

Implementing an Azure Data Solutions

Introduction to Azure

- Introduction to Azure Cloud
- What is difference between Azure Cloud and On-Premises
- What is Subscriptions and Resource Groups
- Different offerings of Cloud IaaS, PaaS and SaaS
- Creation of Virtual Machine

Introduction to Storage

- Azure Storage
 - Azure Blob
 - Table
 - Message
 - Queue
- Azure Data Lake Store Gen I & Gen II
 - What is Data Lake
 - Data Lake vs. Hadoop
 - Blob Storage vs. Data Lake
 - Hierarchical Namespace
 - Ingestion through different tools i.e.; Azure Data Explorer, AzCopy, Azure CLI, Powershell

Introduction to Azure SQL Database

- Introduction to Azure SQL Database
- Why choosing SQL Server in Azure
- Azure IaaS vs. PaaS database offerings
- IaaS vs. Managed Instance
- SQL Server PaaS deployment options
- Demo - Azure Single Database
- Purchasing models and Service Tier
- Azure Database vs. Azure Data Warehouse
- Elastic Database Pool
 - Introduction
 - Azure Elastic Database
 - Demo - Azure Elastic Database
- Managed Instance Database
 - Introduction
 - Azure Managed Instance Database
 - Difference between on-premises and managed instance
 - Migration options for Managed Instance

- Service tiers for Managed Instance
- Demo - Managed Instance
- Azure Database Security
 - Introduction
 - Azure Database and Managed Instance Security options
 - Encrypting Data at Rest and Motion
 - High Availability vs. Disaster Recovery
 - RTO vs. RPO
 - Azure SQL Database High Availability and Disaster Recovery options
 - Azure SQL Database Scaling
- Installation of SQL Server 2016 and above in Virtual Machine
- Creation of External Table or PolyBase in On-Premise SQL Server
 - Creation of Master Key
 - Creation of Database Scoped Credential
 - Creation of External Data Source
 - Creation of External File Format
 - Creation of External Table
- Creation of External Table or PolyBase in Azure SQL Data Warehouse
 - Creation of Master Key
 - Creation of Database Scoped Credential
 - Creation of External Data Source
 - Creation of External File Format
 - Creation of External Table
- Different Distribution or Shredding Patterns
 - ROUND ROBIN
 - HASH
 - REPLICATION
- Cross Query Databases in Azure SQL Database
 - Creation of Master Key
 - Creation of Database Scoped Credential
 - Creation of External Data Source
 - Creation of External Table
- Creation of Elastic Pools in Azure SQL Server between Databases

Data Warehouse Internals and Architecture

- Introduction
- Azure Synapse MPP Architecture
- Storage and Sharding patterns
- Data Distribution and Distributing Keys
- Data Types and Table Types
- Partitioning
- Data Warehouse Concepts
- Dimensions and Facts
- Types of Dimensions and Facts
- Different types of Schemas in Data Warehouse
- Relationship types in Data Warehouse

- Best Practices for Fact and Dimension tables
- Demo - Analyze Data distribution before migration to Azure Synapse

Azure Data Factory

- Introduction to Azure Data Factory
- Creation of Linked Services, Datasets, Pipelines
- Creation of Integration Runtime and different types
- Slowly Changing Dimensions
- Design and implement a Type 1 slowly changing dimension with mapping data flows
- Debug data factory pipelines
- Understand the Azure SSIS Integration Runtime
- Set-up Azure SSIS Integration Runtime
- Run SSIS Package in Azure Data Factory
- Migrate SSIS Packages to Azure Data Factory
- Integrate SQL Server Integration Services Packages within Azure Data Factory
- Activities
 - Copy
 - Data flow
 - Stored Procedure
 - Lookup
 - ForEach
 - Get Metadata
 - Filter Activity
 - Spark
 - U-SQL
 - Databricks Notebooks
 - Web
 - If Condition
 - Delete
- Data Flows
 - Derived Column
 - Join
 - filter
 - exists
 - conditional split
 - Lookup, Exists
 - Select
 - Aggregate
 - Rank
 - Filter
 - Sort
 - Alter Row
- Dynamic Queries in ADF
- Sending mails through Logic Apps
- Few more Activities

- Dataset and Pipeline Parameterization
- Monitor -- Azure and Visually
- Setup Alerts from Azure Data Factory

