Design and implemen

Azure Storage Accounts

This is a service on the Azure platform that allows you to store different data objects.

Blob storage – This is Microsoft's object storage solution on the cloud.

You can use this service for storing large amounts of unstructured data.

Azure Data Lake Storage Gen2

This service provides features that are pertinent to big data analytics.

This service is built on top of Azure Blob Storage.

You can use this as a central repository for storing your structured and unstructured data.

Azure Synapse

This is an enterprise analytics service.

Here you can store your data in data warehouses and query the data accordingly.

It also has Spark capabilities and Pipelines for data integration.

Azure Data Factory

This is a cloud-based ETL tool. It also acts as a data integration service.

You can create workflows when it comes to orchestrating data movement and transforming data.

Has support for a variety of data stores.

Azure Stream Analytics

This is a fully managed stream processing engine.

Here you can analyze and process large volumes of streaming data.

You can ingest data from different data sources.

Azure Databricks

This is a set of tools that can be used for building, deploying , sharing and maintaining enterprise-grade data solutions at scale.

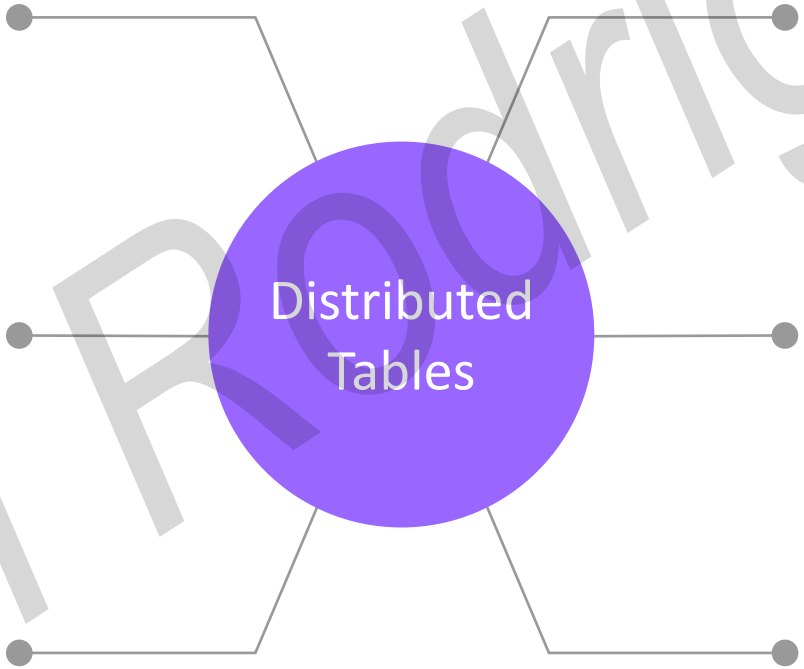
You can use this service to process and analyze your data..

This service makes use of Apache Spark that can be used to process data.

Design and implement data storage - Azure Synapse Analytics

Best Practices

Distributed Tables



Hash-distribution

This improves query performance on large tables.

Round-Robin distribution

This helps in improving loading speed.

Data Movement

With hash-distribution, SQL Analytics has knowledge on the rows in the distribution.

Choose Round-Robin

No joining key, no good candidate for hash distribution.

Fact Tables

Best to use hash-distribution.

Dimension

Best to use replicated tables.

Hash-distributed

Column

1	Choosing the right column	Ensure that data gets distributed across the distributions
2	Data Skew	If the data is not distributed properly it can lead to data skew.
3	Data Movement	Choose a column that minimizes data movement – Is used in JOIN, GROUP BY clauses.

Design and Develop Data Processing - Azure Data Factory

Mapping Data Flows

Mapping Data Flows

This feature helps to visualize the data transformations in Azure Data Factory.

You can write the required transformation logic without actually writing any code.

The data flows run on Apache Spark clusters. Azure Data Factory will manage the transformations in the data flow.

Mapping Data Flows

Debug Mode – You can actually see the results of the data flow while designing the flow.

In the debug mode session, the data flow will run interactively on the Spark cluster.

In the debug mode, you will be charged on an hourly basis for the active cluster.

