

Azure MS SQL Training

22-01-2024

Intelligence = Cloud + Data + Automation

9i, 10g, 11g 12c --> Auto Heal--> 18c

12cc(10DBA) --> Auto Heal--> 18c(3/4 DBA)

12cc - 12 cloud container

Cloud:

- > Set of Services
- > Services:
 - > Storage
 - > Computer
 - 1. Dedicated
 - 2. Virtualize(Shared)
 - 3. Containers
 - 4. Serverless
- > Computer
 - a. ServerBase
 - 1. Dedicated
 - 2. Virtualize(Shared)
 - 3. Containers
 - b. Serverless
 - 1. Microservices

SERVERLESS Services are used when you don't know the pattern OF USER ACCESS.

- > Network
- > Security
- > Cloud Service Model
 - A. IaaS
 - B. PaaS
 - C. SaaS

Excel Sheet for Tasks Assigned -

<https://docs.google.com/spreadsheets/d/1Wnk5zO0LuTd88lZGr48NMPMuNrgQxTqAUjF1WHnSX0/edit?usp=sharing>

> Cloud Service Model

A. IaaS = Full Customization

Storage, Compute, Network

B. PaaS = Heroku, Elastic Beanstalk

C. SaaS =

Microsoft Azure

Subscription = Prepaid Plan

Resource Group

Types of Storage -

- i. Data Lake Storage
- ii. Relational database
- iii. Hierarchical database
- iv. Network database

Web Framework	Django
Database Server	SQL Server
Runtime	VM --> Serverless
VCS	Github
Editor	Online/Offline VSCode
Package Availability	1. VM(Terminal) 2. SSH Tunnel

Task1: Run 1 command simultaneously on 2 hosts (PDSH)

```
azureuser@vm1:~$ sudo apt-get update
Hit:1 http://azure.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://azure.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://azure.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 http://azure.archive.ubuntu.com/ubuntu focal-security InRelease
Reading package lists... Done
azureuser@vm1:~$ sudo apt-get -y install pdsh
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  genders libgenders0
Suggested packages:
  rdist
The following NEW packages will be installed:
  genders libgenders0 pdsh
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 167 kB of archives.
After this operation, 519 kB of additional disk space will be used.
Get:1 http://azure.archive.ubuntu.com/ubuntu focal/universe amd64 libgenders0 amd64 1.22-1build2 [29.2 kB]
Get:2 http://azure.archive.ubuntu.com/ubuntu focal/universe amd64 genders amd64 1.-1build2 [29.7 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu focal/universe amd64 pdsh amd64 2.31-build2 [108 kB]
azureuser@vm1:~$ pdsh -w 172.210.32.27 azureuser -r
pdsh@vm1: 172.210.32.27: rcmd: socket: Permission denied
azureuser@vm1:~$ █
```

Task2: Purchase a 30-days-free trial Subscription of Azure, create a Resource Group and deploy a Virtual Machine.

Subscription -

Azure Training Subscription

Subscription ID: a29fc8ef-0107-407b-9ee0-927783c402aa

Subscription name: Azure Training

Current billing period: Loading...

Currency: INR

Status: Active

Secure Score: Not available

Latest billed amount: [Placeholder]

Invoices over time: [Placeholder]

Shortcuts: Opt-in to receive invoice by email

Resource Group -

rg-22jan-aditya Resource group

Overview

Resources Recommendations

Showing 0 to 0 of 0 records.

Virtual Machine -

vm-22jan-aditya Virtual machine

Overview

Essentials

- Resource group (move): rg-22jan-aditya
- Status: Running
- Location: East US (Zone 1)
- Subscription (move): Azure Training
- Subscription ID: a29fc8ef-0107-407b-9ee0-927783c402aa
- Availability zone: 1

Properties Monitoring Capabilities (7) Recommendations Tutorials

The screenshot shows the Microsoft Azure portal homepage. At the top, there's a navigation bar with the Microsoft Azure logo, an 'Upgrade' button, a search bar, and user account information. Below the navigation bar is a section titled 'Azure services' with icons for creating a resource, managing resource groups, SQL databases, storage accounts, data factories, cost management, subscriptions, virtual machines, quickstart center, and more services. Under the 'Resources' section, there are tabs for 'Recent' and 'Favorite'. A table lists three recent resources: 'vm-22jan-aditya' (Virtual machine, last viewed 9 minutes ago), 'rg-22jan-aditya' (Resource group, last viewed 11 minutes ago), and 'Azure Training' (Subscription, last viewed 19 minutes ago).

23-01-2024

SQL

- Query Language
- Standard (ANSI SQL)
 - Close Source :
 - MS SQL Server(Paid)
 - Open Source :
 - MySQL Server(Community)
- MS SQL Server
 - Implementation of
 - Standard SQL
 - RDBMS
 - Package for OORDBMS(BI)---> DWH(ETL) --> BigData
 - SSI(Integration)S, SSR(Reporting)S, SSA(Analysis)S

FMS(File) --> DBMS

RDBMS --> OORDBMS, NDBMS, HDBMS

SQL Profiler – To check for SQL plans. Checks why any query took longer amount of time to execute or encountered an error.

Tools

- CLI - SQL Trace
- GUI - SQL Profiler
- DB IDE - Data Studio
- SQL Client (GUI) - Sql Server Management Studio
- SQL Client (CLI) - SQLCMD

Data

1. Traditional Data
2. Big Data
 - a. Hadoop --> PySpark --> Streaming ---> Data Lake
3. New Data
 - a. Drone, Click Streaming, IoT(Drone, Vertical Farming)

Driver

- Software which helps to understand system(hardware, virtual hardware, software)
- Infinite Program(program/service/daemon)

SQL - MS SQL Server, MySQL, Postgres, etc

NoSQL -

- Categories:
 - Document Oriented
 - Key- Value Oriented
 - Graph Oriented
 - Time Series
 - Columnar
- Implementations of NoSQL
 - MongoDB, DynamoDB, GraphQL, Neo4J, Cosmos, Cassandra, Hbase
 - 256 NoSQL

Azure SQL

- Server --> infinite program to bring data files
- Database --> set of objects(Table, View, Trigger, Stored Procedure, Functions, Packages, etc)
 - Master(Simple Data Entry Table)
 - Helps to Perform transactions
 - Product
 - Category
 - Transactional(Relational Complex)
 - Stock
 - Sales
 - Purchase
 - Temp Table
 - CTE(Common Table Expression)|
- Client
 - Web - Web Query
 - GUI - Dbeaver
 - CLI - SQLCMD

Dbeaver -> Combination of Eclipse (Plug and play) & Java

Dedicated Machine --> VM(Shared) --> Cluster --> Instance --> Databases ---> Database ---> Tables/Object --> Row/Cols

Creation of Azure SQL

1. Active Subscription
2. Create Resource Group
3. Azure SQL
 - a. Database Server
 - b. Database
 - c. Credentials
 - d. Order

Task1: Create Database and connect with DBeaver

Creation of Azure SQL

- 1) Active subscription
- 2) Create resource group
- 3) Azure SQL instance
 - a) Database server: without server DB is nothing
 - i) Name: db23janaditya.database.windows.net
 - ii) Authentication: use SQL authentication
 - iii) Username: dbadmin
 - iv) Pass: Localhost@1234567
 - b) Database
 - i) Name: dbadmin
 - ii) In networking part select public access to make sure the DB works; if we don't we won't be able to access the DB
 - c) Credentials
 - d) Order
- 4) Connectivity
 - a) CLI
 - b) GUI
 - c) Query Editor (comes inside the DB and not DB Server)

SQL deployment options:

- SQL Database: when you have 2-3 databases
- SQL managed instances: when we have multiple DBs and instances (that handle the database; without it no use of database)
- SQL VM: when we want to work with different OS

The screenshot shows the Microsoft Azure Resource Group overview page for a resource group named 'rg-23jan-aditya'. The page has a top navigation bar with 'Microsoft Azure', 'Upgrade', 'Search resources, services, and docs (G+)', and a user profile. Below the navigation is a breadcrumb trail 'Home > Resource groups > rg-23jan-aditya'. The main content area has a left sidebar with sections like Overview, Activity log, Access control (IAM), Tags, Resource visualizer, Events, Deployments, Security, Deployment stacks, Policies, Properties, and Locks. The main panel is titled 'Essentials' and contains a 'Resources' tab. It features a search bar, filter options ('Filter for any field...', 'Type equals all', 'Location equals all'), and sorting options ('Name ↑', 'Type ↑', 'Location ↑'). A note at the bottom says 'Showing 0 to 0 of 0 records.' and 'No grouping'. A large message 'No resources match your filters' is centered at the bottom.

SQL Database and Database Server creation -

Home > Resource groups > rg-23jan-aditya > Marketplace > Azure SQL > Select SQL deployment option >

Create SQL Database

Microsoft

X

⚠️ Changing Basic options may reset selections you have made. Review all options prior to creating the resource.

💡 Lower, simplified pricing for SQL Database Hyperscale starts from 15th of December 2023. [Learn more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ

Azure Training

Resource group * ⓘ

rg-23jan-aditya

[Create new](#)

General Purpose (GP_S_Gen5_1)

Cost per GB (in INR) 9.03
Max storage selected (in GB) x 41.6

ESTIMATED STORAGE COST / MONTH 375.71 INR
COMPUTE COST / VCORE SECOND¹ 0.011382 INR

NOTES

1 Serverless databases are billed in vCore seconds based on a combination of CPU and memory utilization. [Learn more about serverless billing](#)

Database details

[Review + create](#)

[Next : Networking >](#)

Create SQL Database Server

Microsoft

Server details

Enter required settings for this server, including providing a name and location. This server will be created in the same subscription and resource group as your database.

Server name *

sw-23jan-aditya
.database.windows.net

Location *

(US) East US

Authentication

💡 Azure Active Directory (Azure AD) is now Microsoft Entra ID. [Learn more](#)

Select your preferred authentication methods for accessing this server. Create a server admin login and password to access your server with SQL authentication, select only Microsoft Entra authentication [Learn more](#) using an existing Microsoft Entra user, group, or application as Microsoft Entra admin [Learn more](#), or select both SQL and Microsoft Entra authentication.

[OK](#)

Create SQL Database Server

Microsoft

💡 Azure Active Directory (Azure AD) is now Microsoft Entra ID. [Learn more](#)

Select your preferred authentication methods for accessing this server. Create a server admin login and password to access your server with SQL authentication, select only Microsoft Entra authentication [Learn more](#) using an existing Microsoft Entra user, group, or application as Microsoft Entra admin [Learn more](#), or select both SQL and Microsoft Entra authentication.

Authentication method

- Use Microsoft Entra-only authentication
- Use both SQL and Microsoft Entra authentication
- Use SQL authentication

Server admin login *

azureuser

Password *

Confirm password *

[OK](#)

Create SQL Database ...

Microsoft

⚠ Changing Basic options may reset selections you have made. Review all options prior to creating the resource.

Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name *

db-23jan-aditya



Server * ⓘ

(new) sw-23jan-aditya (East US)



[Create new](#)

Want to use SQL elastic pool? ⓘ

Yes No

Workload environment

Development

Production

[Review + create](#)

[Next : Networking >](#)

Create SQL Database ...

Microsoft

⚠ Changing Basic options may reset selections you have made. Review all options prior to creating the resource.

Compute + storage * ⓘ

General Purpose - Serverless

Standard-series (Gen5), 1 vCore, 32 GB storage, zone redundant disabled

[Configure database](#)

Backup storage redundancy

Choose how your PITR and LTR backups are replicated. Geo restore or ability to recover from regional outage is only available when geo-redundant storage is selected.

Backup storage redundancy ⓘ

Locally-redundant backup storage
 Zone-redundant backup storage
 Geo-redundant backup storage

[Review + create](#)

[Next : Networking >](#)

Create SQL Database ...

Microsoft

[Basics](#) [Networking](#) [Security](#) [Additional settings](#) [Tags](#) [Review + create](#)

Configure network access and connectivity for your server. The configuration selected below will apply to the selected server 'sw-23jan-aditya' and all databases it manages. [Learn more ⓘ](#)

Network connectivity

Choose an option for configuring connectivity to your server via public endpoint or private endpoint. Choosing no access creates with defaults and you can configure connection method after server creation. [Learn more ⓘ](#)

Connectivity method * ⓘ

No access
 Public endpoint
 Private endpoint

Firewall rules

Setting 'Allow Azure services and resources to access this server' to Yes allows communications from all resources inside the Azure boundary, that may or may not be part of your subscription. [Learn more ⓘ](#)
Setting 'Add current client IP address' to Yes will add an entry for your client IP address to the server firewall.


Cost summary
General Purpose (GP_S_Gen5_1)
Cost per GB (in INR) 9.03
Max storage selected (in GB) x 41.6
ESTIMATED STORAGE COST / MONTH 375.71 INR
COMPUTE COST / VCORE SECOND 0.011382 INR
NOTES
1 Serverless databases are billed in vCore seconds based

[Review + create](#)

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Create SQL Database

Microsoft

Firewall rules

Setting 'Allow Azure services and resources to access this server' to Yes allows communications from all resources inside the Azure boundary, that may or may not be part of your subscription. [Learn more](#)
Setting 'Add current client IP address' to Yes will add an entry for your client IP address to the server firewall.

Allow Azure services and resources to access this server *

No Yes

Add current client IP address *

No Yes

ESTIMATED STORAGE COST / MONTH 375.71 INR
COMPUTE COST / VCORE SECOND¹ 0.011382 INR

NOTES

1 Serverless databases are billed in vCore seconds based on a combination of CPU and memory utilization. [Learn more about serverless billing](#)

Connection policy

Configure how clients communicate with your SQL database server. [Learn more](#)

Connection policy

- Default - Uses Redirect policy for all client connections originating inside of Azure (except Private Endpoint connections) and Proxy for all client connections originating outside Azure
- Proxy - All connections are proxied via the Azure SQL Database gateways
- Redirect - Clients establish connections directly to the node hosting the

[Review + create](#)

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Encrypted connections

This server supports encrypted connections using Transport Layer Security (TLS). For information on TLS version and certificates, refer to connecting with TLS/SSL. [Learn more](#)

Minimum TLS version

TLS 1.2

Create SQL Database

Microsoft

Basics Networking Security Additional settings Tags Review + create

Microsoft Defender for SQL

Protect your data using Microsoft Defender for SQL, a unified security package including vulnerability assessment and advanced threat protection for your server. [Learn more](#)

Get started with a 30 day free trial period, and then 1178.0175 INR/server/month.

Enable Microsoft Defender for SQL * Start free trial Not now

Ledger

Ledger cryptographically verifies the integrity of your data and detects any tampering that might have occurred. [Learn more](#)

Ledger Not configured [Configure ledger](#)



Create SQL Database

Microsoft

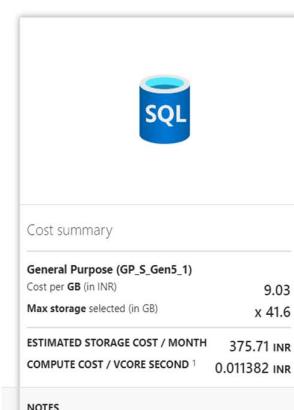
Basics Networking Security Additional settings Tags Review + create

Product details

SQL database
by Microsoft
[Terms of use](#) | [Privacy policy](#)

Estimated cost

Storage cost 375.71 INR / month + Compute cost 0.011382 INR / vCore second



Terms

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. For additional details see [Azure Marketplace Terms](#).

