

# SQL School <sup>TM</sup>

## Quality Training Assured

Complete Practical; Real-time Job Oriented Training

### Azure Data Engineer

	PLAN A	PLAN B	PLAN C
Training Details	Azure Data Engineer	SQL & T-SQL Queries Azure Data Engineer	SQL & T-SQL Queries Azure Data Engineer Power BI
Azure Fundamentals, Migrations	✓	✓	✓
ADF: Azure Data Factory	✓	✓	✓
ADF: Pipelines, ETL, Data Flows	✓	✓	✓
ADF: Data Wrangling & Polybase	✓	✓	✓
Synapse: Configuration, Loads	✓	✓	✓
Synapse: ETL with ADF, DWH	✓	✓	✓
Synapse: MPP, cDWH, Tuning	✓	✓	✓
Storage: Blob, Tables, Queues	✓	✓	✓
ADLS: Azure Data Lake Storage	✓	✓	✓
ADLA: Azure Data Lake Analytics	✓	✓	✓
Stream Analytics: IoT, Event Hubs	✓	✓	✓
ADB: Databricks Tables, Jobs	✓	✓	✓
ADB: Spark Clusters, Notebooks	✓	✓	✓
Cosmos: Distribute Data, ETL	✓	✓	✓
Cosmos: Integration with ADF	✓	✓	✓
TSQL: Database Basics, T-SQL	X	✓	✓
TSQL: Constraints, Joins, Queries	X	✓	✓
TSQL: Views, Group By, Self Joins	X	✓	✓
Power B: Report Design, Visuals	X	X	✓
Power BI: M Lang, DAX for ETL	X	X	✓
Power BI: Cloud, Apps, Tenant	X	X	✓
Power BI: Azure, Report Server	X	X	✓
<b>TOTAL DURATION</b>	6 Weeks	8 Weeks	12 Weeks

**Trainer:** Mr. Sai Phanindra T [15+ Yrs of Real-time Exp]. Profile @ [linkedin.com/in/saiphanindra](https://www.linkedin.com/in/saiphanindra)

Training Module		Duration	Plan A	Plan B	Plan C
Module 1	<b>Azure Data Engineer &amp; DP 200, DP 201</b> [ADF, Synapse, Storage, Data Lake, Databricks, Cosmos]	6 W	✓	✓	✓
Module 2	SQL Basics, T-SQL Queries	2 W	X	✓	✓
Module 3	Power BI & Azure Data Analytics	4 W	X	X	✓
<b>Total Duration</b>			<b>6 W</b>	<b>8 W</b>	<b>12 W</b>

## Module 1: Azure Data Factory [ADF], Synapse

Applicable for All Plans

### AZURE FUNDAMENTALS & DATA ENGINEER INTRODUCTION

Azure Data Engineering - Job Roles; Cloud, Azure Platforms : Advantages; IaaS, SaaS, PaaS Implementations; Microsoft Azure & Data Engineering; Azure SQL Database, Azure Synapse; Azure Data Factory, Azure Databricks; Azure Data Lake, Azure Analytics; DP 200, DP 201 Certification Exams; Subscription and Azure Resources; Azure Portal : Resources, Dashboards; Creating Resource Groups, Creating Azure SQL Server, Region; Creating Azure SQL Databases; Compute and Storage, DTU Plans; Firewall Configurations in Azure; SSMS Tool, ADS Tools. Connection Tests; Azure Migrations;

### Chapter 1: Azure Data Factory (ADF), Synapse Intro

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Azure Data Factory (ADF) - Purpose and Operations; Hybrid Data Ingestion, Data Orchestration & ETL; Data Processing and Data Movement in ADF; Data Pipeline Environment, Data Flow, Wrangling; Data Mashup and ETL Operations in Azure; Azure Synapse (SQL Pool / Data Warehouse); Enterprise Data Warehousing with Synapse; Azure Synapse (SQL Pools) Creation in SQL Server; DWUs : Data Warehouse Units & Resources; Big Data Storage and Analytics; Key Benefits - Column Store Technology; Automated Tuning, Maintenance & Security; Access, Pause/Resume Operations with Synapse; Testing with SSMS & ADS Tools;

### Chapter 2: Azure Synapse Architecture, Operations

MPP - Massively Parallel Processing in Synapse; Control Node, Compute Node and DM Concepts; Azure Storage and Parallel Queries; DWUs; Table Types: Round Robin, Replicate & Hash; Service Level Objective (SLO), Sharding Concepts; Resource Classes; Gen 1 and Gen 2 Service Levels; Regular Table Creation, Storage & Distribution; CTAS: Create Table As Select. Cloning, Indexes; Distribution Types and Time Based Partitions; Creating Logins and Users in SQL Server; Creating Users and Roles in Synapse SQL DW; Using Resource Classes (RC); Blob Data Import; COPY INTO Statement in T-SQL for Data Loads; Data Monitoring @ Dynamic Management Views;

### Chapter 3: Azure Data Factory - Architecture, Usage

Design, Publish and Trigger Options in ADF; ETL Concepts, ADF Architecture and Pipelining; DIU : Data Integration Unit; Nodes & Concurrency; Linked Service, Dataset, Activities & DIU Concept; Staging Data - Advantages and Pricing Options; Copy Options and Polybase; Compression Options; Mapping Data Flow & Wrangling Data Flow; Pipeline Creation using Copy Data Tool in ADF; Azure BLOB Storage Container to Synapse DB; Creating Linked Service and Datasets. Mapping; Polybase Setting; Staging and Bulk Import Options; Validations & Publishing ADF Pipeline to ADF Store; Pipeline Execution (Triggering) & Monitoring; Using Auto Resolving Integration Runtime (IR);

