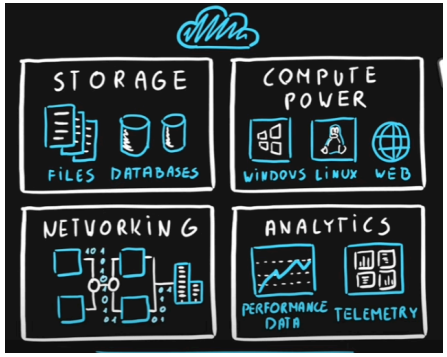
AZURE BASICS

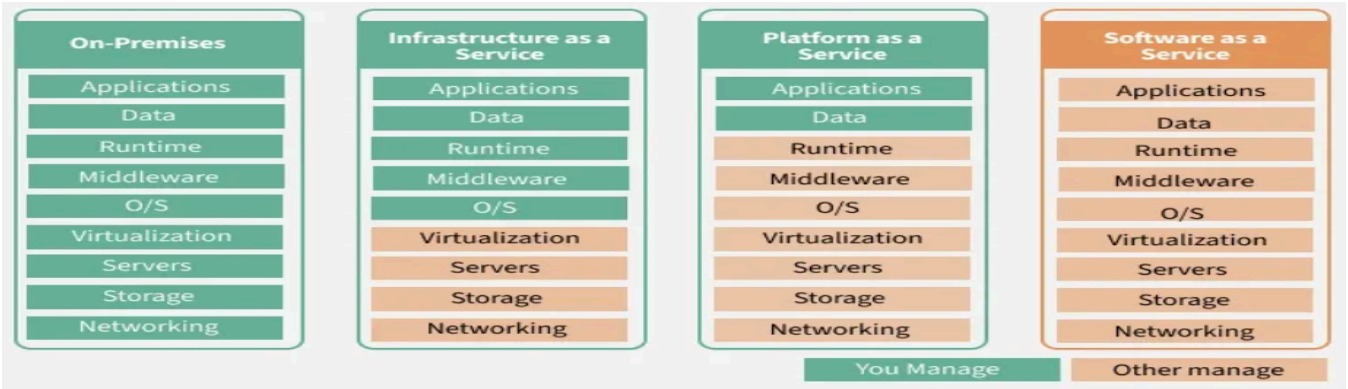
- **Azure:** Microsoft's cloud computing platform
- 

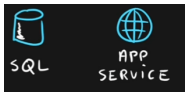
4 main Cloud serviecs :

- ➔ *storage*(ex: Amazon S3/BlobStorage),
- ➔ *computational* (ex: OS, virtual servers) ,
- ➔ *networking* (ex: Azure Virtual N/w),
- ➔ *analytics* (ex: Google Big Query)

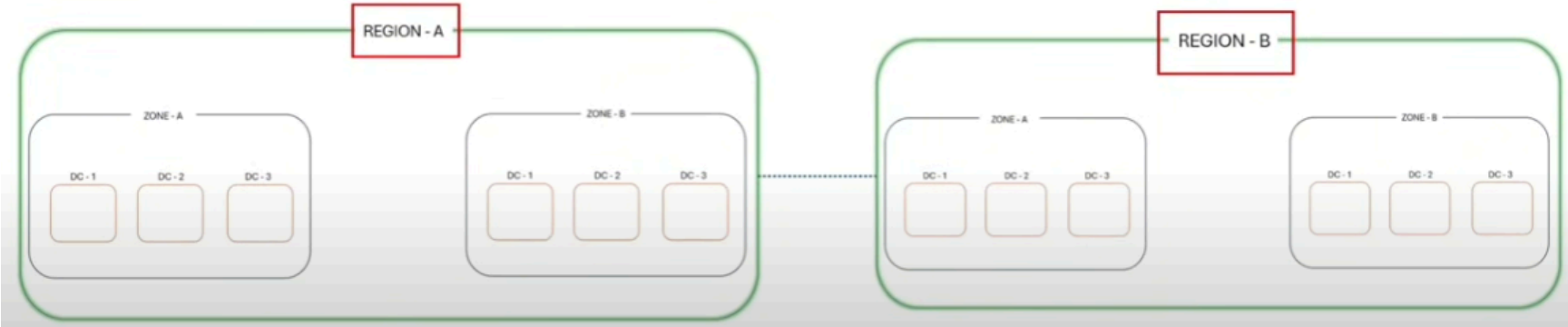
- **Cloud Characteristic**s:
  - ➔ *Scalability*: Vertical Scaling (🔺 / 🔻 memory/storage of existing resource- existing cpu,ram..) & Horizontal Scaling (🔺 / 🔻 no.of resources-cpu,linux,db……for my appplication)
  - ➔ *Elasticity :* allocate/de-allocate resources dynamically as per need.
  - ➔ *Agility*: How fast to react? Min,sec… V/S "**On Prem(you own everything)**"-manually control,hrs, days,mths
  - ➔ *Fault tolerance :* have racks & disks….**Recovery Soln:** Restart or Replication Factor = 3
  - ➔ "Pay as u GO 🟢 " : **actual usage** (e.g., per hour, per GB, per API call).

