Power BI Course Content - BI2AI

1 Introduction to Power BI, Power Query & DAX

- Overview of Power BI
- ⭐ Importance of Power Query in Data Transformation
- Power BI Components & Architecture
- Installing & Setting up Power BI Desktop
- Understanding the Power BI Workflow

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2 Data Extraction & Sources

- Importing data from various sources (Excel, CSV, SQL, Web, APIs)
- ⭐ Using Power Query to Connect with Databases
- Handling different data formats (Structured, Semi-Structured)
- Extracting data from Azure, SharePoint & Cloud Services
- Using Python & R scripts in Power BI

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3 Data Transformation – Shaping & Cleaning Data

- ⭐ Data Cleaning & Data Profiling Techniques
- ⭐ Transforming Data Types & Formatting
- ⭐ Handling Missing Data & Duplicates
- Using Applied Steps (Query Settings)
- Pivoting & Unpivoting Data
- Splitting & Merging Columns
- Creating Custom & Conditional Columns
- Grouping, Sorting, and Filtering Data
- ⭐ Using Parameters in Power Query
- Advanced Query Editor & M Code

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4 Combining & Merging Data

- ⭐ Append vs Merge Queries (Inner, Outer, Left, Right Joins)
- Using Reference & Duplicate Queries

- Working with Relationship Management in Power BI
- ⭐ Best Practices for Data Modeling in Power BI

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5 Power Query Advanced Features

- ⭐ Understanding M Language (Power Query Formula Language)
- ⭐ Writing Custom Functions in M
- Performance Optimization Techniques
- Query Folding Concept
- Handling Performance Issues in Large Datasets

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6 Power BI & DAX Integration

- Introduction to DAX (Data Analysis Expressions)
- ⭐ Calculated Columns vs Measures
- ⭐ Important DAX Functions for Interviews:
    - Time Intelligence (YTD, QTD, MTD)
    - Row Iterators (SUMX, AVERAGEX)
    - Logical & Conditional Functions (IF, SWITCH)
    - Ranking & Cumulative Calculations

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7 Data Loading & Report Building

- Loading Transformed Data into Power BI
- Creating Reports & Dashboards
- Applying Filters & Slicers
- ⭐ Best Practices for Power BI Performance Optimization
- Publishing to Power BI Service
- Power BI Data Refresh & Scheduling

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8 Row-Level Security (RLS)

- Static Row-Level Security
- ⭐ Dynamic Row-Level Security

- Understanding **User Name** vs **User Principal Name**

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9 Visualization in Power BI

Basic Charts

✅ Clustered Bar Chart
✅ Stacked Bar Chart
✅ Clustered Column Chart
✅ Stacked Column Chart
✅ 100% Stacked Bar Chart
✅ 100% Stacked Column Chart
✅ Line Chart
✅ Area Chart
✅ Stacked Area Chart
✅ Ribbon Chart

Combo Charts

✅ Line and Clustered Column Chart
✅ Line and Stacked Column Chart

Pie and Donut Charts

✅ Pie Chart
✅ Donut Chart

Maps & Geospatial Visuals

✅ Basic Map
✅ Filled Map (Choropleth Map)

Tables & Matrices

✅ Table
✅ Matrix

KPI & Cards

✅ Card
✅ Multi-row Card
✅ KPI (Key Performance Indicator)

Gauges & Charts

✅ Gauge
✅ Scatter Chart
✅ Waterfall Chart
✅ Funnel Chart

Tree & Hierarchical Visuals

✅ Treemap

Other Advanced Visuals

✅ Smart Narrative
✅ Q&A Visual
✅ Slicer

Custom Visuals

✅ Image Generator
✅ Timeline Visual
✅ Custom Visuals from Microsoft Store

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10 DAX Functions in Power BI

🟢 **Aggregation Functions**

✅ SUM() – Adds up all values in a column
✅ SUMX() – Iterates over a table and sums up values row by row
✅ AVERAGE() – Calculates the mean of a column
✅ AVERAGEX() – Calculates the mean iteratively over a table
✅ MIN(), MAX() – Returns the smallest or largest value in a column
✅ COUNT(), COUNTX() – Counts the number of rows in a column
✅ DISTINCTCOUNT() – Counts unique values in a column

🔵 **Logical & Conditional Functions**

✅ IF(), IFERROR() – Returns different values based on a condition
✅ SWITCH() – Replaces nested IFs
✅ AND(), OR(), NOT() – Logical operations

🟠 **Filter Functions**

✅ FILTER() – Returns a filtered table based on a condition
✅ ALL(), ALLEXCEPT(), ALLSELECTED() – Controls filter context
✅ KEEPFILTERS(), REMOVEFILTERS() – Preserves or clears filters

🟣 **Time Intelligence Functions**

✅ TODAY(), NOW() – Returns the current date and time
✅ YEAR(), MONTH(), DAY() – Extracts parts of a date
✅ DATESYTD(), DATESMTD(), DATESQTD() – Year-to-date, month-to-date calculations
✅ PREVIOUSMONTH(), PREVIOUSYEAR() – Time-based calculations

🟢 **Ranking & Hierarchical Functions**

✅ RANKX() – Returns the rank of a value
✅ TOPN() – Returns the top N rows based on a measure

🔴 Relationship & Lookup Functions

✅ RELATED() – Fetches a value from a related table
✅ LOOKUPVALUE() – Retrieves a value based on a condition

🟠 Text Functions

✅ CONCATENATE(), COMBINEVALUES() – Joins text values
✅ LEFT(), RIGHT(), MID() – Extracts parts of a string
✅ SEARCH() – Finds a substring
✅ FORMAT() – Converts a value to a specific format