Design and Develop Data Processing - Scala, Notebooks and Spark

Lake databases

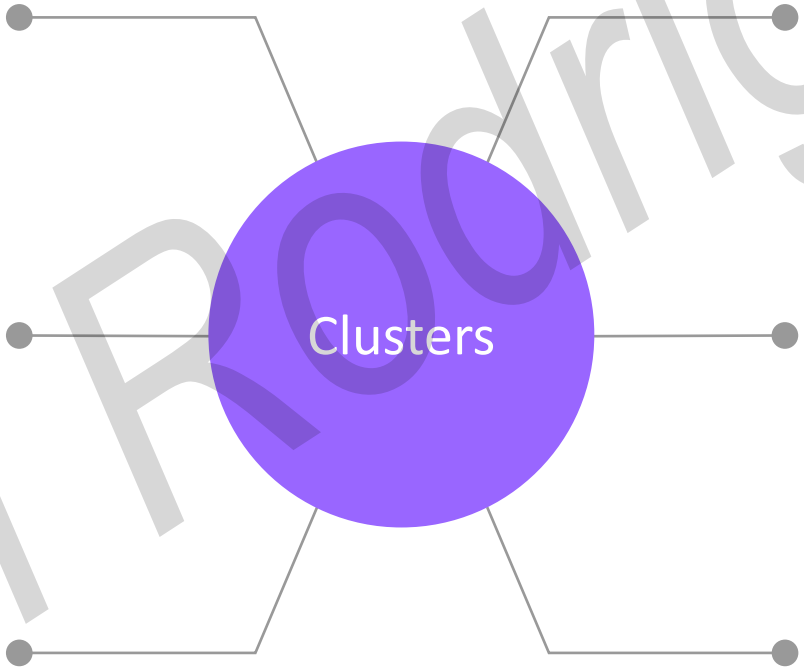
Lake Databases

1. **Spark pool** — These are the databases and tables created in the Spark pool.
2. **Shared** — These tables can also be accessed from the Serverless SQL pool.
3. **Data** — Here the data for the databases are stored in data lake storage. Supported file formats are Parquet, Delta and CSV.

Design and Develop Data Processing - Azure Databricks

More on clusters

Clusters



Compute

Your workloads run on the cluster compute resources.

Notebooks

You define the workloads as a set of commands in Notebooks.

Cluster types

You have your all-purpose clusters and the job clusters.

Terminate

When you terminate the cluster, the details of the cluster are retained for 30 days.

Pin

Pin the cluster if you want the details of the terminated cluster for a longer duration.

Job Cluster

Here the cluster terminates once the job is complete.

Cluster

Access Mode

1. Single User — Supported Languages – Python, SQL, Scala, R
2. Shared — Needs a Premium plan. You can have data isolation amongst users. Python and SQL supported.
3. No Isolation Shared — Supported Languages – Python, SQL, Scala, R.

Databricks

Cluster

Access Mode

1. Driver node

   This maintains the state information for the notebooks attached to the cluster. It also maintains the SparkContext.

2. Worker node

   This runs the executors for running the distributed workloads.

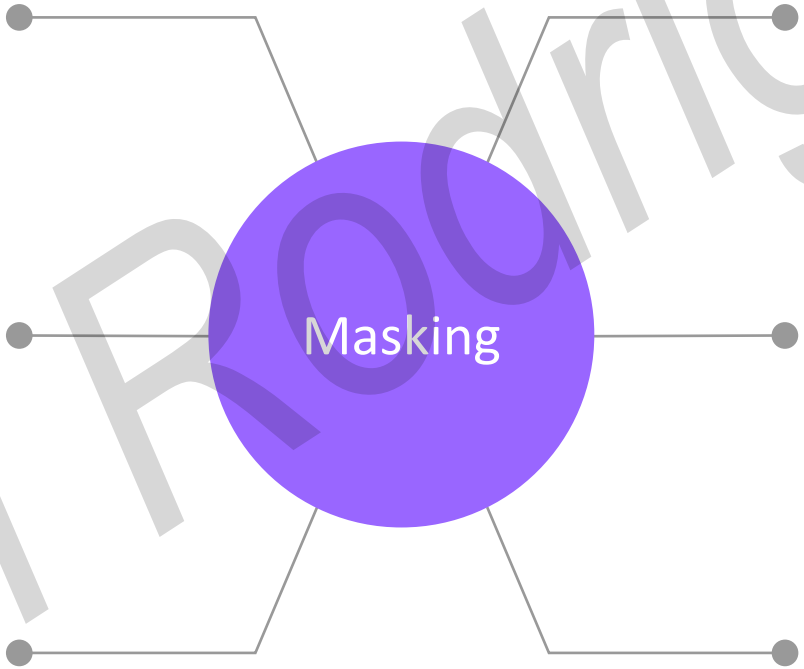
3. Spot Instances

   To save on costs, you can also make use of Spot Instances.