- **Service Models:**



Iaas(Infrastructure as Service)	**Paas(Platform as Service)**	**SaaS(Software as Service)**
• Resources provided related to hardware/virtualisation (process of creating virtual env, virtual mem, virtuals servers, virtual storage-virtual layer b/w host os & multiple instances of guest os) • Platform & software services managed by you!	• Resources provided app development, hosting, and runtime management • Application & software services managed by you!	• Azure manages infrastructure, platform, & software • You manage nothing!😔
Ex: storage (ssd/hdd), servers(mem/cpu), vms(ubuntu), networking tools(routers) • Azure Blob Storage • Azure Virtual Network (VNet) • Azure Virtual Machines (VMs)	ex:  for rdbms, & web hosting , docker	ex: outlook, one-note

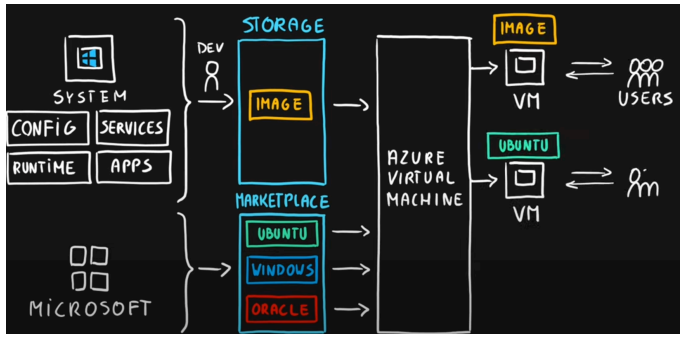
- **3 Famous Cloud Models:** Public, Private,Hybrid
- **Infrastructure:**



Data Availability Zones: zoneA & zoneB : multiple datacentres, each with different configuration,power,cooling
Region Pairs: regions-> having multiple availability zones
If 1 fail -> others are there to help!!! -> Replication Factor !!
How they are connected?? **Zonal Services** { specific to zone , ex:vms} + **Zone-redundant Services** {replicated across zones, ex: sql}

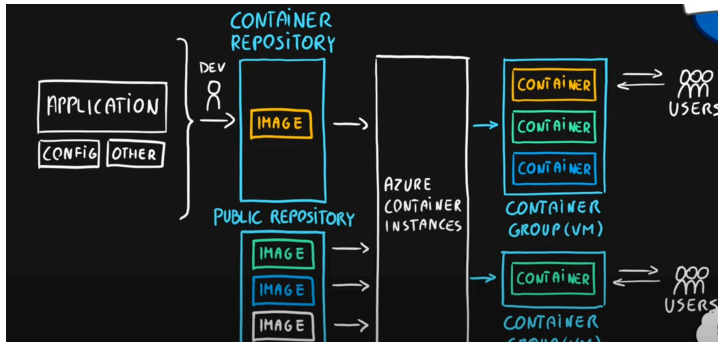
- Resources, Resource Groups, Resource Manager(access controls)
- **Compute Services:**

➔ **AVM (Azure Virtual Machine):** Vms emulate hardware , each has its own os



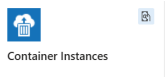
- *Images:* read only templates, specific config(ram/storage/env/dependencies) , instr needed for setup of appln/container
- Provides market-place vm images & enables customised images to be built , stored (hubs/container repository) & used….
- Just select img->download img ->connect to it..
- Images are auto-scaled among vms , distributing traffic across vms ->using *Load Balancer.*

➔ **Azure Container Instances:** Containers emulate os, same os but isolating apps based on req & config & services they use & offer(ex: python package versions)

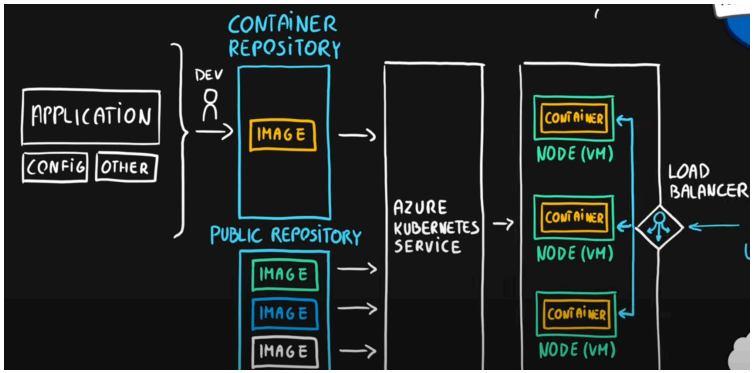


- Containers are instances of images that hold pkg/jar files for running the application(ex: sok8)

