. This service provides a way to offer rich data analytics and visualizations to users within the context of another application, without requiring them to leave the application to access Power BI**.**

**When to Use Power BI Embedded:**

Embedding in SaaS Applications: If you’re developing a SaaS application that requires embedded analytics, Power BI Embedded is ideal. It allows you to offer advanced reporting and visualization features without requiring your users to have a separate Power BI subscription.

* Custom Portals or Intranets:
* Providing White-Labeled Analytics:
* Interactive Reporting in Customer Applications:

Power BI Embedded is designed for developers and organizations that need to integrate powerful data analytics into their applications, websites, or portals, providing a seamless, branded, and scalable experience.