Realize Integrated Analytical Solutions with Azure Synapse Analytics

- Introduction
- What is Azure Synapse Analytics
- How Azure Synapse Analytics works
- When to use Azure Synapse Analytics
- Create Azure Synapse Analytics workspace
- Exercise - Create and manage Azure Synapse Analytics workspace
- Describe Azure Synapse Analytics SQL
- Explain Apache Spark in Azure Synapse Analytics
- Exercise - Create pools in Azure Synapse Analytics
- Orchestrate data integration with Azure Synapse pipelines
- Exercise-Identifying Azure Synapse pipeline components
- Visualize your analytics with Power BI
- Understand hybrid transactional analytical processing with Azure Synapse Link
- Use Azure Synapse Studio
- Understand the Azure Synapse Analytical processes
- Explore the Data hub, Develop hub, Integrate hub
- Explore the Monitor hub, Manage hub
- Describe a modern data warehouse
- Define a modern data warehouse architecture
- Exercise - Identify modern data warehouse architecture components
- Design ingestion patterns for a modern data warehouse
- Understand data storage for a modern data warehouse
- Understand file formats and structure for a modern data warehouse
- Prepare and transform data with Azure Synapse Analytics
- Serve data for analysis with Azure Synapse Analytics

Azure Event Hub, IoT Hub and Azure Stream Analytics

- Introduction to Azure Event Hub, IoT Hub and Stream Analytics
- Azure Stream Analytics Job
- Azure Stream Analytics Components
- Azure Stream Analytics Job
- Batching Streaming using Azure Event Hub
- Real Time Streaming using Azure IoT Hub
- Types of Window Functions
 - Tumbling Window
 - Hopping Window
 - Sliding Window

- Session Window

Azure Databricks

- Spark Basics
- Why Spark is difficult? Why Databricks Evolved?
- Why Databricks in Cloud? Introduction to Azure Databricks
- Demo
- Provision Databricks, Clusters and workbook
- Mount Data Lake to Databricks DBFS
- Explore, Analyze, Clean, Transform and Load Data in Databricks
- Azure Databricks Clusters
- Azure Databricks other Important Components
- Databricks - Monitoring
- How to create Cluster
- How to work with Databricks File System
- How to create notebooks and Integrate with ADF
- How to import and export the Notebooks
- How to connect to blob, SQL DB from Databricks
- How to read data files from Azure Blob and Azure Data Lake Store
 - Using Scala, R, Python, Spark SQL Language
- Creating Data Frames
- Converting Data Frames into Temporary Table or Temporary View
- Incremental and Full Load with Azure SQL Data Warehouse
- Understand the architecture of Azure Databricks spark cluster
- Understand the architecture of spark job
- Read data in CSV format
- Read data in JSON format
- Read data in Parquet format
- Read data stored in tables and views
- Write data
- Describe a DataFrame
- Use common DataFrame methods
- Use the display function
- Exercise: Distinct articles
- Describe the difference between eager and lazy execution
- Describe the fundamentals of how the Catalyst Optimizer works
- Define and identify actions and transformations
- Describe the column class
- Work with column expressions
- Perform date and time manipulation
- Use aggregate functions
- Exercise: Deduplication of data
- Describe the Azure Databricks platform architecture
- Perform data protection
- Describe Azure key vault and Databricks security scopes

- Secure access with Azure IAM and authentication
- Describe security
- Exercise: Access Azure Storage with key vault-backed secrets
- Describe the open source Delta Lake
- Exercise: Work with basic Delta Lake functionality
- Describe how Azure Databricks manages Delta Lake
- Exercise: Use the Delta Lake Time Machine and perform optimization
- Describe Azure Databricks structured streaming
- Perform stream processing using structured streaming
- Work with Time Windows
- Process data from Event Hubs with structured streaming
- Describe bronze, silver, and gold architecture
- Perform batch and stream processing
- Schedule Databricks jobs in a data factory pipeline
- Pass parameters into and out of Databricks jobs in data factory
- Integrate with Azure Synapse Analytics
- Understand workspace administration best practices
- List security best practices
- Describe tools and integration best practices
- Explain Databricks runtime best practices
- Understand cluster best practices

Azure Delta Lake

- Overview of Azure Delta Lake
- Data Lakehouse Architecture
- Read and Write to Delta Lake
- Updates and Deletes on Delta Lake
- Merge/Upsert to Delta Lake
- History, Time Travel, Vacuum
- Delta Lake Transaction Log
- Convert Parquet to Delta