Select container image->& deploy -> container instances



➔ **Azure Kubernetes Service(AKS):**

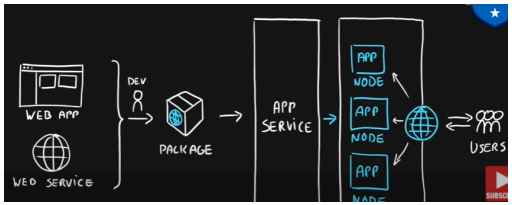


- *Orchestration service:* allocate/deallocate & schedule containers automatically , to run on pods(gp of container)
- Some cmds:
  - `kubectl get nodes`
  - `kubectl get pods`
  - `kubectl apply -f file.yaml`

Azure Kubernetes Service (AKS)

Microsoft | Azure Service

➔ **Azure App Service:** host enterprise apps



- **Networking Services:** VPN, Gateways
- **Azure Storage Services:**
  Data Types: Structured(rdbms,sql) , Semi-Structured (key-value/json/NoSQL) , Unstructured (audio/video/blob)
  3 storage tiers: HOT 🥵 , COOL 🥶, ARCHIVE

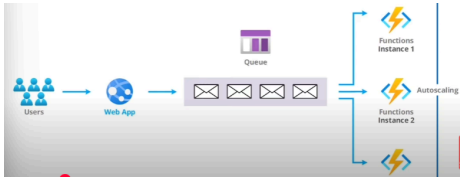
➔ **Azure Blob Storage**

Containers of Blobs (general purpose blob/file storage):

➔ **Azure Queue Storage**

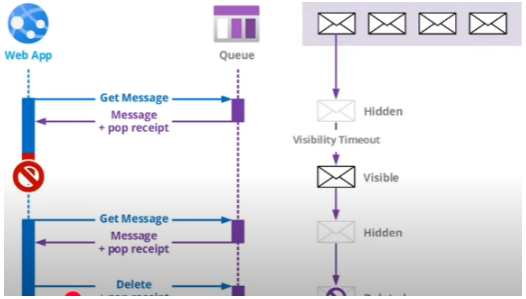
Store msg in queue for asynchronous processing(ex:iot/real time data)

msg have **TTL(TimeToLive)** for expiration



Consumers apps/services consume queue msg

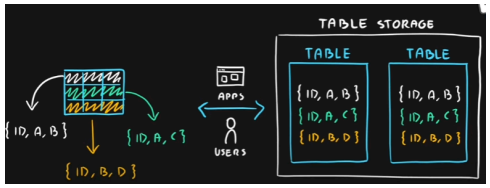
Ex: "**Retry Pattern**" [hide/lock the msg when get req received so that cant be used by other process ->make visible asap once get response sent with ack ->later used by other process]



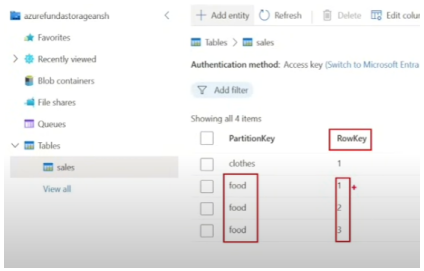
Single queue operations are "atomic"

➔ **Azure Table Storage**

Group of Tables (can store structured &semi-structured data)
Used when: no complex joins, proper schema, json serialisable data
Ex: used for simple logging, metadata &configuration store



*Follows **CompositePrimaryKey =** PartitionKey(groping all items having that partition(column field)) + RowKey(uniquely identify each record/entity) +Timestamp*

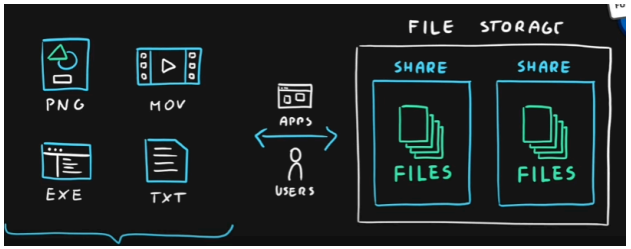


Cant store json objects-use mongodb

➔ **Azure File Storage**

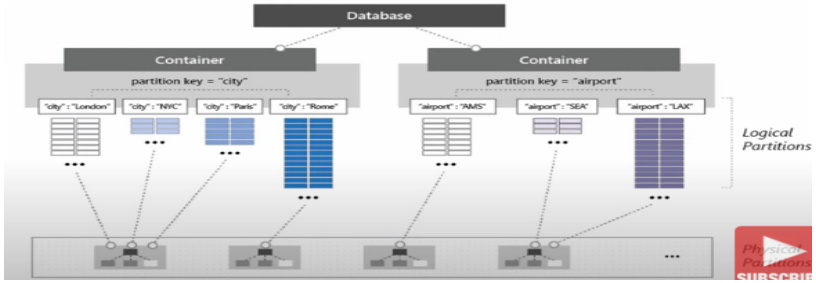
Shares/Folder of Files (shared directories & sync with local directory)

“Lift & shift operation” : **“lifting”** the app/workload from your current local env and **“shifting”** it to the cloud.