[Review](#)

[Create](#)

[< Previous](#)

[Download a template for automation](#)

Microsoft Azure | Upgrade | Search resources, services, and docs (G+)

Home > Microsoft.SQLDatabase.newDatabaseNewServer_03354bbbe7bb4858b32da | Overview

Deployment

Search | Delete | Cancel | Redeploy | Download | Refresh

Overview

Your deployment is complete

Deployment name : Microsoft.SQLDatabase.newD... Start time : 1/24/2024, 4:53:00 PM
Subscription : Azure Training Correlation ID : fa009e8e-3737-41d8-9d5e-4c...
Resource group : rg-23jan-aditya

Deployment details | Next steps

Go to resource | Give feedback | Tell us about your experience with deployment

Cost management | Microsoft Defender for Cloud | Free Microsoft tutorials

Microsoft Azure | Upgrade | Search resources, services, and docs (G+)

Home > Microsoft.SQLDatabase.newDatabaseNewServer_03354bbbe7bb4858b32da | Overview > db-23jan-aditya (sw-23jan-aditya/db-23jan-aditya)

SQL database

Search | Copy | Restore | Export | Set server firewall | Delete | Connect with... | Feedback

Overview

Activity log | Tags | Diagnose and solve problems | Query editor (preview)

Essentials

Resource group (move)	sw-23jan-aditya
Status	Online
Location	East US
Subscription (move)	Azure Training
Subscription ID	a29fc8ef-0107-407b-9ee0-927783c402aa
Tags (edit)	Add tags

Server name: sw-23jan-aditya.database.windows.net | Connection strings | Show database connection strings | Pricing tier: General Purpose - Serverless: Gen5, 1 vCore | Auto-pause delay: 1 hour | Earliest restore point: No restore point available

Getting started | Monitoring | Properties | Features | Notifications (0) | Integrations | Tutorials

Change the Firewall to accept all Connections -

Microsoft Azure | Upgrade | Search resources, services, and docs (G+)

Home > Microsoft.SQLDatabase.newDatabaseNewServer_03354bbbe7bb4858b32da | Overview > db-23jan-aditya (sw-23jan-aditya/db-23jan-aditya) > sw-23jan-aditya

SQL server

Search | Overview | Activity log | Access control (IAM) | Tags | Quick start | Diagnose and solve problems

Networking

Rule | Virtual network | Subnet | Address range | Endpoint status | Resource group | Subscription | State

Firewall rules
Allow certain public internet IP addresses to access your resource. [Learn more](#)

+ Add your client IPv4 address (125.17.147.20) + Add a firewall rule

Rule name	Start IPv4 address	End IPv4 address
Clientip-2024-1-24_16-52-47	0.0.0	255.255.255.255

Exceptions
 Allow Azure services and resources to access this server

Save | Discard

Login in to Query Editor to write a Script -

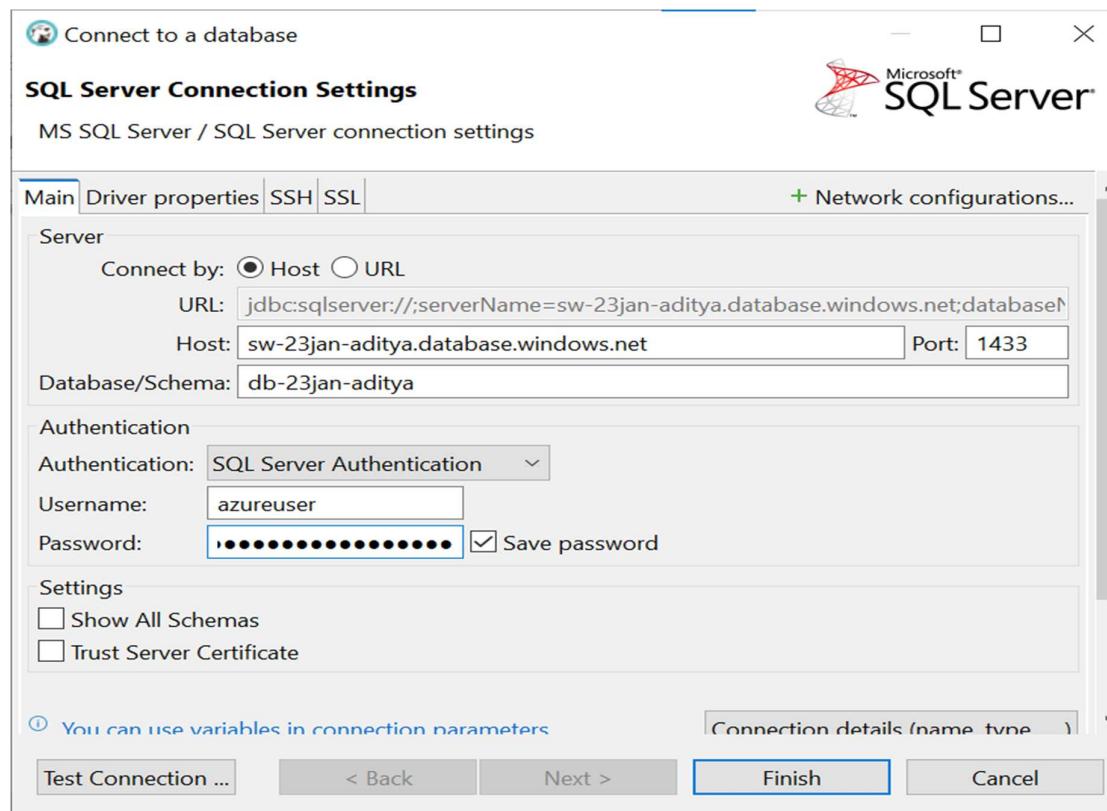
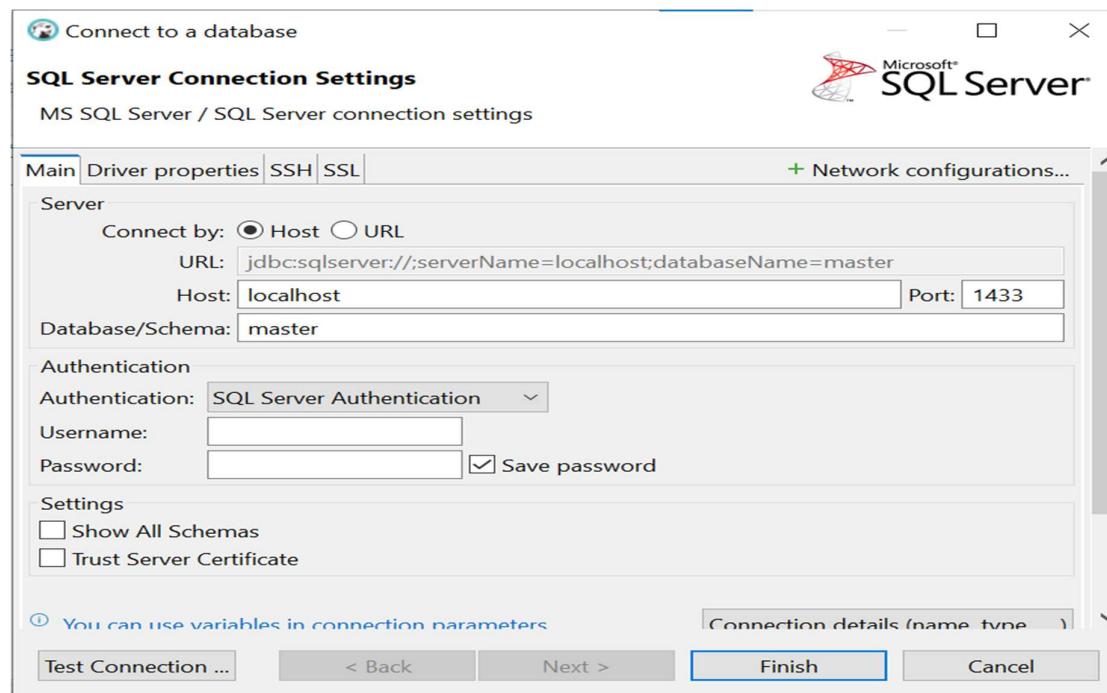
The screenshot shows the Microsoft Azure portal interface for a SQL database named "db-23jan-aditya". The left sidebar contains navigation links like Overview, Activity log, Tags, Diagnose and solve problems, and Query editor (preview). The main area is titled "Welcome to SQL Database Query Editor" and displays a login form for "SQL server authentication". It asks for a "Login" (azureuser) and a "Password". There is also an option for "Microsoft Entra authentication" and a "Continue as aditya.shah1@inedoinc.com" button. A note at the top right says: "Query editor (preview) is a tool to run SQL queries against Azure SQL Database in the Azure portal. It is designed for lightweight querying and object exploration in your database. For more information and troubleshooting, Learn more".

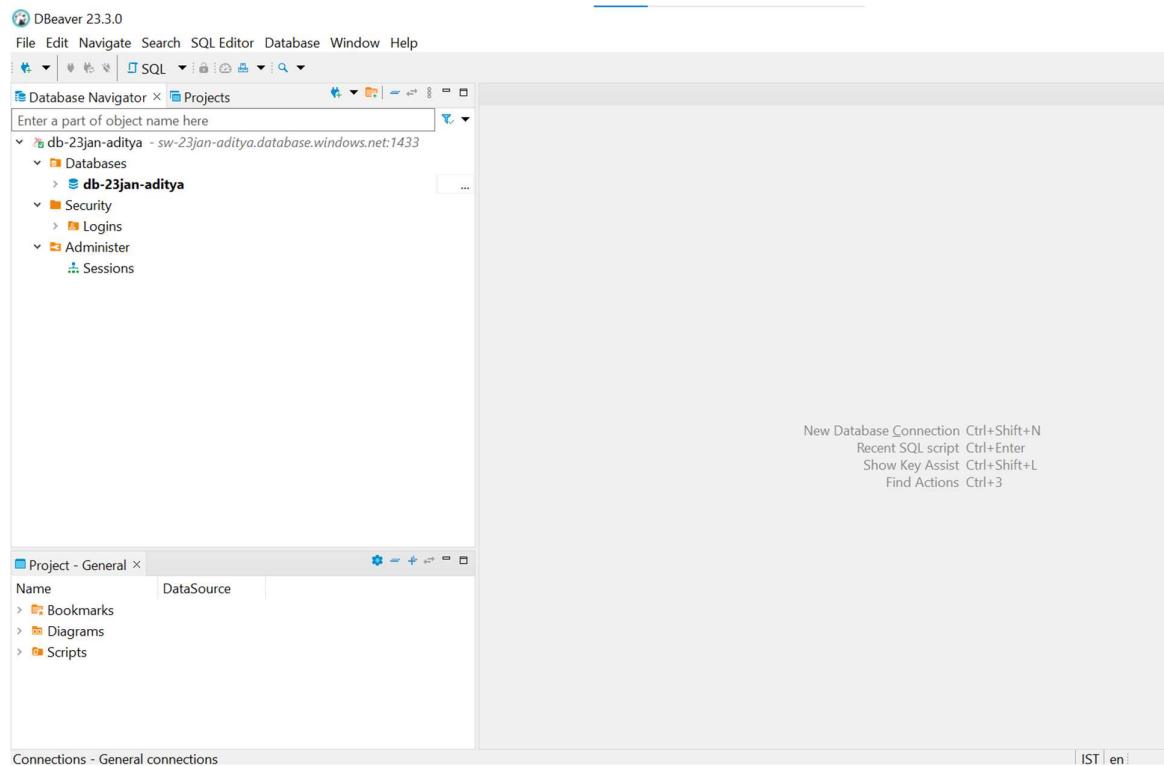
The screenshot shows the Microsoft Azure portal interface for the same SQL database. The left sidebar remains the same. The main area now shows the "Query 1" editor. The title bar says "db-23jan-aditya (azureuser) | Query editor (preview)". Below the title are buttons for Run, Cancel query, Save query, Export data as, and Show only Editor. The editor itself has a single line of code: "1". At the bottom, there are tabs for Results and Messages, and a search bar.

Dbeaver -

The screenshot shows the Dbeaver 23.3.0 application interface. The top menu includes File, Edit, Navigate, Search, SQL Editor, Database, Window, and Help. The left sidebar shows a tree view of database drivers: DB2 for LUW, MariaDB, MySQL, Oracle, PostgreSQL, and SQL Server. The "SQL Server" node is selected. Below the tree, there are options for SQLite, Apache Calcite Avatica, Apache Drill, Apache Hive, and Other, along with "From JDBC URL ..." and "New Database Connection Ctrl+Shift+N". The main workspace shows a "Project - General" tab with a "DataSource" section. A context menu is open over the "DataSource" tab, listing options: "New Database Connection Ctrl+Shift+N", "Recent SQL script Ctrl+Enter", "Show Key Assist Ctrl+Shift+L", and "Find Actions Ctrl+3". At the bottom, there are tabs for "Connections - General connections" and language settings "IST | en".

After selecting SQL Server from the Plugin Section input the following details to connect the Dbeaver with Azure Database Server and Database -





No Tables in database –

Tables	Table Name	Total bytes	Used bytes	Object description (comment)
External Tables				
Views				
Indexes				
Procedures				
Sequences				
Synonyms				
Triggers				
Data Types				
DDL				
No items				

After Script Execution –

The screenshot shows the Azure Data Studio interface. On the left, the object explorer shows a connection to 'db23jan (azureuser)'. The 'Tables' node is expanded, showing 'Employee' as the newly created table. The main area contains a query editor titled 'Query 1' with the following SQL script:

```
1 CREATE TABLE Employee
2 (
3     EmployeeID int,
4     FirstName varchar(255),
5     LastName varchar(255),
6     Email varchar(255),
```

The results tab at the bottom shows the message: 'Query succeeded: Affected rows: 0'.

Table added to the Database -

Columns	Column Name	#	Type	Length	Scale	Precision	Not Null	Identity	Default	Collation	Description
Unique Keys	EmployeeID	1	int	4		10	[]	[]			
Check constraints	FirstName	2	varchar	255			[]	[]		SQL_Latin1_General_CI_AS	
Foreign Keys	LastName	3	varchar	255			[]	[]		SQL_Latin1_General_CI_AS	
Indexes	Email	4	varchar	255			[]	[]		SQL_Latin1_General_CI_AS	
References	AddressLine	5	varchar	255			[]	[]		SQL_Latin1_General_CI_AS	
Triggers	City	6	varchar	255			[]	[]		SQL_Latin1_General_CI_AS	

24/01/2024

24Jan.Data Containerization in Cloud

24 January 2024 10:41 AM

Cloud(Azure)

Data

Traditional Data(RDBMS) = 30%

Big + New Data = 70%

DWH, ETL, BI, Hadoop, Informatica, Pentaho, Spark, Databricks

- RDBMS works only with structured data (not capable for handling all type of data), while New + Big data can work with structures, non-structured
- Pentaho – Hitachi Product (Helps to integrate and kind of data & used to transform any type of data to other)

Virtualization(Microsoft Azure VM)(Containerization(Docker))

Image - File(Local/Remote)

Container - Process/Running Image

Archive Registry/Container Registry

Market Place(Remote Image)

- Hub.Docker.com

- Microsoft ---> ACR- Azure Container Registry

- GCR, ECR, etc.

Shops (Repository)

Shops (Repository)

docker pull mujahed/welcome1:tagname

ShopName/Product Name: Version

docker pull postgres/postgres:13.13

1. Check Subscription
2. Create Resource Group
3. Order VM
 - a. Configuration: 4CPU, 16GB
 - b. UserName: azureuser
 - c. Password: Localhost@1234567
- d) Select all inbound ports
- e) Review + Create
- f) Validation from client side passed
- g) Create
- h) Copy public IP address
- i) We can either use CMD or inbuilt cloud shell of Azure (will work iff we have storage account)
- j) In CMD
cd .ssh
type config
ssh (works with any kind of OS)
ssh azureuser@PublicIPaddress

Connect VM- Connect with the docker

```
az ssh vm -resource-group "name" -vm-name "name" --subscription "value"
```

4. Connect VM

- a. Azure CLI
 - i. \$ az ssh vm --resource-group rg-24jan-pentaho --vm-name vm-24jan-pentaho --subscription 675613e4-01ce-4876-99a1-37bb6cffdd3d
 - ii. \$ az ssh vm --resource-group r1 --vm-name v1 --subscription s1
- b. SSH CLI
- c. GUI Tools
 - i. MobaXterm
 - ii. Putty

5. Install Docker

- a. \$ sudo su
- b. # apt update
- c. # apt install docker.io -y
- d. # docker --version
- e. # docker info

6. Create Application Deployment

- a. Create Docker Network
 - i. # docker network create incedo-nw
 - ii. # docker network ls
- b. Pull Remote Image From CR(hub.docker.com)
 - i. # docker images
 - ii. # docker pull nginx:latest
- c. Local Image(nginx:latest) --> Container [detachable mode]
 - i. # docker run --rm --net nw --name ws -d nginx:latest

```

ii. # docker ps --> ContainerID
iii. # export CID=1ed32814ee6c --> ContainerID
iv. # docker inspect $CID | grep IPAddress
v. # export WSIP=172.18.0.2
d. Pull Remote Image--> Local Image --> Container
i. # docker run --net nw -it busybox sh
e. Test Web Server From 2nd Container
i. # wget -q -O - http://ContainerName:80
ii. # wget -q -O - http://IPAddress:80
iii. wget -q -O http://IPAddress
iv. wget -q -O IPAddress
v. wget -q -O ContainerName
f. Delete All Containers & Images
i. # docker rm $(docker ps -aq) --force && docker rmi $(docker images -q) --force

```

- D – Detached mode
- In – Interactive mode
- sudo su (su is switch user)

- Create Application Deployment
 - Create Docker Network
 - #docker network create incedo-nw
 - #docker network ls
 - Pull remote image from CR (hub.docker.com)
 - #docker images
 - #docker pull nginx:latest
 - Check Local Docker Image comes/not (local image (nginx:latest) → Container [detachable mode])
 - #docker run -rm -net nw -name ws -d nginx:latest
 - This command will try to convert the local image in a detachable mode (-d); -rm (remove disk space); ws is container name
 - #docker ps
 - Gives container ID
 - #export CID=1ed32814ee6c
 - To store a value in a variable CID; it is an environment variable
 - #docker inspect \$CID | grep IPAddress
 - Copy last wala Address
 - #export WSIP=172.18.0.2
 - Web server IP
 - #docker ps -a
 - This command shows the no. of processes running i.e. all

Screenshots of Azure Bash –

```

Requesting a Cloud Shell. Succeeded.
Connecting terminal...

aditya [ ~ ]$ az ssh vm --resource-group rg-24jan-aditya --vm-name vm-24jan-pentaho --subscription a29fc8ef-0107-407b-9ee0-927783c402aa
OpenSSH_8.9p1, OpenSSL 1.1.1k FIPS 25 Mar 2021
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1053-azure x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Wed Jan 24 10:12:47 UTC 2024

System load: 0.0      Users logged in:           1
Usage of /:  8.8% of 28.89GB  IPv4 address for br-192e17fdb14e: 172.18.0.1
Memory usage: 3%        IPv4 address for docker0:      172.17.0.1
Swap usage:  0%          IPv4 address for eth0:       10.0.0.4
Processes:   141

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