Design and Implement Data Security

Dynamic Data Masking

Dynamic Data Masking



Exposure

Here you can limit the exposure of data.

Rule

You can create rules to mask the data.

Credit Card masking rule

This is used to mask the column that contain credit card details. Here only the last four digits of the field are exposed.

Email

Here first letter of the email address is exposed. And the domain name of the email address is replaced with XXX.com.

Custom text

Here you decide which characters to expose for a field.

Random number

Here you can generate a random number for the field.

Data classification

Data Classification

1. **Classify**

   This feature provides capabilities for discovering, classifying, labelling, and reporting the sensitive data in your databases.

2. **Discovery**

   The data discovery feature can scan the database and identify columns that contains sensitive data. You can then view and apply the recommendations accordingly.

3. **Sensitivity labels**

   You can then apply sensitivity labels to the column. This helps to define the sensitivity level of the data stored in the column.

Monitor and optimize data storage and data processing

Microsoft Purview

Microsoft Purview

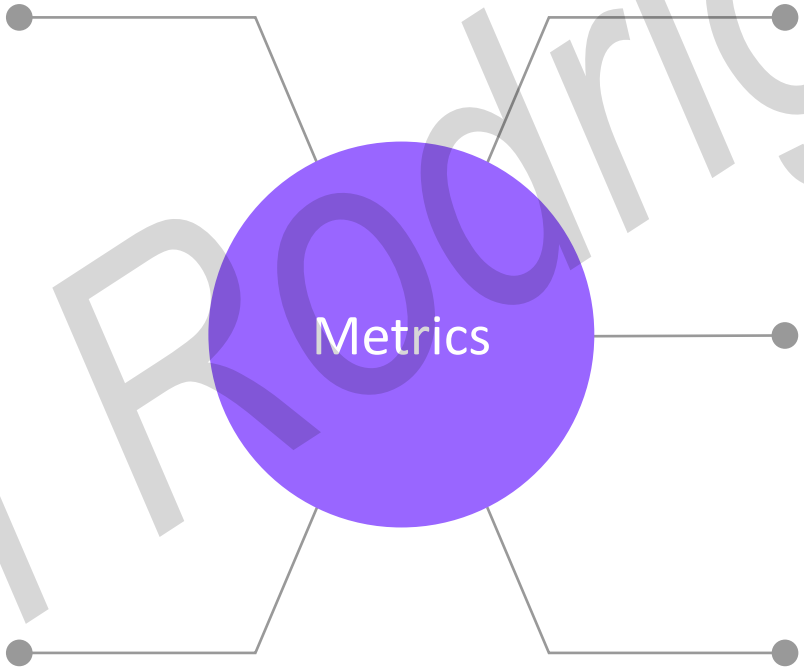
This is a unified data governance service that helps to track your data assets across multi-cloud, on-premises and software-as-a-service data stores.

Data Map – This helps to provide metadata about your enterprise data.

Data Estate Insights – This can give an overview of your data.

Azure Stream Analytics Metrics

Azure Stream Analytics



Backlogged Input Events

Number of input events that are backlogged. A non-zero value for this metric implies that your job isn't able to keep up with the number of incoming events. For this you can decide to scale up the number of streaming units.

Early Input Events

Events whose application timestamp is earlier than their arrival time by more than 5 minutes.

Late Input Events

Events that arrived later than the configured late arrival tolerance window.

Data Conversion Errors

Number of output events that could not be converted to the expected output schema.

Out-of-Order Events

Number of events received out of order that were either dropped or given an adjusted timestamp, based on the Event Ordering Policy.

Azure Stream Analytics

Monitoring

1. **Watermark delay** — The maximum watermark delay across all partitions of all outputs in the job. If the value of the Watermark Delay is greater than 0, it could be due to many reasons.
2. **Delays** — Inherent processing delay of the streaming pipeline. Clock skew of the processing node generating the metric
3. **Resources** — There are not enough processing resources in your Stream Analytics job.