➔ **Azure Cosmos Db :** no-sql, schemaless , multiple apis supported(sql, mongodb, gemlin {graph db}, cassandra{columnar db})

Distributes data into partitions: LOGICAL{group all items having same key} & PHYSICAL{store multiple logical partitions into hardware storage,ex: disks,partition at hardware storage level}



Azure Cosmos DB for NoSQL

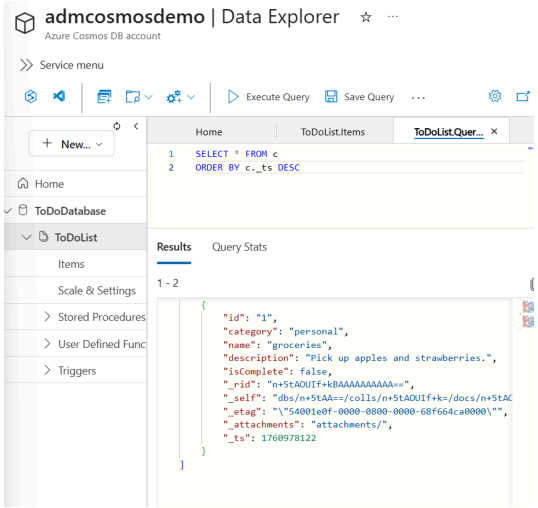
Azure Cosmos DB's core, or native API for working with documents. Supports fast, flexible development with familiar SQL query language and client libraries for .NET, JavaScript, Python, and Java.

Azure Cosmos DB for MongoDB

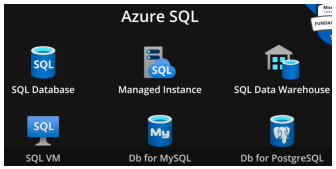
Fully managed database service for apps written for MongoDB. Recommended if you have existing MongoDB workloads that you plan to migrate to Azure Cosmos DB.

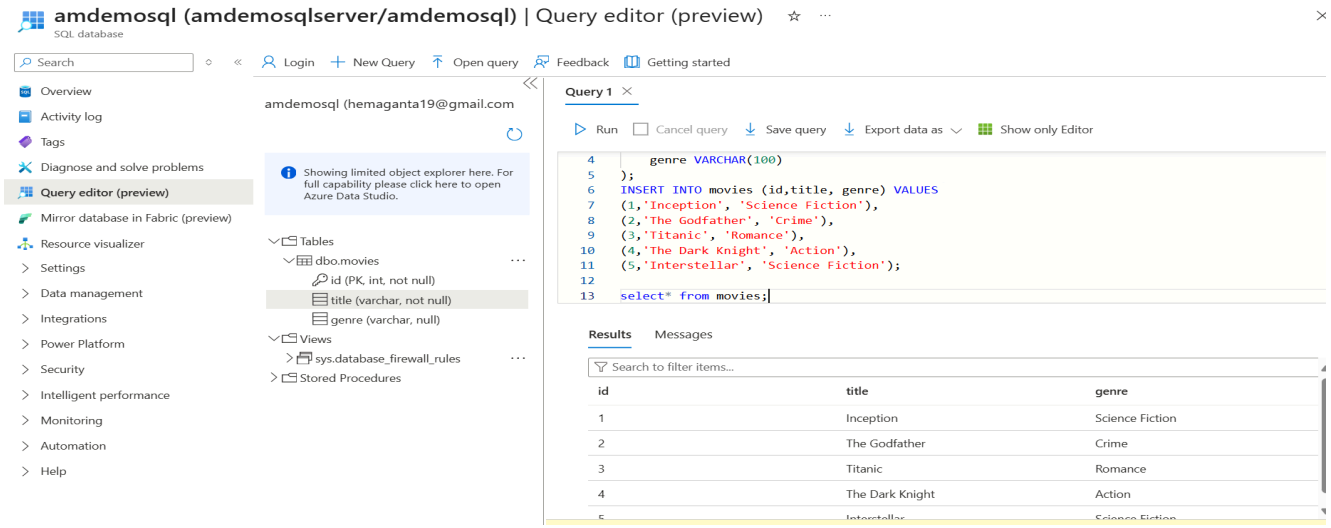
For noSQl: query {key:value} using simple sql,
For mongodb: {key:vales} with values having varying fields, use mongodb query language ,ex: find,insert..
RequestUnit(RU) : cost of api call being made

In below ex: partition key=”category”

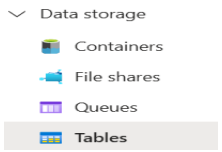


➔ **Azure SQL Db:** mainly for structured data with constraints & relations
Elastic Pool:collection of single databases with shared resources
Managed Instance: fully managed instance of SQL Server
Sql Datawarehouse: cloud-based data warehouse service designed for storing and analyzing large volumes of data