```

```
Expanded Security Maintenance for Applications is not enabled.

24 updates can be applied immediately.
18 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

1 additional security update can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

New release '22.04.3 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Wed Jan 24 09:46:50 2024 from 20.219.168.120
aditya.shah1@incedoinc.com@vm-24jan-pentaho:~$ sudo su
root@vm-24jan-pentaho:/home/aditya.shah1# apt update
Hit:1 http://azure.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Hit:3 http://azure.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 http://azure.archive.ubuntu.com/ubuntu focal-security InRelease
Get:5 https://packages.microsoft.com/repos/microsoft-ubuntu-focal-prod focal InRelease [3631 B]
Fetched 117 kB in 1s (178 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
Reading state information... Done
docker.io is already the newest version (24.0.5-0ubuntu1~20.04.1).
0 upgraded, 0 newly installed, 0 to remove and 33 not upgraded.
root@vm-24jan-pentaho:/home/aditya.shah1# docker --version
Docker version 24.0.5, build 24.0.5-0ubuntu1~20.04.1
root@vm-24jan-pentaho:/home/aditya.shah1# docker info
Client:
  Version:    24.0.5
  Context:    default
  Debug Mode: false

Server:
  Containers: 0
  Running: 0
  Paused: 0
  Stopped: 0
  Images: 2
  Server Version: 24.0.5
  Storage Driver: overlay2
    Backing Filesystem: extfs
    Supports d_type: true
    Using metacopy: false
    Native Overlay Diff: false
    userxattr: false
  Logging Driver: json-file
  Cgroup Driver: cgroupfs
  Cgroup Driver: cgroupfs
  Cgroup Version: 1
  Plugins:
    Volume: local
    Network: bridge host ipvlan macvlan null overlay
    Log: awslogs fluentd gcplogs gelf journalctl json-file local logentries splunk syslog
  Swarm: inactive
  Runtimes: io.containerd.runc.v2 runc
  Default Runtime: runc
  Init Binary: docker-init
  containerd version:
    runc version:
    init version:
  Security Options:
    apparmor
    seccomp
      Profile: builtin
  Kernel Version: 5.15.0-1053-azure
  Operating System: Ubuntu 20.04.6 LTS
  OSType: linux
  Architecture: x86_64
  CPUs: 4
  Total Memory: 15.57GiB
  Name: vm-24jan-pentaho
```

```

Name: vm-24jan-pentaho
ID: c83701f6-c669-4dd8-be7b-b4e0ef22aad2
Docker Root Dir: /var/lib/docker
Debug Mode: false
Experimental: false
Insecure Registries:
  127.0.0.0/8
Live Restore Enabled: false

root@vm-24jan-pentaho:/home/aditya.shah1# docker network create aditya-nw
Error response from daemon: network with name aditya-nw already exists
root@vm-24jan-pentaho:/home/aditya.shah1# docker network ls
NETWORK ID      NAME      DRIVER      SCOPE
192e17fb14e    aditya-nw   bridge      local
9848731b52c9   bridge      bridge      local
99a3405b01e7   host       host       local
dc5433d17bb   none       null      local
root@vm-24jan-pentaho:/home/aditya.shah1# 

root@vm-24jan-pentaho:/home/aditya.shah1# docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
busybox         latest   3f57d9401f8d  6 days ago   4.26MB
nginx           latest   a8758716bb6a  3 months ago  187MB
root@vm-24jan-pentaho:/home/aditya.shah1# 

root@vm-24jan-pentaho:/home/aditya.shah1# docker run --rm --net aditya-nw --name aditya-ws -d nginx:latest
0bc0f12871a5b30aed2c3fdf476d452b0d3ad23ede597fb419d1ea6d085f4dc2
root@vm-24jan-pentaho:/home/aditya.shah1# docker ps
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES
0bc0f12871a5    nginx:latest  "/docker-entrypoint..."  10 seconds ago  Up 9 seconds  80/tcp     aditya-ws
root@vm-24jan-pentaho:/home/aditya.shah1# export CID=0bc0f12871a5
root@vm-24jan-pentaho:/home/aditya.shah1# 

root@vm-24jan-pentaho:/home/aditya.shah1# docker inspect $CID | grep IPAddress
  "SecondaryIPAddresses": null,
  "IPAddress": "",
  "IPAddress": "172.18.0.2",
root@vm-24jan-pentaho:/home/aditya.shah1# export WSIP=172.18.0.2
root@vm-24jan-pentaho:/home/aditya.shah1# docker run --net aditya-nw -it busybox sh
/ # wget -q -O - http://aditya-ws:80
<!DOCTYPE html>
<html>
<head>
<title>Welcome to nginx!</title>
<style>
html { color-scheme: light dark; }
body { width: 35em; margin: 0 auto;
font-family: Tahoma, Verdana, Arial, sans-serif; }
</style>
</head>
<body>
<h1>Welcome to nginx!</h1>
<p>If you see this page, the nginx web server is successfully installed and
working. Further configuration is required.</p>
<p>If you see this page, the nginx web server is successfully installed and
working. Further configuration is required.</p>
<p>For online documentation and support please refer to
<a href="http://nginx.org/">nginx.org</a>.<br/>
Commercial support is available at
<a href="http://nginx.com/">nginx.com</a>.</p>
<p><em>Thank you for using nginx.</em></p>
</body>
</html>
/ #
root@vm-24jan-pentaho:/home/aditya.shah1# docker rm $(docker ps -aq) --force && docker rmi $(docker image -q) --force
925350679e73
0bc0f12871a5
unknown shorthand flag: 'q' in -q
See 'docker image --help'.

Usage: docker image COMMAND

Manage images

Commands:
  build      Build an image from a Dockerfile
  history    Show the history of an image
  import     Import the contents from a tarball to create a filesystem image
  inspect    Display detailed information on one or more images
  load       Load an image from a tar archive or STDIN
  ls        List images
  prune     Remove unused images
  pull       Download an image from a registry
  push       Upload an image to a registry
  rm        Remove one or more images

```

```

rm      Remove one or more images
save    Save one or more images to a tar archive (streamed to STDOUT by default)
tag     Create a tag TARGET_IMAGE that refers to SOURCE_IMAGE

Run 'docker image COMMAND --help' for more information on a command.

"docker rmi" requires at least 1 argument.
See 'docker rmi --help'.

Usage: docker rmi [OPTIONS] IMAGE [IMAGE...]

Remove one or more images
root@vm-24jan-pentaho:/home/aditya.shah1# 

Remove one or more containers
root@vm-24jan-pentaho:/home/aditya.shah1# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
busybox latest 3f57d9401f8d 6 days ago 4.26MB
nginx latest a8758716bb6a 3 months ago 187MB
root@vm-24jan-pentaho:/home/aditya.shah1# docker rmi $(docker images -q) --force
Untagged: busybox:latest
Untagged: busybox@a8758716bb6a4d90071160d27028fe4eae7ce8166221a97d30440c8eac2be6
Deleted: sha256:3f57d9401f8d42f986df300f0c69192fc41da28ccc8d797829467780db3dd741
Deleted: sha256:2e112031b4b923a873c8b3d685d48037e4d5cc967b658743d93a6e56c3064b9
Untagged: nginx:latest
Untagged: nginx@a8758716bb6a4d90071160d27028fe4eae7ce8166221a97d30440c8eac2be6
Deleted: sha256:a8758716bb6a4d90071160d27028fe4eae7ce8166221a97d30440c8eac2be6
Deleted: sha256:8cdc9097fea2fcf2db1988760aff035a8a0324748925fe07e53cd7804fb4
Deleted: sha256:fbece1a08d51bfad7eb10d215a16eba56ee8aefdfa8b1cf63d6a53289b493642
Deleted: sha256:7a8ee37a0874b22baf2823702194110c05f0aa0e6b927f03ea84fd48ebbed743f2
Deleted: sha256:7a2775057689978717868ea8978b57fe38948c28225d18cf190e76b8b26fa77b
Deleted: sha256:e73c88106088f073c8a0b9a1d28ed13b0322698d58437069fca1932eff961cef
Deleted: sha256:18ae995a9099b1104783164e93d8fde1d665bbc35199c726bda1ebe912095582
Deleted: sha256:571ade696b261f0ff46e3cdac4635afc009c4ed3429950cb95cd7e5f70ba0a07
root@vm-24jan-pentaho:/home/aditya.shah1# docker images -q
root@vm-24jan-pentaho:/home/aditya.shah1# docker ps -aq
root@vm-24jan-pentaho:/home/aditya.shah1#

```

Output -

Resource Group & Virtual Machine created using Azure CLI.

Azure services

- Create a resource
- Resource groups
- Subscriptions
- Cost Management ...
- Virtual machines
- Quickstart Center
- App Services
- Storage accounts
- SQL databases
- More services

Resources

Recent Favorite

Name	Type	Last Viewed
vm-24jan-pentaho	Virtual machine	a few seconds ago
rg-24jan-aditya	Resource group	a minute ago
Azure Training	Subscription	4 hours ago

Resource Group -

Home >

rg-24jan-aditya Resource group

Overview

- Activity log
- Access control (IAM)
- Tags
- Resource visualizer
- Events

Settings

- Deployments
- Security
- Deployment stacks
- Policies
- Properties
- Locks

Essentials

Resources Recommendations (1)

Showing 1 to 6 of 6 records.

Name	Type	Location
vm-24jan-pentaho	Virtual machine	East US
vm-24jan-pentaho-ip	Public IP address	East US
vm-24jan-pentaho-nsg	Network security group	East US
vm-24jan-pentaho-vnet	Virtual network	East US
vm-24jan-pentaho345_z1	Network Interface	East US
vm-24jan-pentaho_disk1_135a9a29b7254dd1af2904d5c763a36a	Disk	East US

Virtual Machine -

vm-24jan-pentaho

Virtual machine

Search

Connect Start Restart Stop Hibernate (preview) Capture Delete Refresh Open in mobile Feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

Disks

Size

Microsoft Defender for Cloud

Advisor recommendations

Extensions + applications

Essentials

Resource group (move) rg-24jan-aditya

Status Running

Location East US (Zone 1)

Subscription (move) Azure Training

Subscription ID a29fc8ef-0107-407b-9ee0-927783c402aa

Availability zone 1

Tags (edit) Add tags

Operating system Linux (ubuntu 20.04)

Size Standard D4s v3 (4 vcpus, 16 GiB memory)

Public IP address 172.203.227.149

Virtual network/subnet vm-24jan-pentaho-vnet/default

DNS name Not configured

Health state -

Properties Monitoring Capabilities (7) Recommendations Tutorials

JSON View

25/01/2024

Worked on the Project of OTP Generation and Session Management

29/01/2024

Typical Application:
App1 → WebServer → VM(OS) → IP

Why Azure Load Balancer:

- > Load Balance internal/external traffic(Request/Response) to Azure VM
- > Increase availability distribute resources within + across = Zones
- > Configure outbound connectivity to LB resources
Internet → Incoming traffic → VM =Inbound
Internet ← Outgoing traffic ← VM =Outbound
- > Use health probes to monitor LB resources(VMs)

> Port Forwarding

1) Subscription → Resource Group

2) VNet(10.1.0.0/16) → myPubIP

```
# az network vnet create \
--resource-group CreatePubLBQS-rg \
--location eastus \
--name myVNet \
--address-prefixes 10.1.0.0/16 \
--subnet-name myBackendSubnet \
--subnet-prefixes 10.1.0.0/24
```

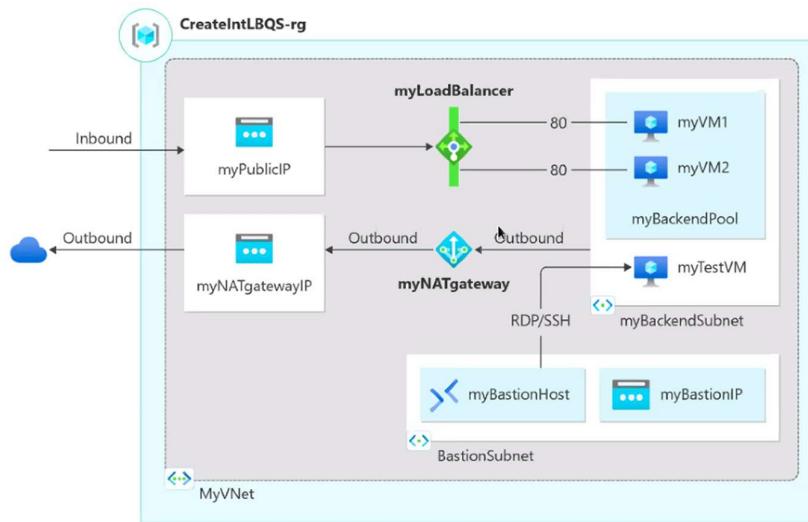
```

3) LB → HP → LB Route
4) NSG → NSG Rule
5) Bastion Host
    PubIP - MyBastionIP
    Subnet - AzBastionSubnet

6) Backend Subnet:
    Create NIC with name as MyNicVM1, MyNicVM2
    VM1, VM2 ← MyNicVM1, MyNicVM2
7) NAT Gateway
    MyNATGWIp
    MyNATGW → BackendSubnet
8) WebServer(IIS) ← HelloWorld ← VM1, VM2
9) Test
10) Delete

```

Load Balancer Diagram -



- RDP - Remote Desktop Protocol
- NSG - Network Security Group
- NIC - Network Interface Card (used to connect & communicate to different devices outside the network)
- Inet - used to display IP Address
- NAT - used for computer network

```

Full CIDR Block: 10.1.0.0/26
Network Type: 10.1.0.
IPV4 : X.X.X.X = 8.8.8.8 = 32 - 26 = 2^6 = 64
Start IP Address: 10.1.0.0
End IP Address : 10.1.0.63

```

```
Full CIDR Block: 10.1.0.0/28
Network Type: 10.1.0.
IPV4 : X.X.X.X = 8.8.8.8 = 32 - 28 = 2^4 = 16
Start IP Address: 10.1.0.0
End IP Address : 10.1.0.15
```

Azure CLI Screenshots for Deploying Load balancer on 2 VMs -

Step 1) Subscription --> Resource Group -

```
aditya [ ~ ]$ az group create \
> --name CreatePubLBQS-rg \
> --location eastus
[
```

Step 2) VNet(10.1.0.0/16) --> myPubIP-

```
aditya [ ~ ]$ az network vnet create \
--resource-group CreatePubLBQS-rg \
--location eastus \
--name myVNet \
--address-prefixes 10.1.0.0/16 \
--subnet-name myBackendSubnet \
--subnet-prefixes 10.1.0.0/24
```

```
aditya [ ~ ]$ az network public-ip create --resource-group CreatePubLBQS-rg --name myPublicIP \
--sku Standard --zone 1
```

Step3) LB --> HP --> LB Route

i. Load Balancer: Frontend Public IP Backend Public IP

```
aditya [ ~ ]$ az network lb create \
--resource-group CreatePubLBQS-rg \
--name myLoadBalancer \
--sku Standard \
--public-ip-address myPublicIP \
--frontend-ip-name myFrontEnd \
--backend-pool-name myBackEndPool
[
```

ii. Health Probe

```
aditya [ ~ ]$ az network lb probe create \
--resource-group CreatePubLBQS-rg \
--lb-name myLoadBalancer \
--name myHealthProbe \
--protocol tcp \
--port 80
```

Ports 25 & 27 does not work due to security reasons

iii. LB Rule -

```
aditya [ ~ ]$ az network lb rule create \
--resource-group CreatePubLBQS-rg \
--lb-name myLoadBalancer \
--name myHTTPRule \
--protocol tcp \
--frontend-port 80 \
--backend-port 80 \
--frontend-ip-name myFrontEnd \
--backend-pool-name myBackEndPool \
--probe-name myHealthProbe \
--disable-outbound-snat true \
--idle-timeout 15 \
--enable-tcp-reset true
```

Step 4) NSG --> NSG Rule

```
aditya [ ~ ]$ az network nsg rule create \
--resource-group CreatePubLBQS-rg \
--nsg-name myNSG \
--name myNSGRuleHTTP \
--protocol '*' \
--direction inbound \
--source-address-prefix '*' \
--source-port-range '*' \
--destination-address-prefix '*' \
--destination-port-range 80 \
--access allow \
--priority 200
```

Output-

Name	Subscription	Location
cloud-shell-storage-centralindia	Azure Training	Central India
CreatePubLBQS-rg	Azure Training	East US
NetworkWatcherRG	Azure Training	East US

Microsoft Azure Search resources, services, and docs (G+/-) aditya.shah1@incedoi... INCEO TECHNOLOGY SOLUTI...

Home > Resource groups > CreatePubLBQS-rg

Resource group

Search Overview

+ Create Manage view Delete resource group Refresh Export to CSV Open query Assign tags Move ... JSON View

Activity log Access control (IAM) Tags Resource visualizer Events

Settings Deployments Security Deployment stacks Policies

Essentials Resources Recommendations

Filter for any field... Type equals all Location equals all Add filter

Showing 1 to 4 of 4 records. Show hidden types No grouping List view

Name	Type	Location	...
myLoadBalancer	Load balancer	East US	...
myNSG	Network security group	East US	...
myPublicIP	Public IP address	East US	...
myVNet	Virtual network	East US	...

Microsoft Azure Search resources, services, and docs (G+/-) aditya.shah1@incedoi... INCEO TECHNOLOGY SOLUTI...

Home > Resource groups > CreatePubLBQS-rg > myLoadBalancer

Load balancer

Search Move Delete Refresh Give feedback

Overview

Resource group (move) CreatePubLBQS-rg

Location East US

Subscription (move) Azure_Training

Subscription ID a29fc8ef-0107-407b-9ee0-927783c402aa

SKU Standard

Tags (edit) Add tags See more

Backend pool myBackEndPool

Load balancing rule myHTTPRule (Tcp:80)

Health probe myHealthProbe (Tcp:80)

NAT rules 0 inbound

Tier Regional

JSON View

Microsoft Azure Search resources, services, and docs (G+/-) aditya.shah1@incedoi... INCEO TECHNOLOGY SOLUTI...