#### **Chapter 4: Azure Data Lake Storage with ADF**

Creating Azure Data Lake Storage Account; Data Lake Gen 2 Hierarchical Namespace Option; Excel Uploads to Container, Data Preview Options; Pipeline Properties - Parameters, Variables, OUT; Copy Data Tool: Timeout, Retry and Schedule; Secured Input and Output. Reusing Linked Services; Sink Options; Column Mapping and Pipeline Triggers; Azure SQL Database Loads to Synapse in ADF; Using Azure SQL Database Tables - Single, Multiple; For Each Loops and Options with ADF Pipelines; Copy Data Tool and Pipeline Edits in ADF Portal; Task Schedules and Tumbling Window; Retries; Pipeline Execution & Runs;

#### **Chapter 5: On-Premise Data Sources to Azure**

Working with On-Premise Data Sources with Azure; Install and Use Self Hosted Integration Runtime; Access Keys Generation & Use. Configuration Tools; Remote Linked Service Configuration in ADF Windows Authentication with Integration Runtime; Linked Services for Source and Sink Connections; Incompatible Rows Skips and Fault Tolerance; Table Mapping, Column Mapping, Fixing Errors; Using Synapse SQL DW Connection with Onpremise; Staged Data Copy; Azure Blob Storage for Staging. Polybase Options; Connections Management - Preview Options; Pipeline Execution Monitoring, Run IDs & Errors;

#### **Chapter 6: Incremental Loads with ADF - 1**

ADF Pipelines with Stored Procedures for ETL; Watermark Tables and Timestamp Columns; Incremental Data Loads to Historical Data Store; New Rows and Old Rows Identification Options; Storing High Water Mark Tables & Columns; Stored Procedures for Timestamp Updates; Azure Storage Container - Incremental Data Loads; Lookup Activity in ADF Portal & ModifiedDate; Writing Expressions in ADF Portal for Lookup; Writing Expressions in ADF Portal for Source; @activity with output Pipelines and Data Window; SQL Queries for Dataset Creation and Data Fetch; Concat Function, Run IDs Expressions For File Names; ADF Pipeline Validation, Trigger and Monitoring;

#### **Chapter 7: Incremental Loads with ADF - 2**

Incremental Loads Pipeline Design in ADF; Working with Azure Storage Containers; Pipeline Executions and Incremental Schedules; Regular Schedules, Tumbling Windows, Retries; Binary Copy, Last Modified Date in Blob; Pipeline Trigger Schedules & Modifications (Edits); Incompatible Rows Skips and Fault Tolerance; Incremental Loads with Multiple Tables. SQL DBs; Stored Procedures and Loops; Configuring Source Tables For ETL; Pre-Copy Scripts; Using @{item()} Option with Dynamic Connections; Table\_Schema for Column Mapping; Writing Expressions in ADF. Dynamic Loads; Staging and Performance for ADF Loads;

#### **Chapter 8: Mapping Data Flow in ADF**

Data Flow Tasks in ADF Pipelines. Creation Options; Transformation Editors, Settings and Parameters; Comparing ADF Pipelines and ADF Data Flow; Debugging: ADF Managed Execution Clusters; Apache Spark Clusters For Data Flow Debugging; Authoring Data Flow, Graph & Configuration Panel; Transformation Setting, Optimize & Data Inspect; Conditional Split Transformation in ADF; Pivot Transformation in Mapping Data Flow; Generating Pivot Column & Aggregation Functions; Pivot Transformation Configuration, Pivot Settings; Pivot Key Selection, Value and Enabling Null Values; Pivoted Columns, Column Pattern & Optimization; Column Prefix, Help Graphic, Pivot Metadata;

#### **Chapter 9: Wrangling Data Flow in ADF**

Advantages of with Wrangling Data Flow in ADF; Power Query Online Editor for Mashup Functions; Spark Code for Cloud Scale Executions in ADF; Wrangling Data For Less Formal Analytic Scenarios; Supported Sources and Sinks with Wrangling DF; Github Integration with ADF Account & Repository; Master and User Defined Data Stores in GitHub; Transformation Operations in Data Wrangling; Group By, Aggregate, Column Rename, Reordering; Pivot Key, Aggregate Pivot Columns in Power Query; Data Type Modifications

- Azure Data Lake Storage; Heterogenous Data in Power Query; Differences with ADF Publish & GitHub;

### **Chapter 10: End to End Implementation with ADF**

Azure Data Share - Configuration & Real-time use; Azure Data Share - PaaS Tool for ADF Sink Shares; Importing BACPAC Files into Azure using SSMS; Azure SQL Server to Data Lake Storage - Gen 2; Data Filtering, Aggregations and Join Options in ADF; Spark Clusters for Data Flow Debugging, Preview; Working with Multi Level Data Flows in ADF Pipeline; Data Loads to Azure Synapse (DWH) from ADLS; Data Load Settings and Optimization Options; ADF Pipeline Debugging without Publish in ADF; Creating Shares using Azure Synapse Data Tables; Data Ingestion and Consumption with- Synapse; Recipients and Azure Active Directory Accounts; Run IDs, Monitoring, Cost Analysis and Metrics;

## **Module 2: Azure Storage, Data Lake [U-SQL], Stream Analytics**

Applicable for All Plans

### **Chapter 11: Azure Storage Concepts**

Azure Storage : Microsoft Managed Service; Azure Storage Services and Types - Uses; High Availability, Durability, Scalability Options; Blob: Binary Large Object (File System) Storage; General Purpose : Gen 1 and Gen 2 Versions; Blobs, File Share, Queues and Tables in Azure; Data Lake Gen 2 Operations with Azure Storage; Blob - File System Storage and Object Storage; Queues - Message Store and Secured Access; File Share Storage - SMB [Server Message Block]; Azure Tables - Unstructured & Semi Structured; Block Blob, Append Blob and Page Blobs; HTTP & HTTPS Access to Azure Storage Services; Azure Storage Containers, Access End Points;