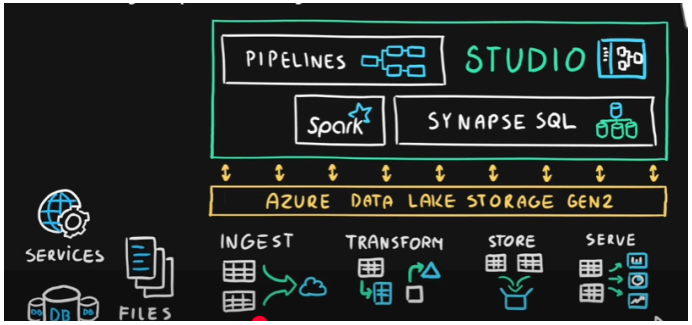
➔ Azure DataLake Storage



Enable hierarchical namespace: store files/data in directories, sub-directories, easy to access & organise
Better than blob storage: as all files will be in same level, just with unique path (files inside container)
Mainly used for big data analytics: integrated with synapse,data bricks, data factory

- **Big Data Services:**

➔ **Azure Synapse Analytics:**

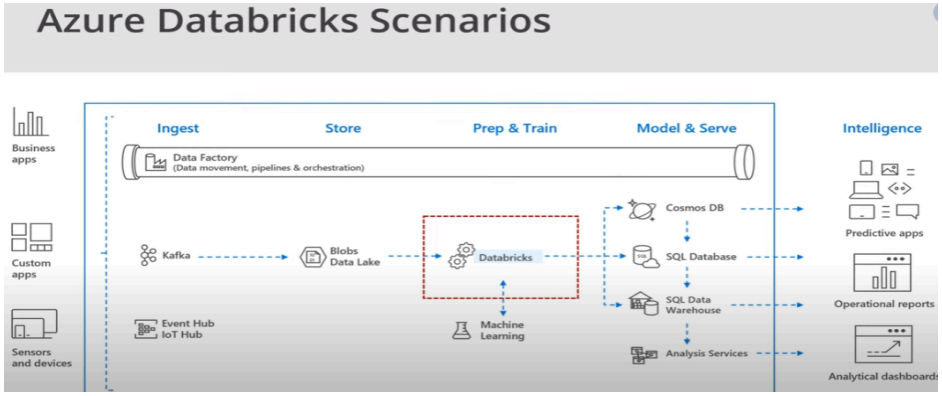


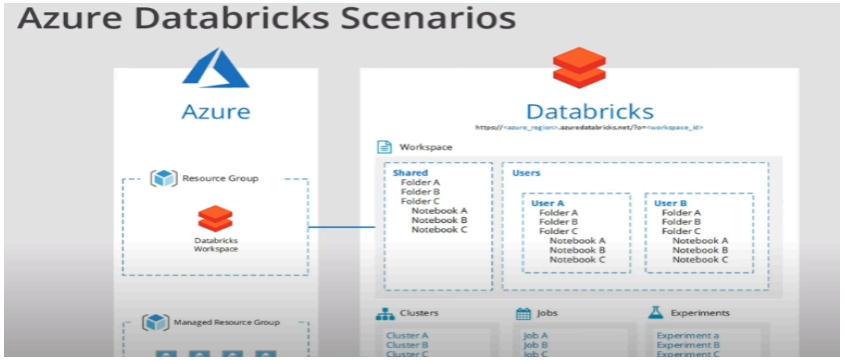
Data warehouse & analytics platform
Spark
Sql pools
Synapse Pipelines(ETL pipelines)
All combined in Studio(unified experience)
Integrates **data ingestion, preparation, management, and analytics** in one workspace.
Integrate with adls