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11 Data Modeling & Relationships in Power BI

🔷 Types of Relationships

✅ One-to-Many (1:M) – Most common
✅ Many-to-Many (M:M) – Using bridge tables
✅ One-to-One (1:1) – Rare but used in specific cases

🔷 Schema Design

⭐ Star Schema (Recommended)

✅ Uses a **Fact Table** & **Dimension Tables**
✅ Faster performance, optimized for Power BI

❄️ Snowflake Schema (Less Recommended)

✅ Uses normalized dimensions
✅ Slower due to multiple joins

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12 Power BI Performance Optimization

✅ Use **Star Schema** instead of Snowflake
✅ **Remove unnecessary columns** to reduce memory usage
✅ **Avoid using too many visuals** on one page
✅ **Use variables in DAX** instead of repeated calculations
✅ **Optimize relationships** – Avoid bi-directional filters
✅ **Use Aggregations** to speed up report loading
✅ **Use Incremental Refresh** for large datasets

MS SQL Course Content - BI2AI

1 Introduction to MS SQL Server

- Overview of **SQL Server** & its Architecture
- Installing and Setting up **MS SQL Server**
- **SQL Server Management Studio (SSMS)** – Interface & Navigation
- Understanding **Databases, Schemas & Tables**
- **Relational Database Management System (RDBMS)** Concepts

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2 Data Types & Constraints

- **Numeric Data Types** (INT, BIGINT, DECIMAL, FLOAT)
- **String Data Types** (VARCHAR, CHAR, TEXT)
- **Date & Time Data Types** (DATE, DATETIME, TIME)
- **Boolean & Other Data Types** (BIT, XML, JSON)
- **Primary Key, Foreign Key & Unique Constraints**
- **Check & Default Constraints**
- **Not Null & Identity Columns**

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3 SQL Queries – SELECT & Filtering Data

- **SELECT Statement** – Fetching Data
- **WHERE Clause** – Filtering Records
- **ORDER BY Clause** – Sorting Data
- **DISTINCT Clause** – Removing Duplicates
- **TOP & LIMIT Clauses** – Fetching Limited Records
- **BETWEEN, IN, LIKE, IS NULL Operators**

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4 SQL Joins & Relationships

- **INNER JOIN** – Fetch Matching Records from Both Tables
- **LEFT JOIN** – Fetch All from Left Table, Matched from Right
- **RIGHT JOIN** – Fetch All from Right Table, Matched from Left
- **FULL OUTER JOIN** – Fetch All Records from Both Tables
- **CROSS JOIN** – Cartesian Product of Two Tables

- **SELF JOIN** – Joining Table with Itself

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5 Aggregate Functions & Grouping Data

✅ COUNT() – Counts Rows in a Table
✅ SUM() – Calculates Total of Numeric Column
✅ AVG() – Computes Average of a Column
✅ MIN() – Finds the Smallest Value in a Column
✅ MAX() – Finds the Largest Value in a Column
✅ GROUP BY – Groups Data for Aggregation
✅ HAVING – Filters Aggregated Results

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6 Subqueries & Common Table Expressions (CTE)

- **Simple Subqueries** – With where clause
- **WITH Clause** – Creating Temporary CTEs

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7 Data Modification – INSERT, UPDATE, DELETE

✅ INSERT INTO – Adding New Records
✅ UPDATE – Modifying Existing Records
✅ DELETE FROM – Removing Records from a Table
✅ MERGE – Combining INSERT, UPDATE & DELETE

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8 SQL Functions – Scalar & Table-Valued

🟢 **String Functions**

✅ LEN() – Returns Length of a String
✅ LEFT(), RIGHT() – Extracts Characters from a String
✅ SUBSTRING() – Extracts Substring from a String
✅ REPLACE() – Replaces Text in a String
✅ LOWER(), UPPER() – Converts Case of a String
✅ TRIM(), LTRIM(), RTRIM() – Removes Whitespace

🔵 **Date & Time Functions**

✅ GETDATE() – Returns Current Date & Time
✅ DATEADD() – Adds/Subtracts Time from a Date
✅ DATEDIFF() – Returns Difference Between Two Dates
✅ FORMAT() – Formats Date & Time

🟠 **Mathematical Functions**

✅ ABS() – Returns Absolute Value
✅ ROUND() – Rounds a Number to Specified Decimal Places
✅ CEILING() – Rounds Up a Number
✅ FLOOR() – Rounds Down a Number

🟣 **Conversion Functions**

✅ CAST() – Converts Data Type of a Value
✅ CONVERT() – Converts Data Type with Formatting

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9 Indexing & Query Performance Optimization

- **Creating & Dropping Indexes**
- **Optimizing Joins & WHERE Conditions**
- **Using Proper Data Types**

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11 Stored Procedures & Triggers

✅ CREATE PROCEDURE – Defining a Stored Procedure
✅ EXEC – Executing a Stored Procedure
✅ ALTER PROCEDURE – Modifying a Stored Procedure
✅ DROP PROCEDURE – Removing a Stored Procedure

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12 Views SQL

- **Creating & Using Views**
- **Drop Views**

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13 Advanced SQL – Window Functions & Pivoting

✅ ROW_NUMBER() – Assigns Row Numbers Based on Order
✅ RANK() – Returns Rank of Each Row
✅ DENSE_RANK() – Similar to RANK but Without Gaps
✅ PIVOT – Converts Rows into Columns
✅ UNPIVOT – Converts Columns into Rows