### **Chapter 12: Azure Tables & Azure BLOB**

Azure Tables - Real-time Use, NoSQL Support; Schema-less Design and Access Options; Structured and Relational Data Storage; Tables, Entities and Properties Concepts; Creating Azure Storage Account for Table Store; Azure Tables in Portal - GUI and Data Types; Azure Tables using Storage Explorer Tool; Querying Azure Tables with Query Builder; Data Imports From Excel and CSV Files; BLOB Data Imports using T-SQL Queries; SAS - Shared Access Signature Generation; CSV File - Uploads, Downloads, Edits, Keys; Master Keys, Credentials; BULK INSERT and Data Imports;

### **Chapter 13: Azure Files, Queues & Security**

Azure Files - SMB Protocol, Creation and Usage; Shared Access, Fully Managed & Resiliency; Performance and Size Requirements for Shares; Azure Storage Explorer Tool for File Access; Azure Queues - Message Queues and Limitations; Adding Messages, Queuing and De-Queuing; Clear Queue and Messages Access from Explorer; Azure Storage Security - Storage Account Keys; Shared Access Keys - Primary, Secondary Keys; SAS - Shared Access Signature Generation, Use; Encryption Options and Data Security at REST; CORS Support (Cross Origin Resource Sharing); Auditing Access and Network Access Rules; Firewalls, Advanced Threat Protection;

### **Chapter 14: Azure Monitor, KQL, Power Shell**

Azure Monitor Components for Storage; Metrics and Logs with Azure Storage; Monitoring the Azure Storage Namespaces; Adding KQL Metrics; Account, Blob and File; Total Ingress & Egress Chart; Average Latency; Request Breakdowns, Signal Logic Options; Alerts, Conditions,

Notifications and Emails; Power Shell Commands for Azure Storage; PowerShell Remoting: Scripts and cmdlets; Background Jobs, Transactions & Eventing; Network File Transfer & Power Shell Data Types; \$ # Prefixes. Creating Azure Resource Group; Creating Storage Account, Context and Files;

### **Chapter 15: Azure Stream Analytics, Event Hubs**

Azure Stream Analytics - Patterns, Relations; Ingest, Analyze & Deliver; Stream Analytics Jobs; IoT Hub, IoT Devices; Transformation Queries; IoT Simulator, Stream Analytics Jobs Monitoring; Stream Analytics Jobs: Start / Stop / Edits; Streaming Units, Error Handling Options; Test Result Schema, Output Schema in Hubs; IoT Hubs with IoT Events: Azure SQL DB Events; Azure Stream Analytics Integration & ETL; Event Hub Policies and Consumer Groups; Power BI Reports from Azure Storage; Shared Access Signature with Power BI; Data Visualizations;

### **Chapter 16: Azure Data Lake Storage (ADLS)**

Azure Data Lake Storage - Semi Structured Data; LIVE Edits, Permissions and Real-time Sharing; Apache Hadoop and based on Apache YARN; DFS file system in cloud with Map Reduce; Authentication, Access Control & Encryption; Azure Data Lake Gen 1 - Deployment, Usage; Encryption Options with Service Master Key; ADLS - Pricing Options and Instance Details; Using Data Explorer Tool in Azure Portal; Using Azure Storage Explorer Tool; File Preview and Header Row Promotion; Download / Rename / Access Properties; Folder Upload and Download; Quick Access; Cached File Access and Folder Statistics;

### **Chapter 17: ADLS Monitoring, Alerts**

Azure Data Lake Monitoring and Alerts; ADL Metrics, Storage Utilization Reports; Reads and Writes Metrics; Charts & Metrics; Data Reads, Writes, Requests & Total Storage; Report Shares, Download to Excel, ADL Alerts; Scope, Condition, Action Groups & Alert Rules; Email Notifications and Scope Options; ADLS - Security Management and Levels; ADLS Resource Levels, Folder / File Level; IP Address; Role Based Access (RBAC); Access Control Lists (ACL); POSIX - Access ACLs and Default ACLs; ACL Permissions; Read, Write & Execute; Super User, RWX, Owing Users & Groups;

### **Chapter 18: Azure Key Vaults & ADL Analytics**

Azure Passwords, Keys and Certificates; Azure Key Vaults - Name and Vault URI; Inbuilt Managed Key and Azure Key Vault; Standard Type, Premium Type Azure Key Vaults; Identify Vault Name, Vault URI: Access Points; Secret Page, Key Backups and Key Restores; Adding Keys to Azure Vaults. Key Type, Size; Azure Data Lake Analytics (ADLA) : Creation; Dynamic Scaling and U-SQL Implementation; Azure Data Lake Storage Requirements for ADLA; Jobs Creation and Execution Environment; Distributed Runtime Environment in ADLA; Analytical On-demand Job Service; Exabyte Scale and Data Lake Options in USQL;

### **Chapter 19: Data Lake Analytics, U-SQL Level 1**

Azure Data Lake Analytics : Advantages, Usage; USQL - Big Data Query Processing Language; Azure Portal and Visual Studio Access Options; Aggregate, Analytical and Ranking Functions; U-SQL Catalog : Databases and Objects; Technical Features : Rowsets, Types, Expressions; Creating U-SQL Jobs For Data Insertions; Creating U-SQL Jobs for Data Storage, Retrieval; SELECT, EXTARCT and OUTPUT Clauses; USING, Outputters and Extractors Classes; Job Execution, Script, Job Graph and Diagnosis; AU Allocation for Job Executions; Script Reuse. Errors: CSC, User and System;