➔ **Azure HDInsight:**

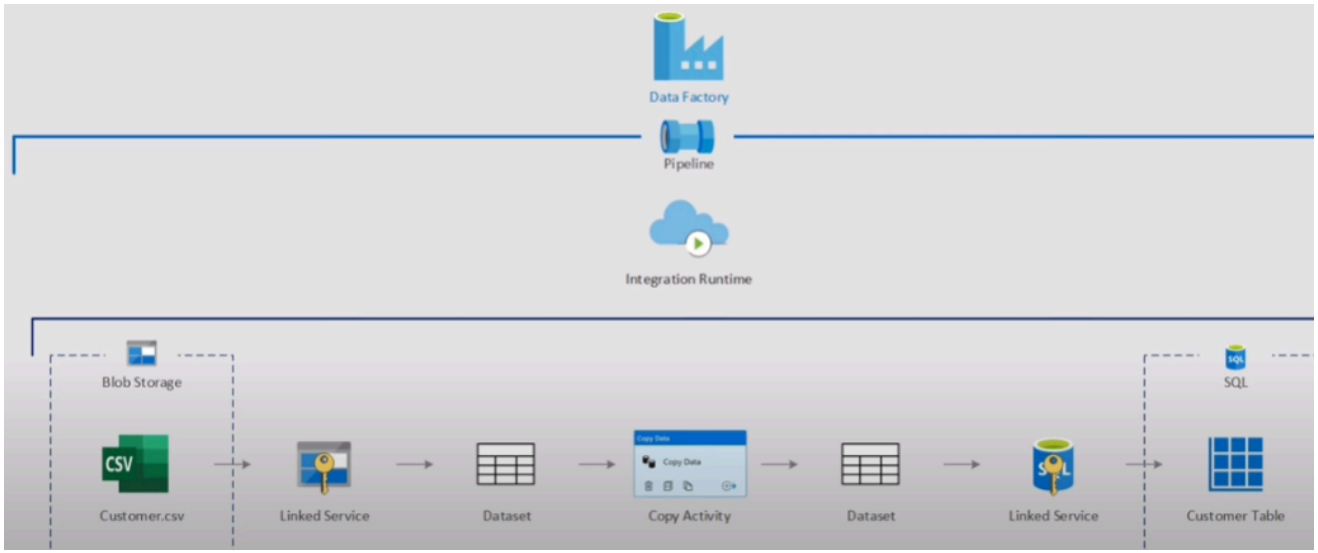
Open source Big Data processing service
Managed Apache Big Data ecosystem
Work with open-source bigdata frameworks:hadoop,kafka..
Hadoop – for batch processing of big data.
Spark – for in-memory, fast data processing.
Hive – for SQL-like querying on big data.
Kafka – for real-time data streaming.
HBase – for NoSQL data storage.

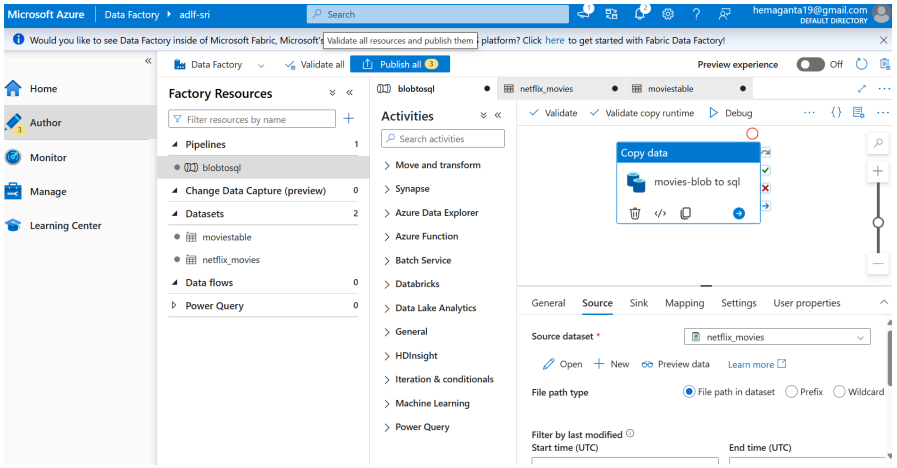
➔ **Azure Databricks:** analytics platform only for **spark based applications**
Allows to create clusters, write scripts(py,scala,write spark code(apply actions & transformations)) that will run on clusters





➔ **Azure Data Factory:** ETL(Extract Transform Load) pipeline building tool
Source: input files to fetch/extract ; Sink: target/destination where we load the data into
Linked Service: establish connection to source & sink
Dataset: what specific data we need to use (ex:which table,file, apply transformation to get enriched data)
Main Activity: transformation(**Copy Activity" or "Data Flow Activity")**
IntegrationRuntime: handles entire job running, runs the activities by integrating multiple tools
Pipeline: logical container of workflow: defining sequence of activities


Data Factory
Pipeline
Integration Runtime
Blob Storage
SQL
CSV
Customer.csv
Linked Service
Dataset
Copy Data
Copy Activity
Dataset
Linked Service
Customer Table