Home > Resource groups > CreatePubLBQS-rg > myNSG

Network security group

Search Move Delete Refresh Give feedback

Overview

Filter by name Port == all Protocol == all Source == all Destination == all Action == all

Inbound Security Rules

Priority ↑	Name ↑	Port ↑	Protocol ↑	Source ↑	Destination ↑	Action ↑
200	myNSGRuleHTTP	80	Any	Any	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalanc...	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

Outbound Security Rules

Priority ↑	Name ↑	Port ↑	Protocol ↑	Source ↑	Destination ↑	Action ↑
65000	AllowVnetOutBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowInternetOutBound	Any	Any	Any	Internet	Allow
65500	DenyAllOutBound	Any	Any	Any	Any	Deny

Microsoft Azure

Home > Resource groups > CreatePubLBQS-rg

myPublicIP

Public IP address

Overview

Activity log

Access control (IAM)

Tags

Settings

Configuration

Properties

Locks

Monitoring

Insights

Alerts

Associate Dissociate Delete Move Refresh Open in mobile Give feedback

Resource group (move) CreatePubLBQS-rg

Location (move) East US

Subscription (move) Azure_Training

Subscription ID a29fc8ef-0107-407b-9ee0-927783c402aa

SKU Standard

Tier Regional

IP address 172.210.3.80

DNS name -

Associated to myLoadBalancer

Virtual machine -

Bash

Microsoft Azure

Home > Resource groups > CreatePubLBQS-rg

myVNet

Virtual network

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Address space

Connected devices

Subnets

Bastion

DDoS protection

Firewall

Microsoft Defender for Cloud

Move Delete Refresh Give feedback

Essentials

Topology Properties Capabilities (5) Recommendations Tutorials

DDoS protection Configure additional protection from distributed denial of service attacks. Not configured

Azure Firewall Protect your network with a stateful L3-L7 firewall. Not configured

Peering Seamlessly connect two or more virtual networks. Not configured

Microsoft Defender for Cloud Strengthen the security posture of your environment. Not configured

Private endpoints Privately access Azure services without sending traffic across internet. Not configured

Step 5) Bastion Configuration Bastion PubIP - MyBastionIP

```
aditya [ ~ ]$ az network public-ip create \
--resource-group CreatePubLBQS-rg \
--name myBastionIP \
--sku Standard \
--zone 1 2 3
```

Bastion Subnet - AzBastionSubnet

```
aditya [ ~ ]$ az network vnet subnet create \
--resource-group CreatePubLBQS-rg \
--name AzureBastionSubnet \
--vnet-name myVNet \
--address-prefixes 10.1.1.0/27
```

Create Bastion Host - myBastionHost

```
aditya [ ~ ]$ az network bastion create \
--resource-group CreatePubLBQS-rg \
--name myBastionHost \
--public-ip-address myBastionIP \
--vnet-name myVNet \
--location eastus
```

Step 6) Backend Subnet: Create NIC with name as MyNicVM1, MyNicVM2

```
aditya [ ~ ]$ array=(myNicVM1 myNicVM2)
for vmnic in "${array[@]}"
do
    az network nic create \
        --resource-group CreatePubLBQS-rg \
        --name $vmnic \
        --vnet-name myVNet \
        --subnet myBackEndSubnet \
        --network-security-group myNSG
done
```

VM1

```
aditya [ ~ ]$ az vm create \
    --resource-group CreatePubLBQS-rg \
    --name myVM1 \
    --nics myNicVM1 \
    --image win2019datacenter \
    --admin-username azureuser \
    --zone 1 --no-wait
Admin Password:
Confirm Admin Password:
```

VM2

```
aditya [ ~ ]$ az vm create \
    --resource-group CreatePubLBQS-rg \
    --name myVM2 \
    --nics myNicVM2 \
    --image win2019datacenter \
    --admin-username azureuser \
    --zone 2 --no-wait
Admin Password:
Confirm Admin Password:
```

Output VM1 & VM2-

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes 'Microsoft Azure', a search bar, and a user profile. Below the navigation bar, the page title is 'CreatePubLBQS-rg' under 'Resource group'. The left sidebar contains navigation links such as 'Overview', 'Activity log', 'Access control (IAM)', 'Tags', 'Resource visualizer', 'Events', 'Settings', 'Deployments', 'Security', 'Deployment stacks', 'Policies', 'Properties', and 'Locks'. The main content area displays a table of resources. The table has columns for 'Name', 'Type', and 'Location'. The resources listed are: myBastionHost (Bastion, East US), myBastionIP (Public IP address, East US), myLoadBalancer (Load balancer, East US), myNicVM1 (Network Interface, East US), myNicVM2 (Network Interface, East US), myNSG (Network security group, East US), and mvPublicIP (Public IP address, East US). Each resource entry includes a checkbox and a 'More' button (three dots).

Name	Type	Location
myBastionHost	Bastion	East US
myBastionIP	Public IP address	East US
myLoadBalancer	Load balancer	East US
myNicVM1	Network Interface	East US
myNicVM2	Network Interface	East US
myNSG	Network security group	East US
mvPublicIP	Public IP address	East US

The screenshot shows the Microsoft Azure Resource Group Overview page for 'CreatePubLBQS-rg'. The left sidebar includes links for Activity log, Access control (IAM), Tags, Resource visualizer, Events, Settings (Deployments, Security, Deployment stacks, Policies, Properties, Locks), and a search bar. The main area displays a table of resources with columns for Name, Type, and Location. The resources listed are:

Name	Type	Location
myNSG	Network security group	East US
myPublicIP	Public IP address	East US
myVM1	Virtual machine	East US
myVM1_OsDisk_1	Disk	East US
myVM2	Virtual machine	East US
myVM2_OsDisk_1	Disk	East US
myVNet	Virtual network	East US

LB <-- VM1,VM2 <-- MyNicVM1,MyNicVM2

```
aditya [ ~ ]$ array=(myNicVM1 myNicVM2)
for vmnic in "${array[@]}"
do
    az network nic ip-config address-pool add \
        --address-pool myBackendPool \
        --ip-config-name ipconfig1 \
        --nic-name $vmnic \
        --resource-group CreatePubLBQS-rg \
        --lb-name myLoadBalancer
done
```

Step 7] NAT Gateway MyNATGW

```
aditya [ ~ ]$ az network public-ip create \
    --resource-group CreatePubLBQS-rg \
    --name myNATgatewayIP \
    --sku Standard \
    --zone 1 2 3
```

Create MyNATGW

```
aditya [ ~ ]$ az network nat gateway create \
    --resource-group CreatePubLBQS-rg \
    --name myNATgateway \
    --public-ip-addresses myNATgatewayIP \
    --idle-timeout 10
```

Update MyNATGW --> BackendSubnet

```
aditya [ ~ ]$ az network vnet subnet update \
    --resource-group CreatePubLBQS-rg \
    --vnet-name myVNet \
    --name myBackendSubnet \
    --nat-gateway myNATgateway
```

Step 8) WebServer(IIS) <-- HelloWorld <-- VM1,VM2

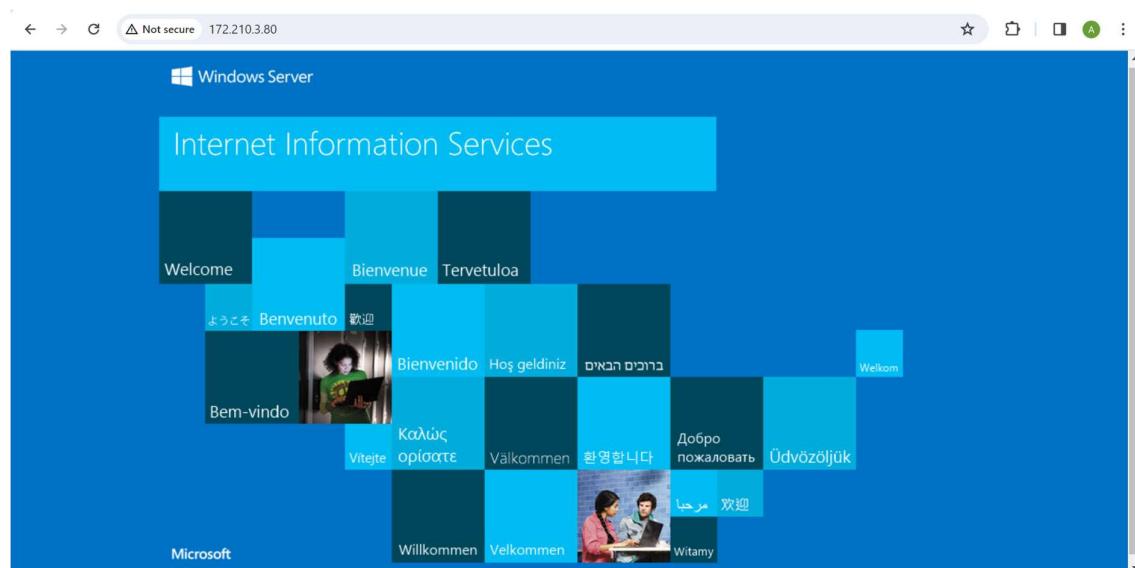
```
aditya [ ~ ]$ array=(myVM1 myVM2)
for vm in "${array[@]}"
do
    az vm extension set \
        --publisher Microsoft.Compute \
        --version 1.8 --name CustomScriptExtension \
        --vm-name $vm --resource-group CreatePubLBQS-rg \
        --settings '{"commandToExecute":"powershell Add-WindowsFeature
Web-Server; powershell Add-Content -Path \"C:\\inetpub\\wwwroot\\Aditya.htm
\" -Value $($env:computername)"}'
done
```

Step 9) Test

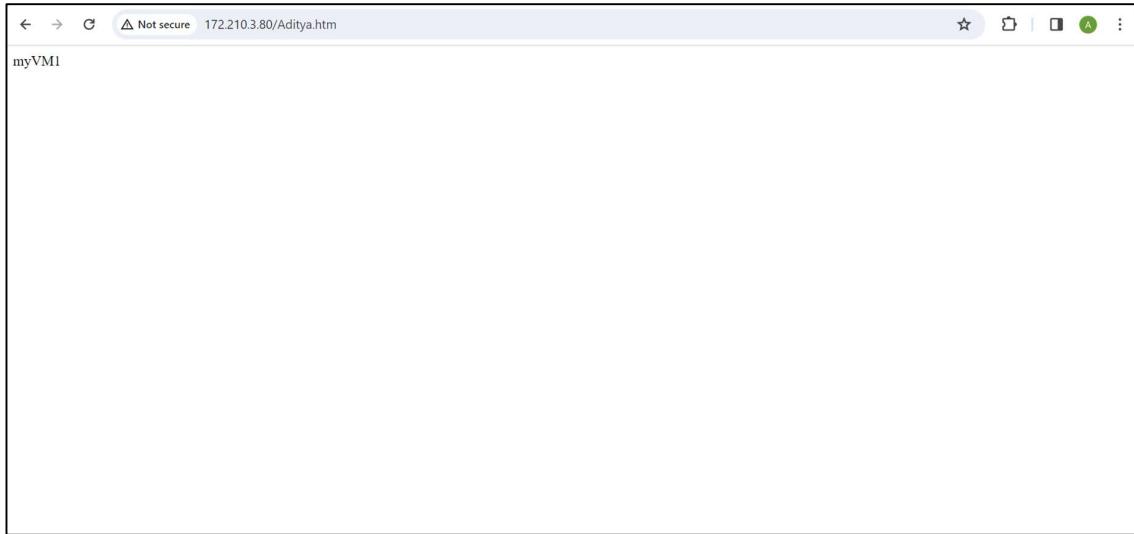
```
aditya [ ~ ]$ az network public-ip show \
    --resource-group CreatePubLBQS-rg \
    --name myPublicIP \
    --query ipAddress \
    --output tsv
```

```
aditya [ ~ ]$ az network public-ip show \
    --resource-group CreatePubLBQS-rg \
    --name myPublicIP \
    --query ipAddress \
    --output tsv
Command group 'az network' is in preview and under development. Reference and support levels: https://aka.ms/CLI_refstatus
172.210.3.80
aditya [ ~ ]$
```

curl <http://PublicIP/Default.htm>



curl <http://PublicIP/Aditya.htm>



Stop VM1 and check again

Notifications X

More events in the activity log → Dismiss all ↴

→ **Stopping virtual machine** Running X
Stopping virtual machine 'myVM1'...
a few seconds ago

✓ **Successfully stopped virtual machine** X
Successfully stopped the virtual machine
'myVM1'.
a few seconds ago

curl <http://PublicIP/Aditya.htm>



Step 10) Delete All Resources in Resource Group

```
aditya [ ~ ]$ az group delete --name CreatePubLBQS-rg --yes --no-wait
```

```
aditya [ ~ ]$ az group delete --name createPubLBQS-rg
```

```
Are you sure you want to perform this operation? (y/n): y
```

```
[/ Running ..
```

30/01/2024

- **Sast & Dast**: Explore them
- **Trello, Asana**: Agile methodology apps use to maintain tickets and burn down charts, deadline management, explore and version control (Ticketing category tools), then use **Jira**
- Github Repository: Source Code
- Vulnerability Repository: Output Repository
- Central Repository
- Artifact Repository
- **Jacoco** - Java Code Coverage

```
Agile
    Documentation: Confluence, Github pages
    Ticketing Tool: Trello, Jira, Github Issue
    Chat: Slack, Microsoft Team

Designing
    Graphic: Corel, Photoshop, AI
    Web/Mobile App: AdobeXD, Figma
    Database: ER Diagram, Draw.io
    Software: UML

Development
    Distributed VCS: Github, GitLab Repo, Bitbucket
    Testing:
        Automated Testing: Selenium, JUnit, TestNG,
        Continues Testing: Jenkins, Github
    Continues Integration: Jenkins, Github Action(Infra Automation), GitLab
    Continues Deployment/Configuration/Delivery/Release:
        Infra. Provisioning(IaaS): AzCLI//Terraform
        Continues Deployment: Ansible/Jenkins/Docker
        Configuration Mgt: Ansible
```

Project Work –

```

app.config['MAIL_SERVER']='smtp.gmail.com'
app.config['MAIL_PORT'] = 465
app.config['MAIL_USERNAME'] = 'creatingwebsitein1hr@gmail.com'
app.config['MAIL_PASSWORD'] = 'rbndtqkevspouvtc'
app.config['MAIL_USE_TLS'] = False
app.config['MAIL_USE_SSL'] = True
mail=Mail(app)

server = 'dbserver23jandeepak.database.windows.net'
database = 'dbfeedbackmgt'
username = 'dbadmin'
password = 'localhost@1234567'
driver = '{SQL Server}'

cnxn = pyodbc.connect('DRIVER=' + driver + ';SERVER=' + server + ';PORT=1433;DATABASE=' + database + ';UID=' + username + ';PWD=' + password)

otp_storage = {}
stored_email = None

# Use global_email and global_otp instead of request.form.get()
email = global_email
otp_str = global_otp
print(f"Received email: {email}")
print(f"Received OTP string: {otp_str}")
if otp_str is not None:
    otp = int(request.form['otpname'])
    print(otp_storage.get(email))
    if otp_storage.get(email) == otp:
        cursor.execute("SELECT Name, Role FROM Users WHERE Email = ?", (email,))
        row = cursor.fetchone()
        if row:
            if row.Role.lower() == 'trainer':
                return render_template('Trainer.html', name=row.Name, email=email)
            elif row.Role.lower() == 'student':
                return render_template('Student.html', name=row.Name, email=email)
            else:
                return render_template('register.html', email=email)
        else:
            return render_template('verify_otp.html')
    else:
        return 'Invalid OTP'
else:
    return 'Invalid OTP'

```

L&T

Home Login About

Learn, Explore & Grow!