### **Chapter 20: Data Lake Analytics, U-SQL Level 2**

U-SQL Operations with Visual Studio Extensions; Script.usql Coding, Executions, Job Graphs; ADLA Account and Local Job Executions; Metadata, State History and AU Analysis; Working with TSV Data Sources in ADLS; Extract, Format and Data Loads with U-SQL; Adding New Columns to Files with U-SQL; Creating Databases, Tables with ADLA Jobs; Managed Tables and External Tables in ADLA; Creating Tables from a Query - Rowset Option; Cloning and Copying Tables using U-SQL Jobs; Clustered Indexes, Hash Distributed Tables; TVF - Table Valued Functions, Data Retrieval; SELECT, TOP, FETCH, Sample & Row\_Number;

## **Module 3: Azure Databricks, Azure Cosmos, Azure Functions**

Applicable for All Plans

### **Chapter 21: Azure Databricks Architecture, Configuration**

Azure Databricks Concepts - Spark Based Analytics; Interactive Workspace: Data Science, Data Analytics; Collaboration For Workspace, Databricks Runtime; Server less Options, Storage, ETL and Analytics; Databricks File System (DBFS): Real-time Usage; Databricks Notebooks: SQL, Spark, Python, Scala; Apache Spark Eco System, Security & Integrations; Azure Databricks Service Deployments, Workspace; Databricks Pricing Tiers & Databricks Units (DBUs); Databricks Storage Account, Network Security Group; Databricks Clusters; Standard and High Concurrency Clusters. Pools; Databricks Runtime. Capacity: CPU, Memory; Autopilot; Worker and Driver Nodes;

### **Chapter 22: Databricks Notebooks & Spark Jobs**

Working with Databricks Workspace and Clusters; File Store : Files and Tables. UI and Notebook Options; Sample Data File Uploads to DBFS. Table Creations; Notebooks : Creation, Cells and Cmd Executions; Python Notebooks : Sample Commands, Access; Data Frames Creation and Data Access. Analytics; Reports, Graphs, Plot Options and Custom UI; Spark Jobs with Azure Open Datasets in Databricks; Creating Notebooks For Azure BLOB Data Access; Remote Data Reads using Spark Jobs in Notebooks; Parquet Files and Data Frames with Spark Jobs; Select Queries on Temporary Data Views, Reports; Bar Chart Options and Custom Reports, Analytics; ADB Plots: Source, Id, Aggregation and Display Type;

### **Chapter 23: Python Notebooks & Operations**

Databricks Notebooks, Cells and Usage Options; Execution Context, Idle Context and Evictions; Common Tasks with Azure Databricks Notebooks; Reading Cluster Configuration Metadata; Notebook Schedules, Cloning, Renames, URL Path; Exporting and Importing of Notebooks; Re-use; Cluster Operations with Notebooks, Configurations; Python Notebooks : Creation and Magic Commands; Importing CSV Files to DBFS. Accessing using Python; Using JDBC Hosts, Connection String and Data Access; Creating SQL Contexts & SQL Database Connections; Data Imports with pyspark Assemblies in Notebooks; Using Pandas Data frames in Python Notebooks; Creating Tables and Data Imports using Notebooks;

### **Chapter 24: Scala Notebooks & SQL Notebooks**

Scala Notebooks and Big Data Load Options; Using CSV Files from Databricks File System Sources; Defining Data Source Connections with Spark; Driver Classes and SQL Server Drivers for Azure; Creating Data Frames in Spark, Reading Data; Data Display, Data Transformations with Spark; Data Loads to Azure SQL Synapse. Auto Table Creates; SQL Notebooks and Data Frame Options, Data Access; Using Magic Commands with Python for Data Access; Data Frame Views, data.take(n) for Unit Testing; SQL Context for Data Representations, Analytics; Using SQL Queries in Notebooks: SELECT, WHERE; ORDER BY, GROUP BY, TOP, LIMIT & Aggregations;

### **Chapter 25: Databricks Jobs, Power BI Integration**

Databricks Jobs : Creation Options and Usage; Job Limits, Workspace Limits, Concurrency Limits; Creating Notebooks with and without Parameters; Creating Jobs with Default Parameters, Executions; Interactive, Automated Clusters for Databricks Jobs; Job Schedules, Manual Executions with Notebooks; Active Jobs, Recently Run Jobs and Monitoring; Databricks Access with Power BI Desktop Tool; Working with Spark Connectors in Power BI; Creating Access Token from Azure Databricks; Spark Cluster (Databricks Server)Connections; Server Host Name, Ports and HTTP Paths; Power BI Reports with DBFS from Databricks;

### **Chapter 26: Azure Cosmos DB - Architecture, Usage**

Azure Cosmos DB - Globally Distributed Database; Multi Model and API Support for Big Data; Technical benefits - Turnkey Global Distribution; Always-On, Elastic Scalability, Low Pricing Option; APIs: SQL API, Mongo DB, Cassandra, Gremlin; Table API and Real-time Applicative Uses; Azure Cosmos DB Account and Database Concept; Containers - Collection, Table and Graph; Items - Document, Rows and Node and Edge; Creating Azure Cosmos DB Account in Portal; Creating Azure Cosmos DB with Data Explorer; Creating Containers, Adding JSON Documents; Data Store and Data Access (Querying); Scaling Options for Cosmos DB;