Microsoft Azure
Data Factory
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Search
hemaganta19@gmail.com
DEFAULT DIRECTORY
Would you like to see Data Factory inside of Microsoft Fabric, Microsoft's
Validate all resources and publish them
platform? Click here to get started with Fabric Data Factory!
Data Factory
Validate all
Publish all 3
Preview experience
Off
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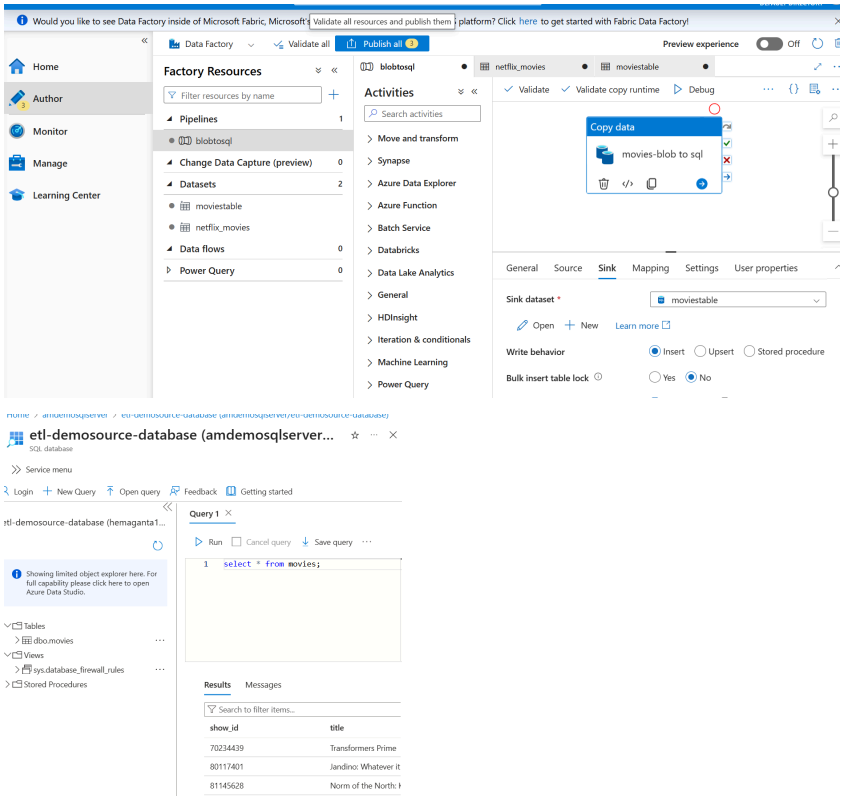
Author
Monitor
Manage
Learning Center
Factory Resources
Filter resources by name
Pipelines 1
blobtosql
Change Data Capture (preview) 0
Datasets 2
moviestable
netflix_movies
Data flows 0
Power Query 0
blobtosql
netflix_movies
moviestable
Activities
Search activities
Move and transform
Synapse
Azure Data Explorer
Azure Function
Batch Service
Databricks
Data Lake Analytics
General
HDInsight
Iteration & conditionals
Machine Learning
Power Query
Validate
Validate copy runtime
Debug
Copy data
movies-blob to sql
General
Source
Sink
Mapping
Settings
User properties
Source dataset *
netflix_movies
Open
New
Preview data
Learn more
File path type
File path in dataset
Prefix
Wildcard
Filter by last modified
Start time (UTC)
End time (UTC)



➔ **Azure Event Hub:**

real time *data ingestion* service

Events sent by producers via *HTTP* or Kafka …into *Event Hub*(contains partitions of event data enable parallel processing)

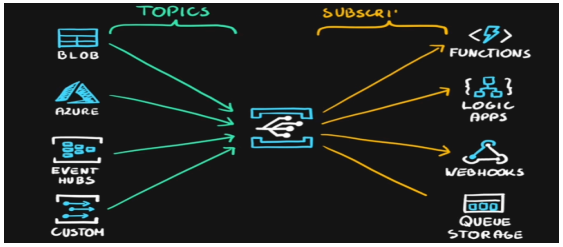
Partitionkey: used to land events into specific partition

Namespace: collections of logical eventhubs

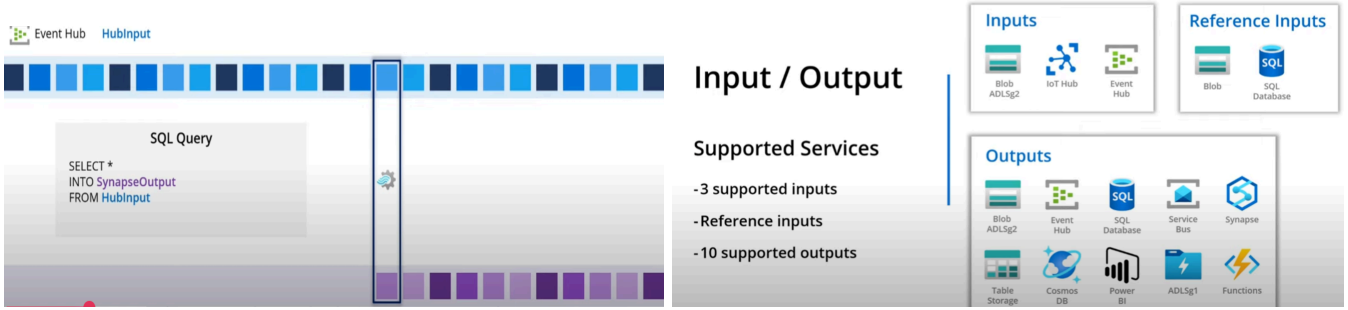
Consumers: Blob Storage, Azure Stream Analytics