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Login

Learner

Enter your email

SEND OTP

© 2024 Inedo Inc | Privacy Policy | Terms of Service

31/01/2024

Completed the Version 1 of Project and Pushed it to Github -
<https://github.com/Deepakksincedo/Learner-Trainer>

Hence Fourth Steps -

```
git clone https://github.com/NubeEra-Projects/LnT.git
```

1) Push all Changes(LnT) in LXP project

1.1 - Push LnT in Github

Mihir

Gaurav

Yuvraj

Deepak

1.2 - LXP.zip → Push in LnT

Remaining Leaners

1.3 - Testing

Authentication(OTP) + Sign in With Google

QnA

2) Web Designing(UI Changes) - CSS, Bootstrap

3) Sqlite → MS SQL Server

4) Django Web Server → NGINX(Web/ProxyServer) & Gunicorn(WSGI)

5) Documentations

Architecture

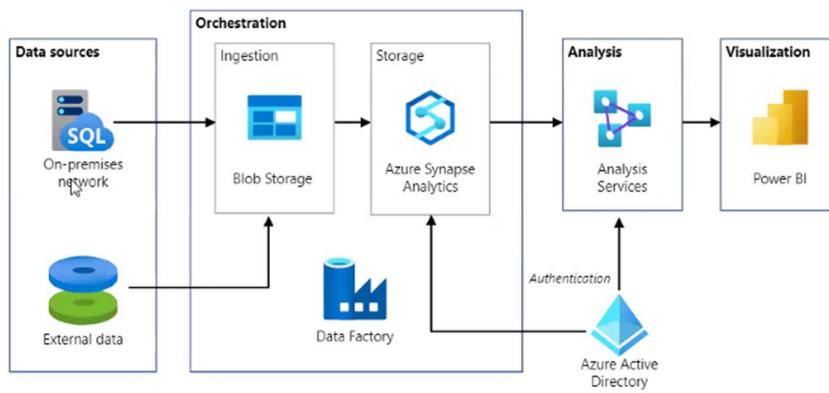
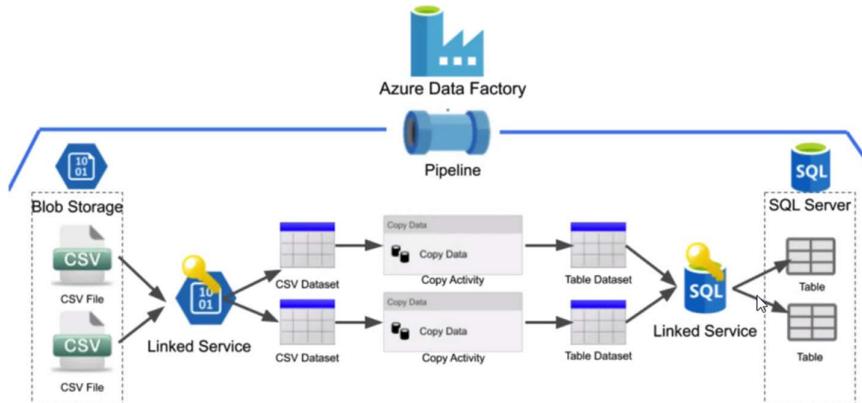
Modules

Database Design

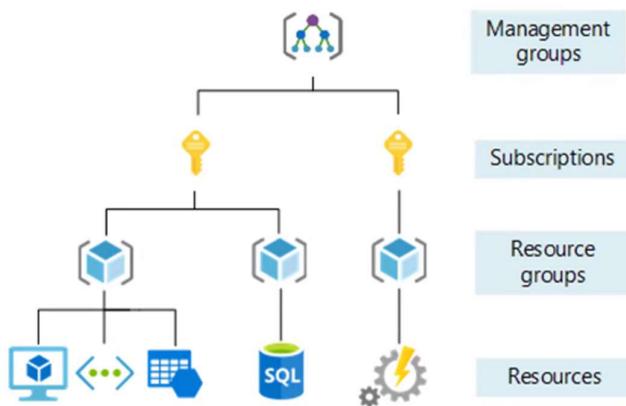
Demonstration

2/2/2024

Azure Data Factory -



Azure Subscription -



1. Source(Storage Account --> Container= Input) = Test.csv
2. Sink(Storage Account --> Container = Output)
3. Create ADF Studio & Pipeline
 - a. Launch Studio
 - b. PIPE LINE
 - i. Manage --> Linked Service
 - ii. Author ---> Data Sets(Input & Output)
 - iii. Pipeline --> Activity(Copy) ---> Select Source & Sink
 - iv. Publish
 - v. Debug

Task 1- ETL to copy a file from 1 container to another

Step 1) Create Resource Group

The screenshot shows the Microsoft Azure Resource Group Overview page for the resource group 'rg-02feb-aditya'. The left sidebar lists navigation options like Overview, Activity log, Access control (IAM), Tags, Resource visualizer, Events, Settings (Deployments, Security, Deployment stacks, Policies, Properties, Locks), and Essentials. The main area displays two resources: 'adf-02feb-aditya' (Data factory V2) and 'sa02febaditya' (Storage account). Both resources are located in the 'East US' region.

Name	Type	Location	Actions
adf-02feb-aditya	Data factory (V2)	East US	... (More)
sa02febaditya	Storage account	East US	... (More)

Step 2) Create Storage Account

The screenshot shows the Microsoft Azure Storage Account Overview page for the storage account 'sa02febaditya'. The left sidebar lists navigation options like Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Data storage (Containers, File shares, Queues, Tables), and Essentials. The main area displays the storage account's configuration details, including Resource group (move) to 'rg-02feb-aditya', Location 'eastus', Primary/Secondary Location 'Primary: East US, Secondary: West US', Subscription 'Azure Training', and various performance and replication settings.

Setting	Value
Resource group (move)	rg-02feb-aditya
Location	eastus
Primary/Secondary Location	Primary: East US, Secondary: West US
Subscription (move)	Azure Training
Performance	Standard
Replication	Read-access geo-redundant storage (RA-GRS)
Account kind	StorageV2 (general purpose v2)
Provisioning state	Succeeded
Created	2/2/2024, 12:17:11 PM

Step 3) Create Container and upload the File on which you want to perform operations

The screenshot shows two screenshots of the Microsoft Azure portal. The top screenshot displays the 'Containers' page for the storage account 'sa02feb-aditya'. It lists three containers: '\$logs', 'input', and 'output'. The 'input' container is selected. The bottom screenshot shows the detailed view for the 'input' container, where a blob named 'industry.csv' is listed.

Containers Page (Top Screenshot):

Name	Last modified	Anonymous access level	Lease state
\$logs	2/2/2024, 12:17:36 PM	Private	Available
input	2/2/2024, 12:18:26 PM	Private	Available
output	2/2/2024, 12:18:41 PM	Private	Available

input Container Details (Bottom Screenshot):

Name	Modified	Access tier	Archive status	Blob type	Size
industry.csv	2/2/2024, 12:44:00 PM	Hot (Inferred)		Block blob	749

Step 4) Create Data factory and Launch the Azure Data Factory Studio

The screenshot shows the 'Azure Data Factory Studio' interface. It features a central logo and the text 'Azure Data Factory Studio'. Below the logo are four buttons: 'Launch studio', 'Quick Starts', 'Tutorials', 'Template Gallery', and 'Training Modules'. On the left side, there is a navigation sidebar with sections like 'Overview', 'Activity log', 'Access control (IAM)', 'Tags', 'Diagnose and solve problems', 'Settings', 'Networking', 'Managed identities', 'Properties', 'Locks', and 'Getting started'. Under 'Getting started', there is a 'Quick start' link.

Microsoft Azure | Data Factory > adf-02feb-aditya

Search factory and documentation

Azure Data Factory allows you to configure a Git repository with either Azure DevOps or GitHub. Git is a version control system that allows for easier change tracking and collaboration. Learn more

Set up code repository

Data factory
adf-02feb-aditya

New

Ingest: Copy data at scale once or on a schedule.

Orchestrate: Code-free data pipelines.

Transform data: Transform your data using data flows.

Configure SSIS: Manage & run your SSIS packages in the cloud.

Recent resources

Name	Type	Last opened by you
pipeline1	Pipeline	15 minutes ago

Step 5) Create Linked Services to Input data and give an Output

Microsoft Azure | Data Factory > adf-02feb-aditya

Search factory and documentation

Validate all Publish all

aditya.shah1@incedoiinc.com INCEDO TECHNOLOGY SOLUTIONS LTD.

Linked services

Linked service defines the connection information to a data store or compute. Learn more

+ New

Filter by name Annotations : Any

Showing 1 - 2 of 2 items

Name	Type	Related	Annotations
LsInput	Azure Data Lake Storage Gen2	1	
LsOutput	Azure Data Lake Storage Gen2	1	

Step 6) Create a Pipeline and create an activity of "Copy Data"

Microsoft Azure | Data Factory > adf-02feb-aditya

Validate all Publish all

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Factory Resources

Filter resources by name

Pipelines

pipeline1

Change Data Capture (preview)

Datasets

DSInput

DSOutput

Data flows

Power Query

Copy data

Copy data1

General Source Sink Mapping Settings User properties

Source dataset * DSInput

File path type File path in dataset

Filter by last modified

Start time (UTC)

End time (UTC)

Recursively

Step 7) (i) Input Dataset (DSInput)

The screenshot shows the Azure Data Factory pipeline configuration for the DSInput dataset. The pipeline is named 'pipeline1'. The DSInput dataset is selected, showing its properties. The 'Connection' tab is active, displaying the following settings:

- Linked service: LsInput
- File path: input / Directory / industry.csv
- Compression type: Select...
- Column delimiter: Comma (,)
- Row delimiter: Default (\r\n, or \n\r)
- Encoding: Default(UTF-8)
- Quote character: Double quote (")
- Escape character: Backslash (\)
- First row as header: checked
- Null value:

Step 7) (ii) Output Dataset (DSOutput)

The screenshot shows the Azure Data Factory pipeline configuration for the DSOutput dataset. The pipeline is named 'pipeline1'. The DSOutput dataset is selected, showing its properties. The 'Connection' tab is active, displaying the following settings:

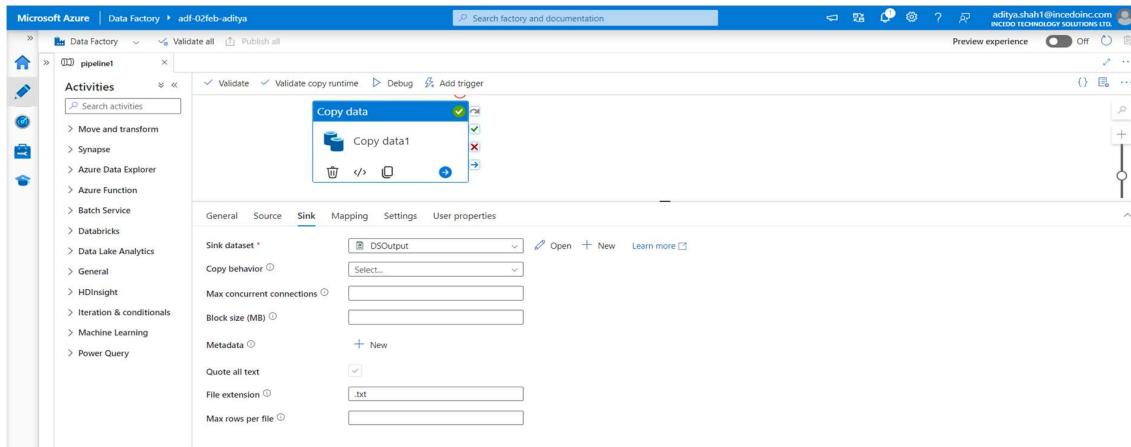
- Expand resources pane
- Linked service: LsOutput
- File path: output / Directory / File name
- Compression type: Select...
- Column delimiter: Comma (,)
- Row delimiter: Default (\r\n, or \n\r)
- Encoding: Default(UTF-8)
- Quote character: Double quote (")
- Escape character: Backslash (\)
- First row as header: checked

Step 8) (i) Select Source of the Activity to be performed (DSInput)

The screenshot shows the Azure Data Factory pipeline activities configuration. The pipeline is named 'pipeline1'. The 'Activities' section is open, showing various activity types. A 'Copy data' activity named 'Copy data1' is selected. The 'Source' tab is active, showing the following configuration:

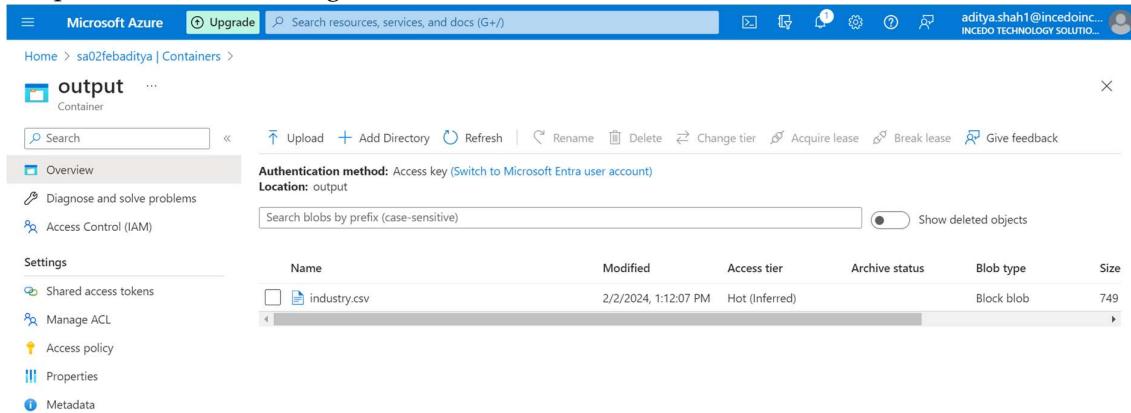
- Source dataset: DSInput
- File path type: File path in dataset (radio button selected)
- Filter by last modified: checked
- Recursively: checked
- Enable partitions discovery: unchecked
- Max concurrent connections:
- Skip line count:
- Additional columns:

Step 8) (ii) Select Sink of the Activity to be performed (DSOutput)



The screenshot shows the Microsoft Azure Data Factory pipeline editor. A 'Copy data' activity is selected. The 'Sink' tab is active, displaying the configuration for the sink dataset 'DSOutput'. Other tabs include General, Source, Mapping, Settings, and User properties.

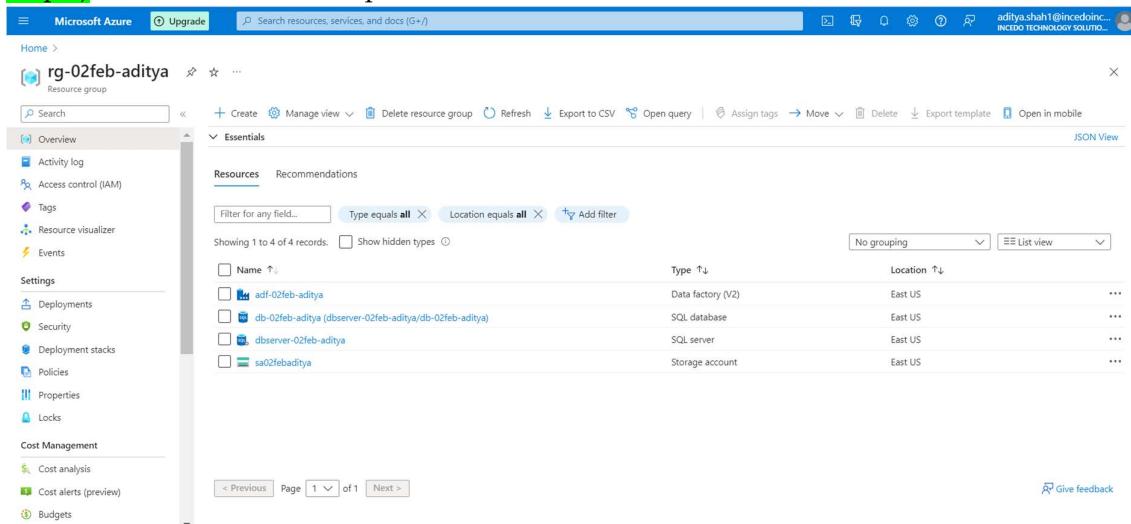
Step 9) After the successful activity performed here "Copy Data" we find a output file in Output Container in Storage Account



The screenshot shows the Microsoft Azure Storage Explorer interface. A container named 'output' is selected. Inside the container, there is a single blob named 'industry.csv'. The blob was modified on 2/2/2024, 1:12:07 PM, has a hot (inferred) access tier, and is a block blob with a size of 749 bytes.

Task 2- ETL to copy a file from 1 container in Blob to SQL Server

Step 1) Create Resource Group



The screenshot shows the Microsoft Azure Resource Groups page. A resource group named 'rg-02feb-aditya' is selected. The 'Essentials' blade is open, showing a list of resources including a Data factory (V2), a SQL database, a SQL server, and a Storage account, all located in the East US region.

Step 2) Create Storage Account

The screenshot shows the Azure Storage Account Overview page for 'sa02febadiya'. The left sidebar contains navigation links for Home, Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Data storage (Containers, File shares, Queues, Tables), Security + networking (Networking, Access keys, Shared access signature), and a JSON View link. The main content area displays the account's properties under the 'Essentials' tab. Key details include:

Setting	Value
Resource group	rg-02feb-aditya
Location	eastus
Subscription	Azure Training
Subscription ID	a29fc8ef-0107-407b-9ee0-927783c402aa
Disk state	Available
Tags	Add tags
Performance	Standard
Replication	Locally-redundant storage (LRS)
Account kind	StorageV2 (general purpose v2)
Provisioning state	Succeeded
Created	2/2/2024, 4:45:33 PM

The 'Properties' tab is selected, showing sections for Data Lake Storage (Hierarchical namespace: Enabled, Default access tier: Hot, Blob anonymous access: Disabled, Blob soft delete: Enabled (7 days), Container soft delete: Enabled (7 days), Versioning: Disabled, Change feed: Disabled, NFS v3: Disabled, SFTP: Placeholder), Security (Require secure transfer for REST API operations: Enabled, Storage account key access: Enabled, Minimum TLS version: Version 1.2, Infrastructure encryption: Disabled), and Networking (Allow access from: All networks, Number of private endpoint connections: 0).

Step 3) Create Container and upload the Text File with sample data on which you want to perform operations

The screenshot shows the Azure Storage Container Overview page for 'input'. The left sidebar contains navigation links for Home, sa02febadiya | Containers, Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Data storage (Containers, File shares, Queues, Tables), Security + networking (Networking, Access keys, Shared access signature), Microsoft Azure (Upgrade), and a search bar. The main content area displays the container's properties under the 'Overview' tab. Key details include:

Name	Last modified	Anonymous access level	Lease state
slogs	2/2/2024, 4:45:58 PM	Private	Available
input	2/2/2024, 4:46:52 PM	Private	Available

The 'Overview' tab is selected, showing options for Container (Create, Change access level, Restore containers, Refresh, Delete, Give feedback), Authentication method (Access key, Switch to Microsoft Entra user account), Location (input), and a search bar for blobs by prefix (case-sensitive). The 'Search resources, services, and docs (G+)' bar at the top also shows the user 'adityashah1@incedoinc.in'.