### **Chapter 27: Azure Cosmos DB Queries - Level 1**

Hierarchical JSON Documents with Azure Cosmos DB; Embrace SQL and Extend SQL with NoSQL Concepts; Writing, Adding and Importing JSON Documents; NoSQL Query Concepts and Execution with Cosmos; SELECT Query Format: Optional, Mandatory Items; Query Statistics : Request Charge, Results, Reads; Query Statistics : Writes, Index, Lookup, Roundtrip; JSON Document & Record Formats. Key Value Pairs; Data Storage, Query Conditions : WHERE, SET; FROM , Aliases, Geo Spatial Queries in Cosmos; JSON Scripts to access Documents, Sub Documents; Hierarchical Data Store, Parent - Child Relationship; NoSQL Operations: Unary & Binary Operators; SELECT Queries with IN, BETWEEN, TOP & JOIN;

### **Chapter 28: Azure Cosmos DB Queries - Level 2**

Data Import Tool : Installation and Usage; JSON Data Imports to Azure Cosmos DB - DTUI; Using Azure Cosmos DB Endpoints, Access Keys; NoSQL Queries on Imported JSON Documents; Writing Stored Procedures and Functions; ACID Properties : Atomicity and Consistency; Isolation and Durability with Stored Procedures; SP Coding and Execution with Parameters & Keys; Creating Stored Procedures for Document Uploads; Stored Procedures with Variables, getResponse(); Stored Procedure Advantages and Execution Option; Creating User Defined Functions (UDF) in Cosmos; UDF Executions @ Cosmos DB Scripts & SELECT; Dynamic Calculations and Reporting;

### **Chapter 29: Azure Notebooks & Azure Functions**

Azure Notebooks and Serverless Deployments; Azure Cosmos Notebooks and Advantages; Jupyter Notebook : Implementation and Usage; Pandas Data Frame with Python Scripts in Portal; Understanding Notebook and Cell Concepts; Python Script for Creating Azure Cosmos DB; Python Script for Data Import, Analyze and Report; Azure Functions : Creation & Usage. Function Apps; Azure Functions with Cosmos Database Triggers; Azure Function App Service Plans and Metrics; Serverless Components, Azure Insight Accounts; Azure Cosmos DB Monitoring and Usage Logs; Azure Monitor Workbooks, Requests & Timelines;

### **Chapter 30: Azure Cosmos DB Admin, Power BI**

Consistency Levels in Azure Cosmos Database; Bounded Staleness, Session, Consistent Prefix; Eventual, Synchronization Options with Cosmos; Azure Cosmos DB : Backups & Restores. Retentions; IAM - Identity Access Management with Azure AD; Owner Role, Contributor Role and Reader Role; Cosmos DB Backup Operator, Account Reader Roles; Global Distribution Strategies and BCDR; Data Replication Options and High Availability; Multi Region Writes and Data Access Options; Azure Cosmos Database Cost Calculation Options; Availability Zones, Manual / Automated Failover; Azure Cosmos Database Cost Calculation Options; Costing Factors: Workloads and Multi Region Writes;

## **Module 4: Database Basics, SQL, T-SQL Queries**

Applicable for **Azure Data Engineer Plans B, C**

### **Chapter 1: SQL SERVER INTRODUCTION**

Data, Databases and RDBMS Software; Database Types : OLTP, DWH, OLAP; Microsoft SQL Server Advantages, Use; Versions and Editions of SQL Server; SQL : Purpose, Real-time Usage Options; SQL Versus Microsoft T-SQL [MSSQL]; Microsoft SQL Server - Career Options; Database Engine Component and OLTP; BI Components, Data Engineer Components; ETL, MSBI and Power BI Components; Course Plan, Resume, Project; Software Installation Pre-Requisites;

### **Chapter 2: SQL SERVER INSTALLATIONS**

System Configuration Checker Tool; Versions and Editions of SQL Server; SQL Server Pre-requisites : S/W, H/W; SQL Server 2016 / 2017 Installation; SQL Server 2019 Installation; Instance Name; Instances : Types; Default Instance, Named Instances; Port Numbers; Service and Service Account; Authentication Modes and Logins; FileStream, Collation Properties;

### **Chapter 3: SSMS Tool, SQL BASICS - 1**

SQL Server Management Studio; Local and Remote Connections; System Databases: Master and Model; MSDB, TempDB, Resource Databases; Creating Databases : Files [MDF, LDF]; Creating Tables in GUI; Data Insertion & Storage; SQL : Real-time Usage; DDL, DML, SELECT, DCL and TCL Statements; Data Storage, Inserts - Basic Level; SELECT; Table Data Retrieval;



## **Chapter 4: SQL BASICS - 2**

Creating Databases & Tables in SSMS; Single Row Inserts, Multi Row Inserts; Rules for Data Insertion Statements; SELECT Statement @ Data Retrieval; SELECT with WHERE Conditions; AND and OR; IN and NOT IN; Between, Not Between; LIKE and NOT LIKE; UPDATE Statement; DELETE & TRUNCATE; Logged and Non-Logged Operations; ADD, ALTER and DROP Statements;

## **Chapter 5: SQL BASICS - 3, T-SQL Introduction**

Schemas : Group Tables in Database; Using Schemas for Table Creation; Using Schemas in Table Relations; Table Migrations across Schemas; Default Schema : "dbo"; Import and Export Wizard; Bulk Operations; Excel File Imports / Exports; SQL Server Native Client; Executing SSIS Packages, Data Loads; Local and Global Temporary Tables; # & ## Prefix; Temporary Vs Permanent Tables;

