Power Bi Assignment

**1) What is Power BI and how does it differ from Excel?**  
Power BI is a business intelligence tool used to create interactive reports and dashboards by connecting to various data sources, transforming data, and visualizing it.

* **Differences**:
  + **Visualization**: Power BI provides advanced, interactive visualizations compared to Excel's static charts.
  + **Data Volume**: Power BI handles larger datasets efficiently.
  + **Integration**: Power BI integrates seamlessly with cloud services and real-time data sources, unlike Excel.
  + **Automation**: Power BI supports automatic data refresh, while Excel requires manual updates.

**2) Explain the concept of data modeling in Power BI.**  
Data modeling in Power BI involves organizing and structuring data from multiple sources into a logical format by creating relationships between tables.

* It uses primary keys and foreign keys to define relationships.
* A well-structured data model enables efficient use of DAX calculations and allows for better analysis and reporting.

**3) What are the different types of connections available in Power BI?**  
Power BI supports the following connection types:

* **Import**: Data is imported into Power BI and stored in-memory for fast performance.
* **DirectQuery**: Queries data directly from the source without importing it.
* **Live Connection**: Connects to live data sources such as SQL Server Analysis Services (SSAS).
* **Composite Models**: Combines both Import and DirectQuery in a single model.

**4) How do you handle data transformation in Power BI?**  
Data transformation in Power BI is performed using the Power Query Editor, where you can:

* Clean data by removing duplicates or handling missing values.
* Perform operations like merging or appending tables.
* Rename columns, change data types, and split or group data.
* Use Applied Steps to track transformations and revert changes if necessary.

**5) What is DAX (Data Analysis Expressions) and why is it important in Power BI?**  
DAX is a formula language in Power BI used for creating custom calculations, aggregations, and filtering data.

* It is essential for:
  + Defining measures and calculated columns.
  + Performing advanced analytics such as time-based calculations.
  + Enabling dynamic reports and dashboards.
* Example of DAX formula:  
  Total Sales = SUM(Sales[Amount]).

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

* **Calculated Columns**:
  + Created row-by-row in a table.
  + Stored in the data model, increasing file size.
  + Example: Profit = Sales[Revenue] - Sales[Cost].
* **Measures**:
  + Calculated dynamically during report interactions.
  + Does not increase file size.
  + Example: Total Sales = SUM(Sales[Amount]).

**7) How do you handle relationships between tables in Power BI?**  
Relationships between tables in Power BI are handled using the **Manage Relationships** feature:

* Define relationships such as one-to-one, one-to-many, or many-to-many.
* Use primary and foreign keys for accurate data linking.
* Control the **cross-filter direction** to determine how filters propagate.

**8) What is the purpose of a Power BI Gateway?**  
Power BI Gateway is a bridge that securely connects on-premises data sources to the Power BI Service.

* It allows scheduled data refresh for on-premises datasets.
* Ensures secure data transfer to the cloud for reporting.

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

1. Go to the dataset in Power BI Service.
2. Click on **Settings**.
3. Under **Scheduled Refresh**, set the frequency and time for the refresh.
4. Ensure a Power BI Gateway is configured for on-premises data sources.

**10) Explain the concept of row-level security in Power BI.**  
Row-Level Security (RLS) restricts access to specific rows in a dataset based on user roles.

* Roles are defined in Power BI Desktop using DAX filters.
* After publishing to Power BI Service, roles are assigned to users or groups.
* Example: Sales representatives can view only data for their assigned region.

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

* **Power BI Desktop**: A Windows-based application for creating reports, data modeling, and transforming data.
* **Power BI Service**: A cloud-based platform for sharing, collaborating, and viewing reports and dashboards.
* Key Differences:
  + Desktop is for report creation; Service is for sharing and collaboration.
  + Data refresh and automation occur in the Service, not the Desktop.

**12) Explain the concept of Direct Query in Power BI.**  
Direct Query allows Power BI to query data directly from the source without importing it.

* It is ideal for large datasets or when data needs to stay updated in real-time.
* Queries are sent to the source every time a user interacts with a report.
* It minimizes storage requirements but may impact performance due to query execution time.

**13) What are Power BI templates and how are they useful?**  
Power BI templates (.pbit) are pre-defined files that contain report layouts, visualizations, and queries without including the actual data.

* Useful for reusing report designs across projects.
* Allows sharing standardized reporting structures with different teams.

**14) How do you handle incremental data refresh in Power BI?**  
Incremental data refresh loads only new or changed data, saving time and resources.

1. Define a **RangeStart** and **RangeEnd** parameter in Power Query.
2. Apply filters to limit the data range.
3. Enable incremental refresh in Power BI Service under dataset settings.

**15) What is the role of Power Query in Power BI?**  
Power Query is a data transformation and preparation tool in Power BI.

* Allows users to clean, shape, and combine data from multiple sources.
* Provides a no-code interface for common transformations.
* Uses M language for advanced transformations.

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

* **Calculated Columns**:
  + Created within a table and calculated row-by-row.
  + Example: Profit = Sales[Revenue] - Sales[Cost].
* **Calculated Tables**:
  + Creates an entirely new table based on a DAX expression.
  + Example: FilteredSales = FILTER(Sales, Sales[Region] = "West").

**17) How do you create custom visuals in Power BI?**  
Custom visuals can be created using the **Power BI Developer Tools**:

1. Install Node.js and Power BI Visual Tools (PBIVIZ).
2. Use TypeScript and D3.js to build the visual.
3. Package the visual into a .pbiviz file.
4. Import the visual into Power BI Desktop for use.

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

* Use **Import Mode** for faster performance.
* Optimize data models by reducing the number of columns and rows.
* Use **measures** instead of calculated columns.
* Aggregate data at the source level when possible.
* Limit the use of complex visuals and filters.

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

* **Azure Integration**: Connect to Azure SQL Database, Data Lake, and Synapse Analytics for real-time data access.
* **Office 365 Integration**: Share reports via Teams, embed in SharePoint, or use Power Automate for workflows.
* Use **Azure Active Directory (AAD)** for secure authentication.

**20) Explain the concept of aggregations in Power BI.**  
Aggregations improve performance by summarizing data at a higher level and reducing the volume of data queried.

* Define aggregation tables for frequently used metrics.
* Power BI automatically directs queries to aggregation tables when possible.

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

* Use **Power Query Editor** to identify and fix errors, such as missing or incorrect data.
* Implement conditional columns to handle invalid values.
* Enable error-handling settings in DAX expressions (e.g., IFERROR).
* Monitor data refresh logs for issues.

**22) What is the purpose of Power BI Embedded and when would you use it?**  
Power BI Embedded is a service for embedding Power BI reports and dashboards into external applications.

* Used by ISVs (Independent Software Vendors) to provide analytics in their apps.
* Allows businesses to share insights without giving direct access to Power BI.