Step 4) (i) Create Database Server and Database

The screenshot shows two main sections of the Microsoft Azure portal.

Top Section (Database Server):

- URL: [Home > rg-02feb-aditya > dbserver-02feb-aditya](#)
- Resource group: rg-02feb-aditya
- Status: Available
- Location: East US
- Subscription: Azure Training
- Tags: (empty)
- Notifications: (0)
- Features (6):
 - Microsoft Entra admin: NOT CONFIGURED
 - Microsoft Defender for SQL: NOT CONFIGURED
 - Automatic tuning: CONFIGURED
 - Auditing: NOT CONFIGURED
 - Failover groups: NOT CONFIGURED
 - Transparent data encryption: SERVICE-MANAGED KEY

Bottom Section (Database):

- URL: [Home > db-02feb-aditya \(dbserver-02feb-aditya/db-02feb-aditya\)](#)
- Resource group: rg-02feb-aditya
- Status: Online
- Location: East US
- Subscription: Azure Training
- Tags: (empty)
- Getting started tabs: Monitoring, Properties, Features, Notifications (0), Integrations, Tutorials
- Start working with your database section:
 - Configure access: Configure network access to your SQL server. Learn more
 - Connect to application: Use connection strings to connect to your SQL database from your applications and favorite tools. See connection strings
 - Start developing: Work in your database by using tools to add, modify and query data. Open Azure Data Studio

Step 4) (ii) Configure Database Server Firewall to Start – ‘0.0.0.0’ & End – ‘255.255.255.255’

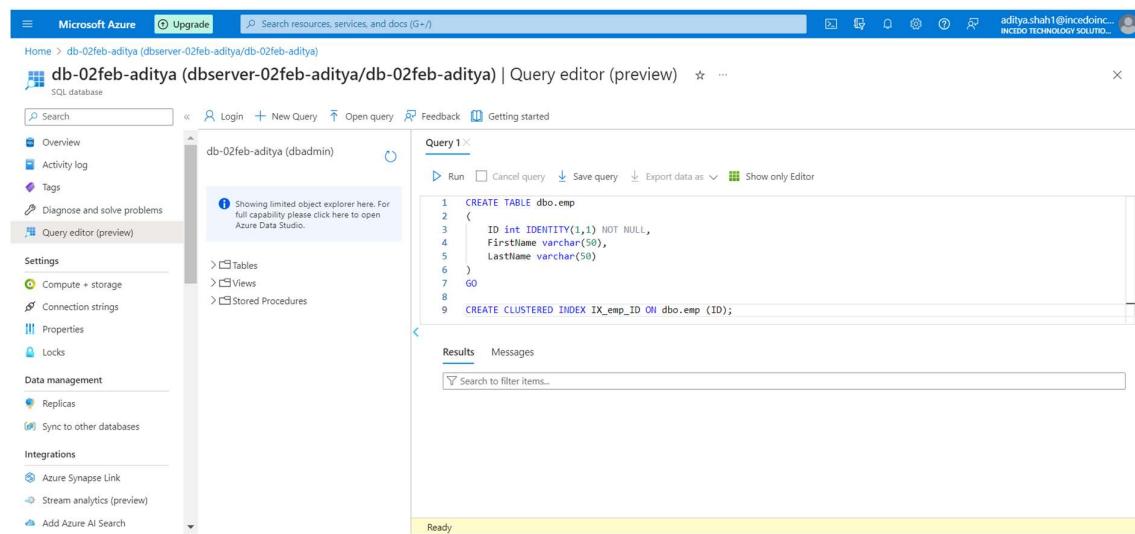
The screenshot shows the Networking settings for the database server.

Networking Settings:

- Virtual networks: Allow virtual networks to connect to your resource using service endpoints. Learn more
- Firewall rules: Allow certain public Internet IP addresses to access your resource. Learn more
- Rule table:

Rule	Virtual network	Subnet	Address range	Endpoint status	Resource group	Subscription	State
ClientIP-2024-2-2-15-42-3			0.0.0.0	255.255.255.255			Enabled
- Exceptions: Save, Discard

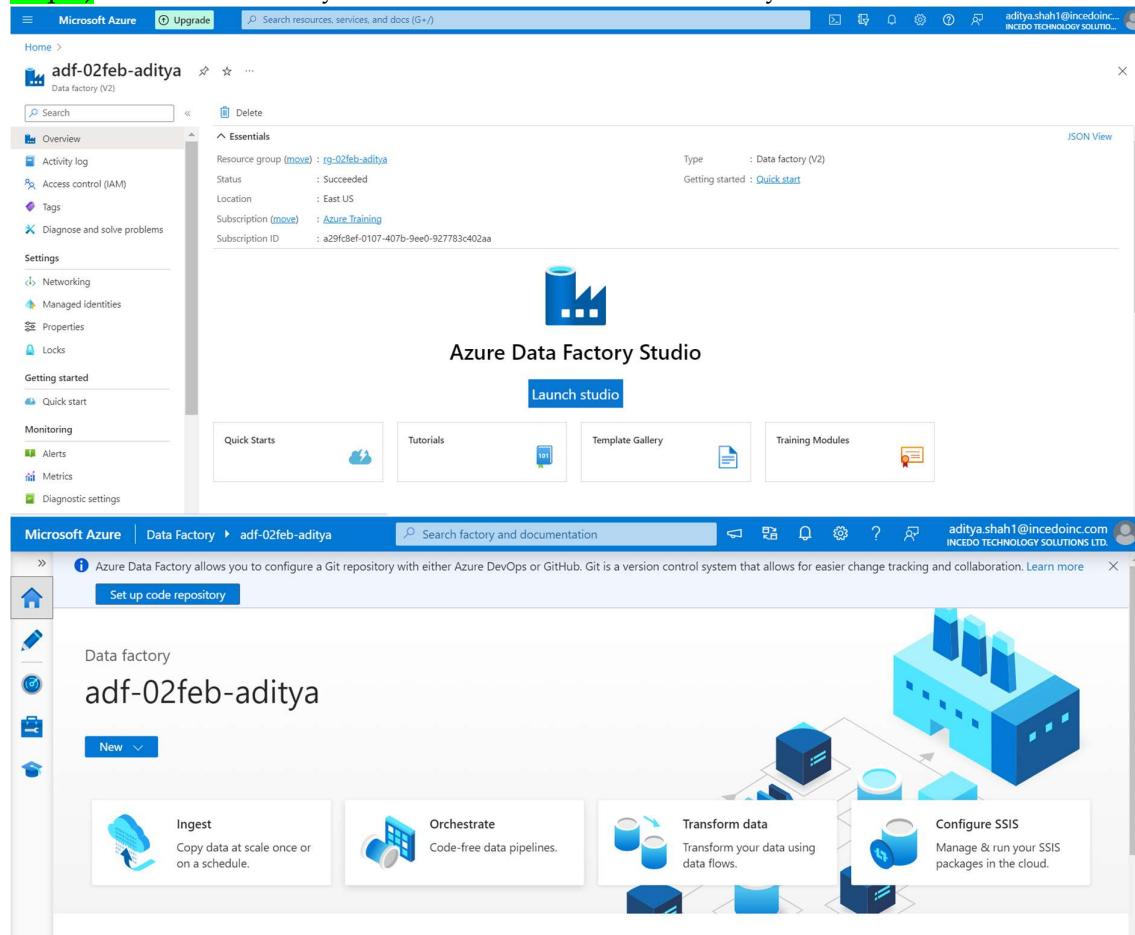
Step 5) In Query Editor Fire an Query to create a table 'emp' with ID, FirstName and LastName



The screenshot shows the Microsoft Azure portal interface for a database named 'db-02feb-aditya'. The left sidebar has 'Query editor (preview)' selected. The main area displays a query window titled 'Query 1' containing the following T-SQL code:

```
1 CREATE TABLE dbo.emp
2 (
3     ID int IDENTITY(1,1) NOT NULL,
4     FirstName varchar(50),
5     LastName varchar(50)
6 )
7 GO
8
9 CREATE CLUSTERED INDEX IX_emp_ID ON dbo.emp (ID);
```

Step 6) Create Data factory and Launch the Azure Data Factory Studio



The screenshot shows the Microsoft Azure portal interface for a data factory named 'adf-02feb-aditya'. The left sidebar has 'Getting started' selected. The main area shows the 'Essentials' section with the following details:

- Resource group: rg-02feb-aditya
- Status: Succeeded
- Location: East US
- Subscription: Azure Training
- Subscription ID: a29fc8ef-0107-407b-9ee0-927783c402aa

A central panel titled 'Azure Data Factory Studio' features a blue factory icon and a 'Launch studio' button. Below it are four buttons: 'Quick Starts', 'Tutorials', 'Template Gallery', and 'Training Modules'. The bottom section shows a diagram of a data factory with components like 'Ingest', 'Orchestrate', 'Transform data', and 'Configure SSIS'.

Step 7) Initiate and Activity of Copy Data and select the Source and Sink of the Activity

Copy data

Source dataset: SourceBlobDataset

File path type: File path in dataset

Start time (UTC): [empty input]

End time (UTC): [empty input]

Recursively: checked

Enable partitions discovery: unchecked

Max concurrent connections: [empty input]

Skip line count: [empty input]

Additional columns: + New

Sink dataset: OutputSQLDatabase

Write behavior: Insert (radio button selected)

Bulk insert table lock: No (radio button selected)

Table option: None (radio button selected)

Pre-copy script: [empty input]

Write batch timeout: e.g. 00:30:00

Write batch size: [empty input]

Max concurrent connections: [empty input]

Disable performance metrics analytics: unchecked

Step 8) (i) Activity performed on Input Dataset (SourceBlobDataset)

Connection: AzureStorageLinkedService

File path: input / Directory / emp.txt

Compression type: Select...

Column delimiter: Comma (,)

Row delimiter: Default (\r\n or \n)

Encoding: Default(UTF-8)

Step 8) (ii) Output is generated in OutputSQLDatabase

Object: dbo.emp

ID	FirstName	LastName
1	John	Doe
2	Jane	Doe

Step 9) Activity is automated to be triggered every 1 Min

The screenshot shows the 'Pipeline runs' section of the Azure Data Factory interface. The left sidebar has a tree view with 'Runs' selected. The main area displays a table of pipeline runs with the following columns: Pipeline name, Run start, Run end, Duration, Triggered by, and Status. There are 11 items listed, all showing a duration of 1s and triggered by 'RunEveryMinute'. All runs are marked as successful (green checkmark).

Pipeline name	Run start	Run end	Duration	Triggered by	Status
CopyPipeline	2/2/2024, 5:44:01 PM	2/2/2024, 5:44:18 PM	18s	RunEveryMinute	Succeeded
CopyPipeline	2/2/2024, 5:43:00 PM	2/2/2024, 5:43:38 PM	38s	RunEveryMinute	Succeeded
CopyPipeline	2/2/2024, 5:42:01 PM	2/2/2024, 5:42:25 PM	24s	RunEveryMinute	Succeeded
CopyPipeline	2/2/2024, 5:41:00 PM	2/2/2024, 5:41:21 PM	21s	RunEveryMinute	Succeeded
CopyPipeline	2/2/2024, 5:40:00 PM	2/2/2024, 5:40:19 PM	20s	RunEveryMinute	Succeeded
CopyPipeline	2/2/2024, 5:39:00 PM	2/2/2024, 5:39:20 PM	20s	RunEveryMinute	Succeeded
CopyPipeline	2/2/2024, 5:38:00 PM	2/2/2024, 5:38:21 PM	21s	RunEveryMinute	Succeeded
CopyPipeline	2/2/2024, 5:37:00 PM	2/2/2024, 5:37:15 PM	16s	RunEveryMinute	Succeeded
CopyPipeline	2/2/2024, 5:36:00 PM	2/2/2024, 5:36:19 PM	19s	RunEveryMinute	Succeeded
> CopyPipeline	2/2/2024, 5:28:29 PM	2/2/2024, 5:28:48 PM	20s	Manual trigger	Succeeded

Step 10) Output generated in OutputSQLDatabase after Activity is automatically triggered after every 1 Min

Preview data

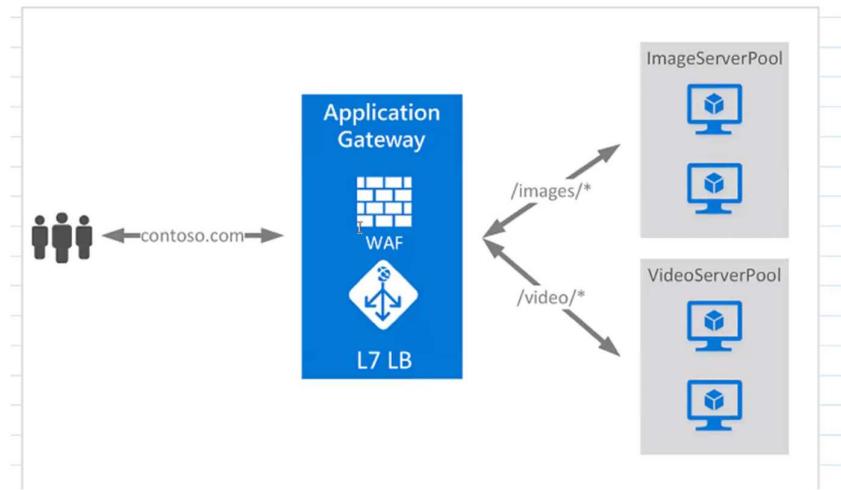
Linked service: AzureSqlDatabaseLinkedService

Object: dbo.emp

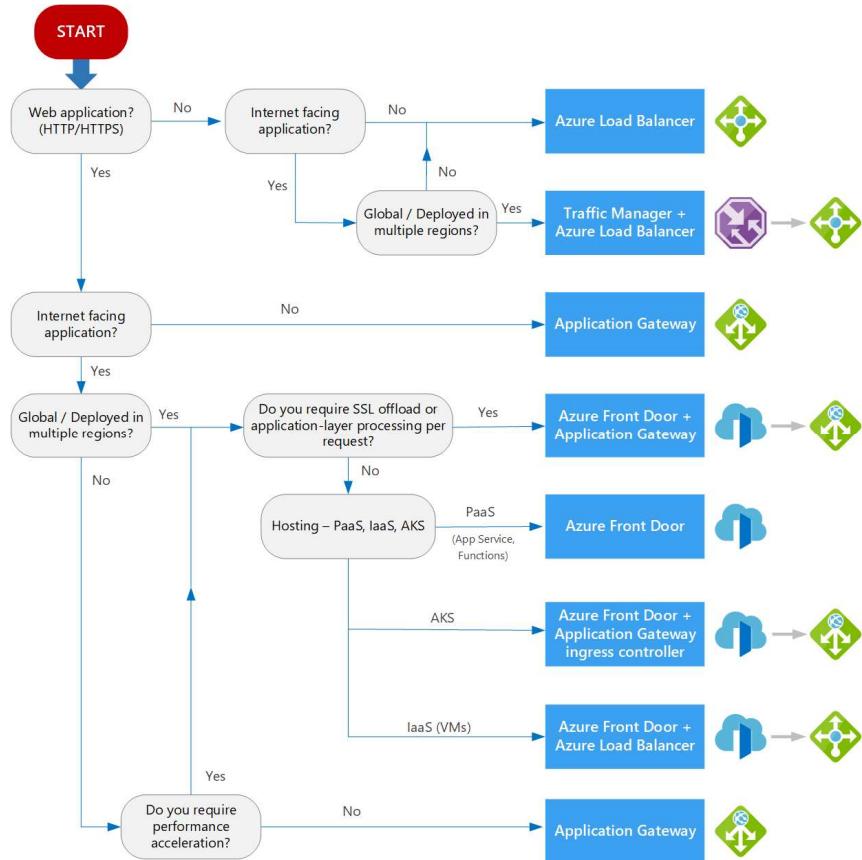
ID	FirstName	LastName
1	John	Doe
2	Jane	Doe
3	John	Doe
4	Jane	Doe
5	John	Doe
6	Jane	Doe
7	John	Doe
8	Jane	Doe
9	John	Doe
10	Jane	Doe

03-02-2024

Load Balancer -



Load Balancing Decision Tree -



Notes -

03/02/2024

VIP - Virtual IP Address (MS IP)

DIP - Dynamic IP Address.

PIP - Public IP Address

DNS - Domain Name System (Local / Server)

192.168.0.196 → NEL005 = Laptop = Private IP

192.168.0.25 → NEL004 = Sam

192.168.0.125 → NEL001 = John

Public IP = 106.213.85.120

196 → Router (196 = Google) 120 ← → Google

DNS (142.95.76.206 = VTP) ← Google (VM = DIP)

VM1 → DIP → Connect → Execute → Stop (1/2 Hour)
Run (Change IP) ←

DNS

Local (File) = Laptop =

Linux = /etc/hosts

Windows = C:/\Windows\System32\Drivers
etc\hosts

System

Laptop → Router (DNS) → Gateway

Application Gateway

Content based Load Balancer

S1 = Images

S2 = Videos.

Create Private Connection between Azure DC &
Infra On Prem → Express Route.

DOS → PowerShell → ISE

File.PG1 → Format

Commands → Script.

Task 1 PowerShell Commands-

1) Hello World

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

Loading personal and system profiles took 602ms.
PS C:\Users\aditya.shah1> Write-Host 'Hello, World!'
>> 'Hello, World!' | Write-Host
Hello, World!
Hello, World!
PS C:\Users\aditya.shah1> Write-Output 'Hello, World!'
>> 'Hello, World!' | Write-Output
Hello, World!
Hello, World!
PS C:\Users\aditya.shah1> $wh = 'Hello, World!' | Write-Host
>> $wo = 'Hello, World!' | Write-Output
>>
>> Get-Variable wh
>>
>> Get-Variable wo
Hello, World!