## **Chapter 6: CONSTRAINTS & INDEXES BASICS**

Constraints and Keys - Data Integrity; NULL, NOT NULL Property on Tables; UNIQUE KEY Constraint; PRIMARY KEY Constraint; FOREIGN KEY Constraint, References; CHECK Constraint; DEFAULT Constraint; Identity Property : Seed & Increment; Database Diagrams and ER Models; Relationships Verification and Links; Indexes : Basic Types and Creation; Index Sort Options, Search Advantages; Clustered and Non Clustered Indexes; Primary Key and Unique Key Indexes;

## **REAL-TIME CASE STUDY - 1 (SALES & RETAIL)**

## **Chapter 7: JOINS and TSQL Queries : Level 1**

JOINS - Table Comparisons; INNER JOINS For Matching Data; OUTER JOINS For (non) Match Data; Left Outer Joins; Right Outer Joins - Example Queries; FULL Outer Joins; One-way and Two Way Comparisons; "ON" Conditions; Join Unrelated Tables; NULL, IS NULL in Joins; CROSS JOIN and CROSS APPLY; Join Options: Merge, Loop and Hash Joins; Performance Advantages;

## **Chapter 8: GROUP BY, T-SQL Queries : Level 2**

GROUP BY Queries and Aggregations; Group By Queries with Having Clause; Group By Queries with Where Clause; Using WHERE and HAVING in T-SQL; Rollup : Usage and T-SQL Queries; Cube : Usage and T-SQL Queries; UNION and UNION ALL Operator; EXISTS Operator, Query Conditions; Sub Queries; Joins with Group By Queries; Nested Sub Queries; UNION and UNION ALL; Nested Sub Queries with Group By, Joins; Comparing WHERE, HAVING Conditions;

## **Chapter 9: JOINS & T-SQL Queries : Level 3**

GetDate, Year, Month, Day Functions; Date & Time Styles, Data Formatting; DateAdd and DateDiff Functions; Cast and, Convert Functions in Queries; String Functions: SubString, Reliccate; Len, Upper, Lower, Left and Right; LTrim, RTrim, CharIndex Functions; MERGE Statement - Comparing Tables; WHEN MATCHED and NOT MATCHED; Incremental Load with MERGE Statement; IIF() Function for Value Compares; CASE Statement : WHEN, ELSE, END; ROW\_NUMBER() and RANK() Queries; Dense Rank and Partition By Queries;

## **Chapter 10: View, Procedure, Function Basics**

Views : Types, Usage in Real-time; System Predefined Views and Audits; Listing Databases, Tables, Schemas; Functions : Types, Usage in Real-time; Scalar, Inline and Multi-Line Functions; System

Predefined Functions, Audits; DBId, DBName, ObjectID, ObjectName; Variables & Parameters; User & System Predefined Procedures; Parameters; Sp\_help, Sp\_helpdb and sp\_helptext; sp\_pkeys, sp\_rename and sp\_help; When to use Which Database Objects;

### **Chapter 11: Triggers & Transactions**

Triggers - Purpose, Real-world Usage; FOR/AFTER Triggers; INSTEAD OF Triggers; INSERTED, DELETED Memory Tables; DML Automations using Memory Tables; Read Only Tables using DML Triggers; Enable Triggers and Disable Triggers; Database Level, Server Level Triggers; Transactions & ACID Properties; Auto Commit; EXPLICIT & IMPLICIT; COMMIT and ROLLBACK; Open Transaction; Query Blocking Scenarios @ Real-time; NOLOCK and READPAST Lock Hints;

### **Chapter 12: ER MODELS, NORMAL FORMS**

Normal Forms for Entity Relationships; First, Second, Third Normal Forms Usage; Boycee-Codd Normal Form: BNCNF : Usage; 4 NF, EKNF, ETNF. Functional Dependency; Multi-Valued, Transitive Dependencies; Composite Keys and Composite Indexes; 1:1, 1:M, M:1, M:M Relationship Types; SQL Queries Access in Reporting Tools; Storing SQL Queries into Views; Creating Office Data Connection Files; Excel Pivot Reports and Reports; SQL Queries (Auto Generated) in BI Tools; FETCH OFFSET, NEXT ROWS; Data Refresh (Manual, Automated);

## **REAL-TIME CASE STUDY - 2 (Sales & Retail), EXCEL INTEGRATION**

## **Module 5: Power BI (Reports, Cloud, Server, Analytics)**

Applicable for **Azure Data Engineer Plan C**

### **Chapter 1 : POWER BI BASICS**

Power BI Job Roles in Real-time; Power BI Data Analyst Job Roles; Business Analyst - Job Roles; Power BI Developer - Job Roles; Power BI for Data Scientists Comparing MSBI and Power BI; Comparing Tableau and Power BI; MCSA 70-778, MCSA 70-779 Exam; Types of Reports in Real-World; Interactive & Paginated Reports; Analytical & Mobile Reports; Data Sources Types in Power BI; Licensing Plans; Power BI Training : Lab Plan; Power BI Dev, Prod Environments;

### **Chapter 2 : BASIC REPORT DESIGN**

Power BI Desktop Installation; Data Sources & Visual Types; Canvas, Visualizations and Fields; Get Data and Memory Tables; In-Memory xvelocity Database; Table and Tree Map Visuals; Format Button and Data Labels; Legend, Category and Grid; PBIX and PBIT File Formats; Visual Interaction, Data Points; Disabling Visual Interactions; Edit Interactions - Format Options; SPOTLIGHT & FOCUSMODE; CSV and PDF Exports. Tooltips; Power BI EcoSystem, Architecture;