Offset: position of event in partition
Each partition maintains its own offset sequence.
Each consumer group tracks its own offset per partition.
Helps each consumer know how many partitions read so far -If that consumer restarts, it can continue from next offset -no need to reprocess old events

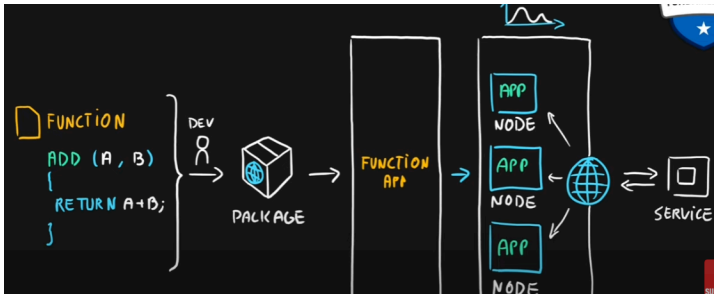
➔ **Azure Event Grid (~Kafka):**
Follows pub-sub model: providers register themselves -> publish messages as topics ->send to event-grid ->event grid sends the specific topics being subscribed to by the subscribers
Used for : real time events/data routing b/w different sources & consumers.



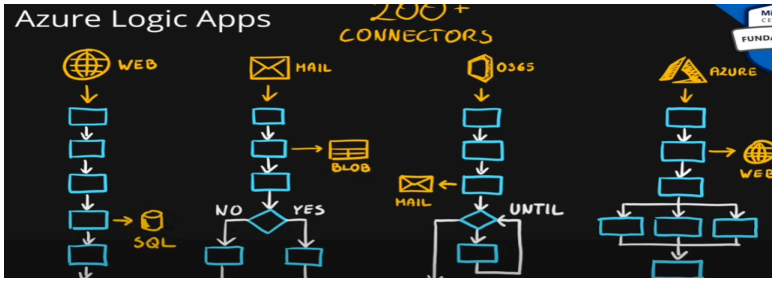
➔ **Azure Streaming/Synapse Analytics**: ADF+SPARK+SQL DATAWAREHOUSE
Input sources: get real time streaming data from event-hub
Perform analytics by writing sql queries & send the enriched data to output sources(cosmosdb, adls)



- **Serverless Services:** You write code or workflows, Azure runs them without you worrying about servers(build,manage,scaling,deployment)
  - ➔ **Azure Functions:**
    Small pieces of code written->devs deploy to pkgs->registered in function apps & exposed
    Mainly designed for *nano-services*
    Run the code snippets in the cloud (serverless)



  - ➔ **Azure Logic Apps**
    Automate workflows using a visual designer (*low-code*)
    Build step-by-step logical workflows(conditions, loops) & trigger them using microsoft products(outlook,O365)
    Ex: When a new row is added to an Excel sheet in OneDrive → send an email → update a SQL Database.



- **ML Service: Azure ML La**b (to write nb, train models, deploy,test, monitor, re-learn form observation/pattern)

- **Security Services: Authorisation & Authentication**

  Authentication: Who You Are??

  Authorisation: What you can access??

  ➔ **Azure Active Directory(AAD):**

  Identity & access management service

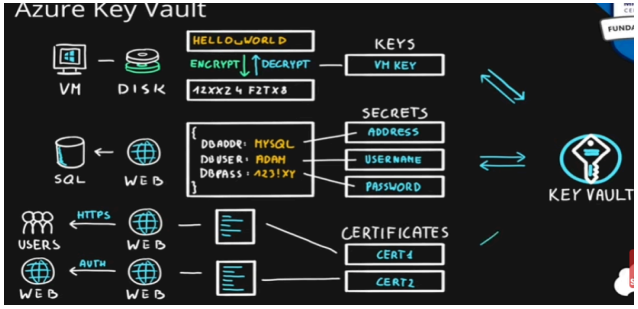
  Manages- users,resource groups,roles,role assignments,

  Can be used by other microsoft apps(office 365,outlook)

  ➔ **SLA (Service Level Agreement):** measure of guarantee of expected level of service availability,performance,reliability provided by Microsoft Azure for the services they provide

  ➔ **Azure KeyVault:**

  Secure storage for encrypted keys, configuration secrets/credentials , certificates(SSL/TLS-identifies service & encrypts communication b/w client and server)



- **Azure Role-Based Access Control(RBAC):**
  Role: set of actions assigned to users/user groups..
  Scope: where the access can be applied to..follows a hierarchy (access to parent object(ex: resource gp) can be extended and applied to child object(ex:resources))
  Resource Locks: assign locks to resources to prevent accidental modification/deletion
  (*ReadOnly Lock*- only read allowed)
  (*Delete Lock*)- all actions except delete allowed

- **SAS(Shared Access Signature):** *temporary pass(temporary url & pswd that is short lived)* allowing others to access my storage account with specific permissions without sharing my storage account key
  Storage Account Key: master credentials for your entire Azure storage account