Name                           Value
----                           ---
wh                            Hello, World!
wo                            Hello, World!
```

2) Variables

```
PS C:\Users\aditya.shah1> $a = 1337      # System.Int32
>> $b = "Swift"                         # System.String
>> $c = 31337, "Swift"                   # array of System.Int32, System.String
>> $d = Get-ChildItem C:\Windows        # FileInfo and DirectoryInfo types
>> New-Variable -Name e -Value 1337      # System.Int32
PS C:\Users\aditya.shah1> $number = "1337"    # The string is converted to an integer.
>> $number.GetType()                   # Get the type of the variable.

IsPublic IsSerial Name                           BaseType
-----  -----  ----
True     True     String                         System.Object

PS C:\Users\aditya.shah1> [int]$number = 1337
>> $number = "One Thousand, Three Hundred and Thirty-Seven" #This will give an error
Cannot convert value "One Thousand, Three Hundred and Thirty-Seven" to type "System.Int32". Error: "Input string was
not in a correct format."
At line:2 char:1
+ $number = "One Thousand, Three Hundred and Thirty-Seven" #This will ...
+ ~~~~~
+     + CategoryInfo          : MetadataError: (:) [], ArgumentTransformationMetadataException
+     + FullyQualifiedErrorId : RuntimeException
```

3) Read-Only Variables

```
PS C:\Users\aditya.shah1> New-Variable -Name myVar -Value 1337 -Option ReadOnly
>> $myVar
1337
PS C:\Users\aditya.shah1> $myVar = 31337
Cannot overwrite variable myVar because it is read-only or constant.
At line:1 char:1
+ $myVar = 31337
+ ~~~~~
+     + CategoryInfo          : WriteError: (myVar:String) [], SessionStateUnauthorizedAccessException
+     + FullyQualifiedErrorId : VariableNotWritable

PS C:\Users\aditya.shah1> $myvar           # Should output 1337
>> New-Variable -Name myVar -Value 31337 -Option ReadOnly -Force
>> $myVar           # Should output 31337
1337
31337
```

4) Constants

```
PS C:\Users\aditya.shah1> New-Variable -Name myConst -Value "This CANNOT be changed" -Option Constant  
>> $myConst  
This CANNOT be changed  
PS C:\Users\aditya.shah1> New-Variable -Name myConst -Value "I'm going to change it" -Option Constant -Force  
New-Variable : Cannot overwrite variable myConst because it is read-only or constant.  
At line:1 char:1  
+ New-Variable -Name myConst -Value "I'm going to change it" -Option Co ...  
+ ~~~~~  
+ CategoryInfo          : WriteError: (myConst:String) [New-Variable], SessionStateUnauthorizedAccessException  
+ FullyQualifiedErrorId : VariableNotWritable,Microsoft.PowerShell.Commands.NewVariableCommand
```

5) For Loop

6) Foreach

```
PS C:\Users\aditya.shah1> $list = @('a', 'b', 'c', 'd');
>>
>> foreach($item in $list){
>>     Write-Host $item
>> }
a
b
c
d
PS C:\Users\aditya.shah1> $list = @('a', 'b', 'c', 'd');
>>
>> $list |ForEach-Object { Write-Host $_ }
a
b
c
d
PS C:\Users\aditya.shah1> Get-Help ForEach-Object

NAME
    ForEach-Object

SYNTAX
    ForEach-Object [-Process] <scriptblock[]> [-InputObject <psobject>] [-Begin <scriptblock>] [-End <scriptblock>]
    [-RemainingScripts <scriptblock[]>] [-WhatIf] [-Confirm] [<CommonParameters>]

    ForEach-Object [-MemberName] <string> [-InputObject <psobject>] [-ArgumentList <Object[]>] [-WhatIf] [-Confirm]
    [<CommonParameters>]

ALIASES
    foreach
    %

REMARKS
    Get-Help cannot find the Help files for this cmdlet on this computer. It is displaying only partial help.
    -- To download and install Help files for the module that includes this cmdlet, use Update-Help.
    -- To view the Help topic for this cmdlet online, type: "Get-Help ForEach-Object -Online" or
    go to https://go.microsoft.com/fwlink/?LinkID=113300.
```

7) If/Else

```
PS C:\Users\aditya.shah1> $value = 5
>>
>> if ($value -gt 1) {
>>     Write-Host "value is greater than 1"
>> }
value is greater than 1
PS C:\Users\aditya.shah1> $value = 5
>>
>> if ($value -gt 10) {
>>     Write-Host "value is greater than 10"
>> }
>> else {
>>     Write-Host "value is $value"
>> }
>>
>> if ($value -gt 10) {
>>     Write-Host "value is greater than 10"
>> }
```

```
>> elseif ($value -lt 10) {  
>>     Write-Host "value is less than 10"  
>> }  
>> else {  
>>     Write-Host "value is 10"  
>> }■  
value is 5  
value is less than 10
```

8) Switch

```
PS C:\Users\aditya.shah1> $month = 3  
>>  
>> if ($month -eq 1) { Write-Host "January" }  
>> elseif ($month -eq 2) { Write-Host "February" }  
>> elseif ($month -eq 3) { Write-Host "March" }  
>> elseif ($month -eq 4) { Write-Host "April" }  
>> elseif ($month -eq 5) { Write-Host "May" }  
>> elseif ($month -eq 6) { Write-Host "June" }  
>> elseif ($month -eq 7) { Write-Host "July" }  
>> elseif ($month -eq 8) { Write-Host "August" }  
>> elseif ($month -eq 9) { Write-Host "September" }  
>> elseif ($month -eq 10) { Write-Host "October" }  
>> elseif ($month -eq 11) { Write-Host "November" }  
>> elseif ($month -eq 12) { Write-Host "December" }  
>> else { Write-Host "Invalid month" }  
>>  
>> # Instead we can write the above as  
>> switch ($month) {  
>>     1 { Write-Host "January" }  
>>     2 { Write-Host "February" }  
>>     3 { Write-Host "March" }  
>>     4 { Write-Host "April" }  
>>     5 { Write-Host "May" }  
>>     6 { Write-Host "June" }  
>>     7 { Write-Host "July" }  
>>     8 { Write-Host "August" }  
>>     9 { Write-Host "September" }  
>>    10 { Write-Host "October" }  
>>    11 { Write-Host "November" }  
>>    12 { Write-Host "December" }  
>>    default { Write-Host "Invalid month" }  
>> }  
March  
March
```

```

PS C:\Users\aditya.shah1> # Using the -Wildcard parameter
>> $msg = "Error, the action failed"
>> switch -Wildcard ($msg) {
>>     "Error*" { "Action error" }
>>     "Warning*" { "Action warning" }
>>     "Successful*" { "Action succesfull" }
>> }
>>
>> ## Or use it in the conditions
>> $msg = "Error, the action failed"
>> switch ($msg) {
>>     { $_ -like "Error*" } { "Action error" }
>>     { $_ -like "Warning*" } { "Action warning" }
>>     { $_ -like "Successful*" } { "Action succesfull" }
>> }
Action error
Action error
PS C:\Users\aditya.shah1> switch ((Get-Date).Day) {
>>     { $_ -le 10 } { "Day of the month is lower than 10" }
>>     { $_ -gt 10 -and $_ -le 25 } { "Day of the month is between 10 and 25" }
>>     { $_ -gt 25 } { "Day of the month is greater than 25" }
>> }
Day of the month is lower than 10

```

9) Arrays

```

PS C:\Users\aditya.shah1> $values = @("One", "Two", "Three", "Four", "Five")
>> $values
>> $values.GetType()
One
Two
Three
Four
Five

IsPublic IsSerial Name                                     BaseType
----- ----- -- Object[]                                     System.Array

PS C:\Users\aditya.shah1> $values = "Six", "Seven", "Eight", "Nine", "10"
>> $values
Six
Seven
Eight
Nine
10
PS C:\Users\aditya.shah1> [int[]]$values = 6, 7, 8, 9, 10
>> $values
6
7
8
9
10
PS C:\Users\aditya.shah1> [array]$values = 11, 12, 13, 14, 15
>> $values
11
12
13
14
15

```

```
PS C:\Users\aditya.shah1> $values = @("One", "Two", "Three")
>> $values
>>
>> # Counting the items in the array using the Count property
>> Write-Host "Items in array $($values.Count)"
>>
>> # Add a value to the array using the + operator
>> $values += "Four"
>> $values
>>
>> Write-Host "Items in array $($values.Count)"
>>
>> # Change a value in the array using the index
>> $values[0] = "Five"
>> $values
One
Two
Three
Items in array 3
One
Two
Three
Four
Items in array 4
Five
Two
Three
Four
PS C:\Users\aditya.shah1> [array]$values = 1, 2, 3, 4, 5
>>
>> # Access the third item in the array
>> Write-Host "Item at index 2: $($values[2])"
Item at index 2: 3
```

```
PS C:\Users\aditya.shah1> $nameArray = @("Erik", "Penny", "Randy", "Sandy",
"Toby", "Uma", "Vicky", "Will", "Xavier", "Yvette", "Zach")
>> for ($i = 0; $i -lt $nameArray.Length; $i++) {
>>     Write-Host $nameArray[$i]
>> }
Erik
Penny
Randy
Sandy
Toby
Uma
Vicky
Will
Xavier
Yvette
Zach
```

10) Multidimensional Arrays

```
PS C:\Users\aditya.shah1> $array = @(1, 2, (1, 2, 3), 3, 4, (10, 11, 12), 5)
>> $array[0]
>> $array[1]
>> $array[2]
>> $array[2][0]
>> $array[2][1]
>> $array[5]
1
2
1
2
3
1
2
10
11
12
PS C:\Users\aditya.shah1> $array = New-Object 'object[,]' 5,8
>> $array[2,5] = 'Hello'
>> $array[3,7] = 'World!'
>> $array
Hello
World!
```

11) Hashtables

```
PS C:\Users\aditya.shah1> $employees = @{}
>>
>> # Adding values using integers
>> $employees.Add(1, "John")
>> $employees.Add(2, "Mary")
>> $employees.Add(3, "Bob")
>> $employees.Add(4, "Sam")
>>
>> $address = @{}
>>
>> # Adding values using strings
>> $address.Add("John", "123 Main Street")
>> $address.Add("Mary", "456 North Street")
>> $address.Add("Bob", "789 West Street")
>> $address.Add("Sam", "321 South Street")
>>
>> # Creating the hashtable in one go with values
>> $zipCodes = @{
>>     "John" = "12345"
>>     "Mary" = "54321"
>>     "Bob" = "98765"
>>     "Sam" = "32145"
>> }
PS C:\Users\aditya.shah1> $employees[4]
>> $address["Mary"]
>> $zipCodes.Sam
Sam
456 North Street
32145
```

```

PS C:\Users\aditya.shah1> $employees.keys | Sort-Object :
{
    Write-Host "Employee ID $($_) : $($employees[$_])"
}
>>
>> foreach ($key in $address.Keys) {
    Write-Host "$($key) lives at $($address[$key])"
}
>>
Employee ID 1 : John
Employee ID 2 : Mary
Employee ID 3 : Bob
Employee ID 4 : Sam
Bob lives at 789 West Street
John lives at 123 Main Street
Sam lives at 321 South Street
Mary lives at 456 North Street
PS C:\Users\aditya.shah1> $employeeAddress = @{
    Name      = "Mary"
    Address   = "456 North Street"
    Zipcode   = "54321"
}
>>
$employeeAddress

Name          Value
----          -----
Name          Mary
Zipcode       54321
Address       456 North Street

PS C:\Users\aditya.shah1> $employeeAddress = @{
    Name      = "Mary"
    Address   = "456 North Street"
    Zipcode   = "54321"
}
>>
>> $employeeAddress.Remove("Zipcode")
>>
$employeeAddress

Name          Value
----          -----
Name          Mary
Address       456 North Street

PS C:\Users\aditya.shah1> $addresses = @()
>>
>> $addresses += [ordered]@{Name = "John"; Address = "123 Main Street" }
>> $addresses += [ordered]@{Name = "Sam"; Address = "321 South Street" }
>>
>> $addresses += @{Name = "Mary"; Address = "456 North Street" }
>> $addresses += @{Name = "Bob"; Address = "789 West Street" }
>>
$addresses

Name          Value
----          -----
Name          John
Address       123 Main Street
Name          Sam
Address       321 South Street
Name          Mary
Address       456 North Street
Name          Bob
Address       789 West Street

```

```

PS C:\Users\aditya.shah1> $addresses = @()
>>
>> $addresses += @{Name = "John"; Address = "123 Main Street" }
>> $addresses += @{
>>   Name = "Sam"
>>   Address = "321 South Street"
>> }
>> $addresses += @{Name = "Mary"; Address = "456 North Street" }
>> $addresses += @{Name = "Bob"; Address = "789 West Street" }
>>
>> $addresses | Sort-Object -Property @{$e = { $_.Name } }

Name                Value
----              -----
Name                Bob
Address             789 West Street
Name                John
Address             123 Main Street
Name                Mary
Address             456 North Street
Name                Sam
Address             321 South Street

```

12) Functions

```

PS C:\Users\aditya.shah1> function writeHelloWorld() {
>>   Write-Host "Hello World!"
>> }
>>
>> writeHelloWorld
Hello World!
PS C:\Users\aditya.shah1> function writeMessage {
>>   param(
>>     [string]$Message
>>   )
>>
>>   Write-Host "Message: $Message"
>> }
>>
>> writeMessage "Hello World!"
>> writeMessage -message "Who is there?"
Message: Hello World!
Message: Who is there?
PS C:\Users\aditya.shah1> function writeMessage {
>>   param(
>>     [Parameter(Mandatory = $true, Position = 1, HelpMessage = "The message to write")]
>>     [string]$Message
>>   )
>>
>>   process {
>>     Write-Host "Message: $message"
>>   }
>> }
>>
>> writeMessage "Hello World!"
>> writeMessage
Message: Hello World!

cmdlet writeMessage at command pipeline position 1
Supply values for the following parameters:
(Type !? for Help.)
Message:
writeMessage : Cannot bind argument to parameter 'Message' because it is an empty string.
At line:13 char:1
+ writeMessage
+ ~~~~~
+ CategoryInfo          : InvalidData: (:) [writeMessage], ParameterBindingValidationException
+ FullyQualifiedErrorMessage : ParameterArgumentValidationErrorEmptyStringNotAllowed, writeMessage

```

```

PS C:\Users\aditya.shah1> function writeMessage {
>>     [CmdLetBinding()]
>>     param(
>>         [Parameter(Mandatory = $true, Position = 1, HelpMessage = "The message to write")]
>>         [string]$Message
>>     )
>>
>>     begin {
>>         Write-Verbose "Beginning of script"
>>         if (($null -eq $Message) -or ($Message -eq "")) {
>>             throw "Message cannot be empty";
>>         }
>>     }
>>
>>     process {
>>         Write-Host "Message: $message"
>>     }
>>
>>     end {
>>         Write-Host "End of script"
>>     }
>> }
>>
>> writeMessage "Hello World!" -Verbose
VERBOSE: Beginning of script
Message: Hello World!
End of script

```

13) Scopes

```

PS C:\Users\aditya.shah1> $var = "bla"
>>
>> $var
bla
PS C:\Users\aditya.shah1> $global:varOne = "bla"          # Assign a variable in the global scope
>>
>> Write-Host "Variable One:" $global:varOne           # Print the variable
>>
>> # Function to demonstrate local and global scope
>> function MyFunc() {
>>     $global:varOne = "bla bla"
>>     $varTwo = "boo"
>>     return $varTwo
>> }
>>
>> Write-Host "Variable Two:" $varTwo                  # Print the variable
>>
>> $varTwo = MyFunc                                     # Call the function and change the variable
>> Write-Host "Variable One:" $varOne                  # Print the variable
>>
>> Write-Host "Variable Two:" $varTwo                  # Print the variable
Variable One: bla
Variable Two:
Variable One: bla bla
Variable Two: boo

```

```

PS C:\Users\aditya.shah1> # Make sure that the variable is gone
>> Remove-Variable -Name var1 -ErrorAction SilentlyContinue
>>
>> $var1 = "This is a variable"
>>
>> Write-Host "var1 = '$var1'"
>>
>> function test1 {
>>     Write-Host "Inside function, var1 = $var1"
>> }
>>
>> test1
>>
>> # Now let's do it privately
>> Remove-Variable -Name var1 -ErrorAction SilentlyContinue
>>
>> $Private:var1 = "This is a variable"
>>
>> function test2 {
>>     Write-Host "Inside function with private, var1 = $var1"
>> }
>>
>> test2
var1 = 'This is a variable'
Inside function, var1 = This is a variable
Inside function with private, var1 =

```



```

PS C:\Users\aditya.shah1> function myFunc {
>>
>>     $Script:VarOne = "Script Scoped"
>>     $Var2 = "Function Scoped"
>> }
>>
>> myFunc
>> Write-Host "Var 1: $VarOne"
>> Write-Host "Var 2: $Var2"
Var 1: Script Scoped
Var 2:

```

14) Strings