### **Chapter 3 : VISUAL SYNC, GROUPING**

Slicer Visual : Real-time Usage; Orientation, Selection Properties; Single & Multi Select, CTRL Options; Slicer : Number, Text and Date Data; Slicer List and Slicer Dropdowns; Visual Sync Limitations; Disabling Slicers; Grouping : Real-time Use, Examples; List Grouping and Binning Options; Grouping Static / Fixed Data Values; Grouping Dynamic / Changing Data; Bin Size and Bin Limits (Max, Min); Bin Count and Grouping Options; Grouping Binned Data, Classification;

### **Chapter 4 : HIERARCHIES, FILTERS**

Creating Hierarchies in Power BI; Independent Drill-Down Options; Dependant Drill-Down Options;

Conditional Drilldowns, Data Points; Drill Up Buttons and Operations; Expand & Show Next Level Options; Dynamic Data Drills Limitations; Show Data and See Records; Filters : Types and Usage in Real-time; Visual Filter, Page Filter, Report Filter; Basic, Advanced and TOP N Filters; Category and Summary Level Filters; DrillThru Filters, Drill Thru Reports; Keep All Filters" in DrillThru; CrossReport Filters, Include, Exclude;

### **Chapter 5 : BOOKMARKS, AZURE, MODELING**

Drill-thru Filters, Page Navigations; Bookmarks : Real-time Usage; Bookmarks for Visual Filters; Bookmarks for Page Navigations; Selection Pane with Bookmarks; Buttons, Images with Actions; Buttons, Actions and Text URLs; Bookmarks View & Selection Pane; OLTP Databases, Big Data Sources; Azure Database Access, Reports; Import & Direct Query with Power BI; Enter Data; Data Modeling : Currency, Relations; Summary, Format, Synonyms; Web & Mobile View in PBI;

### **Chapter 6 : VISUALIZATION PROPERTIES**

Stacked Charts and Clustered Charts; Line Charts, Area Charts, Bar Charts; 100% Stacked Bar and Column Charts; Map Visuals: Tree, Filled, Bubble; Cards, Funnel, Table, Matrix; Scatter Chart : Play Axis, Labels; Series Clusters; Waterfall Chart; ArcGIS Maps; Infographics; Color Saturation, Sentiment Colors; Column Series, Column Axis in Lines; Join Types : Round, Bevel, Miter; Shapes, Markers, Axis, Plot Area; Data Colors; Series, Custom Series and Legends;

### **Chapter 7 : POWER QUERY LEVEL 1**

Power Query Architecture and M Language; Data Types, Literals and Values; Power Query Transformation Types; Table & Column; Text & Number Transformations; Date, Time and Structured Data; List, Record & Table; let, source, in statements @ M Lang; Power Query Functions, Parameters; Invoke Functions; Get Data, Table Creations, Edit; Merge and Append Transformations; Join Kinds, Advanced Editor, Apply; ETL Operations with Power Query;

### **Chapter 8 : POWER QUERY LEVEL 2**

Query Duplicate, Query Reference; Group By and Advanced Options; Aggregations with Power Query; Transpose, Header Row Promotion; Reverse Rows and Row Count; Data Type Changes & Detection; Replace Columns: Text, NonText; Replace Nulls: Fill Up, Fill Down; PIVOT, UNPIVOT; Move Column and Split Column; Extract, Format; Date & Time Transformations; Deriving Year, Quarter, Month, Chapter; Add Column : Query Expressions; Query Step Inserts and Step Edits;

### **Chapter 9 : POWER QUERY LEVEL 3**

Creating Parameters in Power Query; Parameter Data Types, Default Lists; Static/Dynamic Lists For Parameters; Removing Columns and Duplicates; Convert Tables to List Queries; Linking Parameters to Queries; Parameters and PBI Canvas; Multi-Valued Parameter Lists; Creating Lists in Power Query; Converting Lists to Table Data; Advanced Edits and Parameters; Data Type Conversions, Expressions; Columns From Examples, Indexes; Conditional Columns, Expressions;

### **Chapter 10 : DAX Functions - Level 1**

DAX : Importance in Real-time; Real-world usage of Excel, DAX; DAX Architecture, Entity Sets; DAX Data Types, Syntax Rules; DAX Measures and Calculations; ROW Context and Filter Context; DAX Operators, Special Characters; DAX Functions, Types in Real-time; Vertipaq Engine, DAX Cheat Sheet; Creating, Using Measures with DAX; Creating, Columns with DAX; Quick Measures; SUM, AVERAGEX, KEEPFILTERS; Dynamic Expressions, IF in DAX;

### **Chapter 11 : DAX Functions - Level 2**

Data Modeling Options in DAX; Detecting Relations for DAX; Using Calculated Columns in DAX; Using Aggregated Measures in DAX; Working with Facts & Measures; Modeling : Missing Relations; Modeling : Relation Management; CALCULATE Function Conditions; CALCULATE & ALL Member Scope; RELATED & COUNTROWS in DAX; Slicing; Dynamic Expressions, RETURN; Date, Time, Text Functions; Logical, Mathematical Functions; Running Total, EARLIER Function;

### **Chapter 12 : DAX FUNCTIONS - Level 3**

1:1, 1:M and M:1 Relations; Connection with CSV, MS Access; AVERAGEX and AVERAGE in DAX; KEEPFILTERS and CALCULATE; COUNTROWS, RELATED, DIVIDE; PARALLELPERIOD, DATEDADD; CALCULATE & PREVIOUSMONTH; USERRELATIONSHIP, DAX Variables; TOTALYTD , TOTALQTD; DIVIDE, CALCULATE, Conditions; IF..ELSE..THEN Statement; SELECTEDVALUE, FORMAT; SUM, DATEDIFF Examples; TOCHAPTER, DATE, CHAPTER with DAX; Time Intelligence Functions;

### **Chapter 13 : POWER BI CLOUD - 1**

Power BI Service Architecture; Power BI Cloud Components, Use; App Workspaces, Report Publish Related Datasets Cloud; Creating New Reports in Cloud; Report Publish and Report Uploads; Dashboards Creation and Usage; Adding Tiles to Dashboards; Pining Visuals and Report Pages; Visual Pin Actions in Dashboards; LIVE Interaction in Dashboard; Adding Images, Custom Links; Videos & Embed Links; API Data Sources; Streaming Dataset Tiles (REST API);

### **Chapter 14 : POWER BI CLOUD - 2**

Dashboards Actions, Report Actions; DataSet Actions: Create Report; Share, Metrics and Exports; Mobile View & Dashboard Themes; Q & A [Cortana], Pin Visuals; Export, Subscribe, Favourite, Insights, Embed Code; Featured Dashboards and Refresh; Gateways Configuration, PBI Service; Gateway Types; Gateway Clusters, Data Refresh : Manual, Automatic; PBIEngw Service; DataFlows, Power Query Expressions; Adding Entities, JSON Files;

### **Chapter 15 : EXCEL, ROW LEVEL SECURITY**

Import and Upload Options in Excel; Excel Workbooks and Dashboards; Datasets in Excel and Dashboards; Using Excel Analyzer in Power BI; Using Excel Publisher in PBI Cloud; Excel Workbooks, PINS in Power BI; Excel ODC Connections, Power Pivot; Row Level Security (RLS) with DAX; Need for RLS in Power BI Cloud; Data Modelling; DAX Roles Creation and Testing; Power BI Users to Roles; Custom Visualizations; Histogram, Gantt Chart, Info graphics;

### **Chapter 16: REPORT SERVER, REPORT BUILDER**

Need for Report Server in PROD; Install, Configure Report Server; Report Server DB, Temp Database; Webservice URL, Webportal URL; Creating Hybrid Cloud with Power BI; Using Power BI DesktopRS; Uploading Interactive Reports; Report Builder; Report Builder For Power BI Cloud; Designing Paginated Reports (RDL); Deploy to Power BI Report Server; Data Source Connections, Report; Power BI Report Server to Cloud; Tenant IDs; Mobile Report Publisher;

### **Chapter 17: AZURE BI INTEGRATIONS WITH POWER BI**

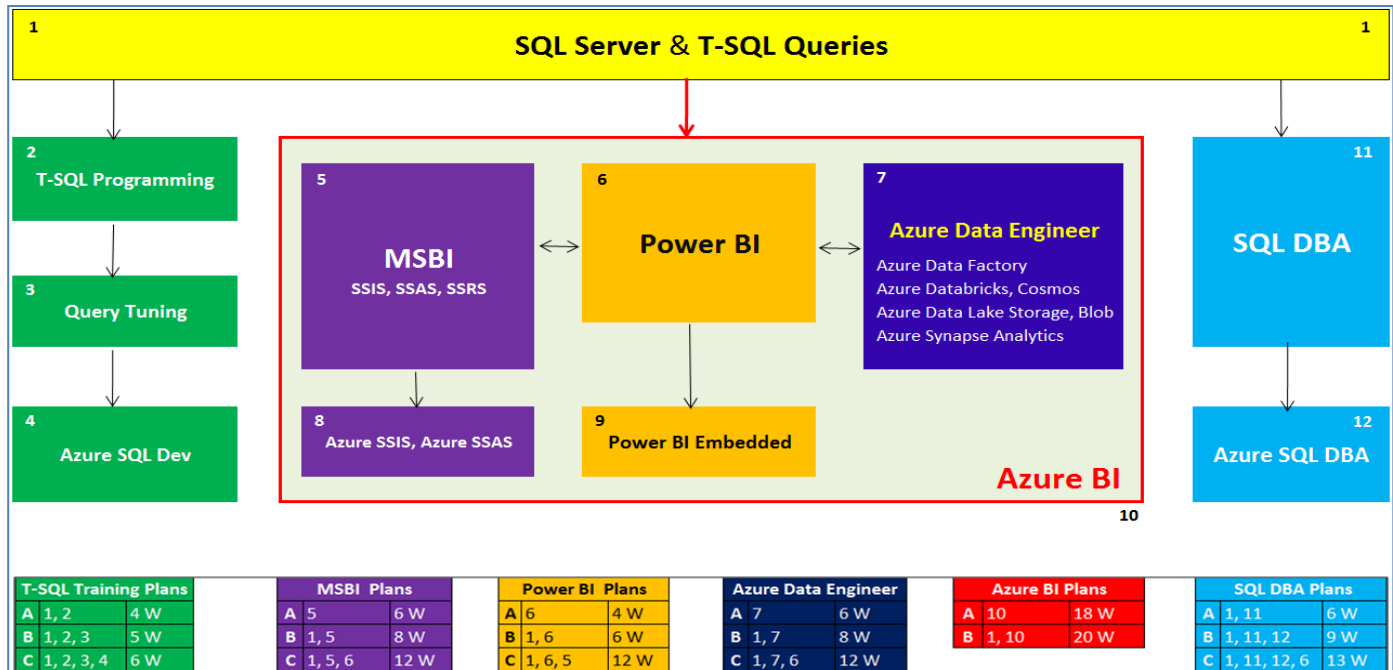
Power BI with SQL Server Source; Power BI with Azure SQL Database; Power BI with Azure Data Warehouse (Synapse); Power BI with Azure Data Lake; Power BI with Azure Databricks; Power BI with Azure Cosmos DB; Power BI with Azure BLOB Storage; Azure AD Authentication;

### **Chapter 18: Real-time Project [Sales & Customers]**

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