```

PS C:\Users\aditya.shah1> $var = "Hello World!"
>>
>> "Lorem ipsum dolor sit amet..."
>> $value1 = "Ut enim ad minim veniam... $var"
>> $value2 = 'Duis aute irure dolor in... $var'
>> [string]$value3 = "Excepteur sint occaecat cupidatat non proident..."
>>
>> $value1, $value2, $value3
>> write-host $value1, $value2, $value3
>> write-host $value1 $value2 $value3
Lorem ipsum dolor sit amet...
Ut enim ad minim veniam... Hello World!
Duis aute irure dolor in... $var
Excepteur sint occaecat cupidatat non proident...
Ut enim ad minim veniam... Hello World! Duis aute irure dolor in... $var Excepteur sint
occaecat cupidatat non proident...
Ut enim ad minim veniam... Hello World! Duis aute irure dolor in... $var Excepteur sint
occaecat cupidatat non proident...
PS C:\Users\aditya.shah1> $firstName = "John"
>> $middleName = "Hubert"
>> $lastName = "Doe"
>>
>> $fullName = $firstName + ' ' + $middleName + ' ' + $lastName
>> $fullName
>>
>> $fullName = "$firstName $middleName $lastName"
>> $fullName
John Hubert Doe
John Hubert Doe

```

```

PS C:\Users\aditya.shah1> # Join array
>> $list = @('a', 'b', 'c', 'd', 'e')
>> $list -join ','
>>
>> # Join array without declaring variable
>> 'f', 'g', 'h', 'i', 'j' -join '-'
>>
>> # Join array without separator
>> -join ('k', 'l', 'm', 'n', 'o')
>>
>> # Using .Net string.Join
>> [string]::Join('|', 'p', 'q', 'r', 's', 't')
a,b,c,d,e
f-g-h-i-j
klmno
p|q|r|s|t

PS C:\Users\aditya.shah1> $string1 = "a,b,c,d,e"
>> $string2 = "f-g-h-i-j"
>> $string3 = 'monday,tuesday,wednesday,thursday,friday,saturday,sunday'
>> $string4 = 'one1two2three3four4five5six6seven7'
>>
>> # Splitting based on comma with .Split()
>> $result1 = $string1.split(",")
>> Write-Host "Count of items split: " $result1.Count
>> Write-Host $result1
>> ""
>>
>> # Splitting based on hyphen with -split()
>> $result2 = $string2 -split "-"
>> Write-Host "Count of items split: " $result2.Count
>> ""
>>
>> # Splitting based on a part of the string with -split
>> $string3 -split "day"
>>
>> # Split the string based on a try/catch block
>> # and limit the amount of items returned (3)
>> $string4 -split {
>>     try {
>>         [int]$_. -gt 1
>>     }
>>     catch {
>>         # Just ignore it
>>     }
>> }, 3
Count of items split: 5
a b c d e

Count of items split: 5

mon
,tues
,wednes
,thurs
,fri
,satur
,sun

one1two
three
four4five5six6seven7

```

```

PS C:\Users\aditya.shah1> $firstName = "John"
>> $middleName = "Hubert"
>> $lastName = "Doe"
>>
>> # Format the names
>> "{0} {1} {2}" -f $firstName, $middleName, $lastName
>>
>> # Format the names but also do something else
>> "{0}.{1}@awesomedcorp.com" -f $firstName.Substring(0, 1), $lastName
John Hubert Doe
J.Doe@awesomedcorp.com

PS C:\Users\aditya.shah1> # Create a simple object
>> $person = @{
>>     FirstName = 'John'
>>     LastName = 'Doe'
>> }
>> # Let's see what we have
>> $person
>>
>> # Use the object by referencing a property
>> Write-Host "`nHello, " $person.FirstName
>>
>> # Setup the full name of the person using the properties
>> $fullName = $person.FirstName + ' ' + $person.LastName
>> Write-Host "`nHello, " $fullName
>>
>> # Try to add the properties to a string
>> $fullName = "$person.FirstName $person.LastName"
>> Write-Host "`nHello, " $fullName # This will fail
>> # Let's add them the proper way
>> $fullName = "$($person.FirstName) $($person.LastName)"
>> Write-Host "Hello, " $fullName # This will work

Name          Value
----          -----
LastName      Doe
FirstName     John

Hello, John
Hello, John Doe
Hello, System.Collections.Hashtable.FirstName System.Collections.Hashtable.LastName
Hello, John Doe

```

```

PS C:\Users\aditya.shah1> # Setup the query
>> $query = "SELECT * FROM [_SCHEMENAME_].[_TABLENAME_] WHERE id = _ID_";
>>
>> # Replace the templated values using the .Replace() method
>> $query = $query.Replace("_SCHEMENAME_", "dbo");
>> $query = $query.Replace("_TABLENAME_", "tbl_test");
>> $query = $query.Replace("_ID_", "1");
>> $query
>>
>> # Replace the delimiter for the CSV using the -replace operator
>> $csv = "a,b,c,d,e,f,g,h,i"
>> $csv -replace ",", ";"
SELECT * FROM [dbo].[tbl_test] WHERE id = 1
a;b;c;d;e;f;g;h;i

```

15) Error Actions

```
PS C:\Users\aditya.shah1> Clear-Host
>>
>> $items = @()
>>
>> # Generate more items
>> $items += for ($i = 0; $i -le 3; $i++) {
>>     "$($env:TEMP)\$(Get-Process -Id $pid)-$($i).txt"
>> }
>>
>> # Let's generate some errors
>> $items | ForEach-Object {
>>     Get-Item -Path $_
>> }

Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-0.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-0.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d

Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-1.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-1.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d

Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-2.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-2.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d

Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-3.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-3.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d
```

```
PS C:\Users\aditya.shah1> Clear-Host
>>
>> $items = @()
>>
>> # Generate more items
>> $items += for ($i = 0; $i -le 3; $i++) {
>>     "$($env:TEMP)\$(Get-Process -Id $pid)-$($i).txt"
>> }
>>
>> # Let's generate some errors
>> $items | ForEach-Object {
>>     Get-Item -Path $_ -ErrorAction Stop
>> }

Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-0.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_ -ErrorAction Stop
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-0.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d
```

```
PS C:\Users\aditya.shah1> Clear-Host
>>
>> $items = @()
>>
>> # Generate more items
>> $items += for ($i = 0; $i -le 3; $i++) {
>>     "$($env:TEMP)\$(Get-Process -Id $pid)-$($i).txt"
>> }
>>
>> # Let's generate some errors
>> $items | ForEach-Object {
>>     Get-Item -Path $_ -ErrorAction Continue
>> }

Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-0.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_ -ErrorAction Continue
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-0.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d

Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-1.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_ -ErrorAction Continue
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-1.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d
```

```
Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-2.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_ -ErrorAction Continue
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-2.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d

Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-3.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_ -ErrorAction Continue
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-3.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d
```

```
PS C:\Users\aditya.shah1> Clear-Host
>>
>> $items = @()
>>
>> # Generate more items
>> $items += for ($i = 0; $i -le 3; $i++) {
>>     "$($env:TEMP)\$(Get-Process -Id $pid)-$($i).txt"
>> }
>>
>> # Let's generate some errors
>> $items | ForEach-Object {
>>     Get-Item -Path $_ -ErrorAction SilentlyContinue
>> }
>>
>> $error[0]
```

```
Get-Item : Cannot find path
'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process
(powershell)-3.txt' because it does not exist.
At line:12 char:5
+     Get-Item -Path $_ -ErrorAction SilentlyContinue
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\Users\ADITYA...wershell)-3.txt:String
g) [Get-Item], ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetItemCommand
d
```

```
PS C:\Users\aditya.shah1> Clear-Host
>>
>> $items = @()
>>
>> # Generate more items
>> $items += for ($i = 0; $i -le 3; $i++) {
>>     "$($env:TEMP)\$(Get-Process -Id $pid)-$($i).txt"
>> }
>>
>> # Let's generate some errors
>> $items | ForEach-Object {
>>     Get-Item -Path $_ -ErrorAction Ignore
>> }
>>
>> $error[0]
```

Output - Nothing

```
PS C:\Users\aditya.shah1> Clear-Host
>>
>> $items = @()
>>
>> # Generate more items
>> $items += for ($i = 0; $i -le 3; $i++) {
>>     "$($env:TEMP)\$((Get-Process -Id $pid)-$($i).txt"
>> }
>>
>> # Let's generate some errors
>> $items | ForEach-Object {
>>     Get-Item -Path $_ -ErrorAction Inquire
>> }

Confirm
Cannot find path 'C:\Users\ADITYA~1.SHA\AppData\Local\Temp\System.Diagnostics.Process(powershell)-0.txt' because it does not exist.
[Y] Yes [A] Yes to All [H] Halt Command [S] Suspend [?] Help (default is "Y"): ■
```

16) Error Handling

```
PS C:\Users\aditya.shah1> try {
>>     # This will generate an error
>>     1/0
>>     Write-Host "This is executed after the error"
>> } catch {
>>     # Catch all errors
>>     Write-Host "Oh oh! Error occurred.`n$_"
>> }
Oh oh! Error occurred.
Attempted to divide by zero.
PS C:\Users\aditya.shah1> try {
>>     # This will generate an error
>>     1/0
>>     Write-Host "This is executed after the error"
>> } catch [System.DivideByZeroException] {
>>     # Catch all errors
>>     Write-Host "Divide by zero error occurred.`n$_"
>> } catch {
>>     # Catch all errors
>>     Write-Host "Oh oh! Another error occurred.`n$_"
>> }
Divide by zero error occurred.
Attempted to divide by zero.

PS C:\Users\aditya.shah1> try {
>>     # This will generate an error
>>     1/0
>>     Write-Host "This is executed after the error"
>> } catch [System.DivideByZeroException] {
>>     # Catch all errors
>>     Write-Host "Divide by zero error occurred.`n$_"
>> } catch {
>>     # Catch all errors
>>     Write-Host "Oh oh! Another error occurred.`n$_"
>> } finally {
>>     Write-Host "Finally!"
>> }
Divide by zero error occurred.
Attempted to divide by zero.
Finally!
```

17) Reading Files

```
PS C:\Users\aditya.shah1> # Let's download a sample file just for the example
>> $url = "https://gist.githubusercontent.com/sanderstad/7b9593f7f30abb9f17f9026c74ed9c68/raw/d4406c4cbcc427e15fc9d6d92f8bcf3c72a1e70a/samplefile1.txt"
>> $filePath = Join-Path -Path $env:temp -ChildPath "samplefile1.txt"
>>
>> Invoke-WebRequest -Uri $url -OutFile $filePath
>>
>> $url = "https://gist.githubusercontent.com/sanderstad/f59996889fc3ec794d325ad2162648f8/raw/5353480009bd714f9764a093b52f0fabff1078fd/samplefile2.csv"
>> $filePath = Join-Path -Path $env:temp -ChildPath "samplefile2.txt"
>>
>> Invoke-WebRequest -Uri $url -OutFile $filePath
>>
>> Get-Content -Path (Join-Path -Path $env:temp -ChildPath "samplefile1.txt")
Utilitatis causa amicitia est quae sita.
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Collatio igitur ista te nihil iuvat.
Honesta oratio, Socratica, Platonis etiam. Primum in nostrane potestate est, quid meminerimus?
Duo Reges: constructio interrete. Quid, si etiam iucunda memoria est praeteritorum malorum? Si quidem, inquit, tollerem, sed relinquo. An nisi populari fama?
Quamquam id quidem licebit iis existimare, qui legerint. Summum a vobis bonum voluptas dicitur.
At hoc in eo M. Refert tamen, quo modo. Quid sequatur, quid repugnet, vident. Iam id ipsum absurdum, maximum malum neglegi.
PS C:\Users\aditya.shah1> $content = Get-Content -Path (Join-Path -Path $env:temp -ChildPath "samplefile1.txt")
>>
>> $content.GetType()
>> $content.Count
IsPublic IsSerial Name                                     BaseType
----- ----- ----
True     True    Object[]                                System.Array
4

PS C:\Users\aditya.shah1> $content = Get-Content -Path (Join-Path -Path $env:temp -ChildPath "samplefile1.txt")
>>
>> $content | Select-Object -First 2
Utilitatis causa amicitia est quae sita.
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Collatio igitur ista te nihil iuvat.
Honesta oratio, Socratica, Platonis etiam. Primum in nostrane potestate est, quid meminerimus?
Duo Reges: constructio interrete. Quid, si etiam iucunda memoria est praeteritorum malorum? Si quidem, inquit, tollerem, sed relinquo. An nisi populari fama?
PS C:\Users\aditya.shah1> Import-Csv -Path (Join-Path -Path $env:temp -ChildPath "samplefile2.csv")
Month      : May
Average   : 0.1
2005       : 0
2006       : 0
2007       : 1
2008       : 1
2009       : 0
2010       : 0
2011       : 0
2012       : 2
2013       : 0
2014       : 0
2015       : 0

Month      : Jun
Average   : 0.5
2005       : 2
2006       : 1
2007       : 1
2008       : 0
2009       : 0
2010       : 1
2011       : 1
2012       : 2
2013       : 2
2014       : 0
2015       : 1
```

18) Writing Files

```
PS C:\Users\aditya.shah1> Add-Content -Path (Join-Path -Path $env:TEMP -ChildPath "test1.txt") -Value "This is just a test"
>> Add-Content -Path (Join-Path -Path $env:TEMP -ChildPath "test1.txt") -Value "This is just another test"
>> Get-Content (Join-Path -Path $env:TEMP -ChildPath "test1.txt")
This is just a test
This is just another test

PS C:\Users\aditya.shah1> Add-Content -Path (Join-Path -Path $env:TEMP -ChildPath "test2.txt") -Value "Test1"
>> Add-Content -Path (Join-Path -Path $env:TEMP -ChildPath "test2.txt") -Value "Test2" -NoNewline
>> Add-Content -Path (Join-Path -Path $env:TEMP -ChildPath "test2.txt") -Value "Test3" -NoNewline

PS C:\Users\aditya.shah1> "Lorem ipsum dolor sit amet, consectetur adipiscing elit" | Out-File -FilePath c:\temp\output1.txt
>> Get-Content C:\temp\output1.txt
Out-File : Could not find a part of the path 'C:\temp\output1.txt'.
At line:1 char:61
+ ... consectetur adipiscing elit" | Out-File -FilePath c:\temp\output1.txt
+ ~~~~~
+ CategoryInfo          : OpenError: (:) [Out-File], DirectoryNotFoundException
+ FullyQualifiedErrorId : FileOpenFailure,Microsoft.PowerShell.Commands.OutFileCommand
+ mand

Get-Content : Cannot find path 'C:\temp\output1.txt' because it does not exist.
At line:2 char:1
+ Get-Content C:\temp\output1.txt
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\temp\output1.txt:String) [Get-Content]
+ ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetContentCommand
+ mand

Get-Content : Cannot find path 'C:\temp\output1.txt' because it does not exist.
At line:2 char:1
+ Get-Content C:\temp\output1.txt
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\temp\output1.txt:String) [Get-Content]
+ ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetContentCommand
+ mand

Out-File : Could not find a part of the path 'C:\temp\output2.txt'.
At line:2 char:43
+ ... enim, quis nostrud" | Out-File -FilePath c:\temp\output2.txt -Append
+ ~~~~~
+ CategoryInfo          : OpenError: (:) [Out-File], DirectoryNotFoundException
+ FullyQualifiedErrorId : FileOpenFailure,Microsoft.PowerShell.Commands.OutFileCommand

Get-Content : Cannot find path 'C:\temp\output2.txt' because it does not exist.
At line:3 char:1
+ Get-Content C:\temp\output2.txt
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (C:\temp\output2.txt:String) [Get-Content]
+ ItemNotFoundException
+ FullyQualifiedErrorId : PathNotFound,Microsoft.PowerShell.Commands.GetContentCommand
```

19) Time and Date

```
PS C:\Users\aditya.shah1> $today = Get-Date
>> Write-Host "Full Date: `t$today"
>> Write-Host "Date: `t`t$( $today.Date )"
>> Write-Host "Year: `t`t$( $today.Year )"
>> Write-Host "Month: `t`t$( $today.Month )"
>> Write-Host "Day: `t`t$( $today.Day )"
>> Write-Host "Day of the Week: $($today.DayOfWeek)"
>> Write-Host "Day of the Year: $($today.DayOfYear)"
>> Write-Host "Hour: `t`t$( $today.Hour )"
>> Write-Host "Minute: `t`t$( $today.Minute )"
>> Write-Host "Second: `t`t$( $today.Second )"
>> Write-Host "Millisecond: $($today.Millisecond)"
Full Date: 02/05/2024 09:11:43
Date: 02/05/2024 00:00:00
Year: 2024
Month: 2
Day: 5
Day of the Week: Monday
Day of the Year: 36
Hour: 9
Minute: 11
Second: 43
Millisecond: 385
PS C:\Users\aditya.shah1> $date = Get-Date
>> $date
>> $date -f "yyyyMMdd"

05 February 2024 09:12:01 AM
02/05/2024 09:12:01
```

```
PS C:\Users\aditya.shah1> $today = Get-Date
>> $yesterday = $today.AddDays(-1)
>> $tomorrow = $today.AddDays(1)
>> Write-Host "Today: `t`t$today"
>> Write-Host "Yesterday: `t`t$yesterday"
>> Write-Host "Tomorrow: `t`t$tomorrow"
Today: 02/05/2024 09:12:09
Yesterday: 02/04/2024 09:12:09
Tomorrow: 02/06/2024 09:12:09
PS C:\Users\aditya.shah1> $date = Get-Date -Date "2022-01-02 03:04:05"
>> $date

02 January 2022 03:04:05 AM

PS C:\Users\aditya.shah1> # Assume with this example that the current date is 2022-03-14
>> $date = get-date -Month 5
>> $date

05 May 2024 09:12:27 AM
```

20) Sorting

```
PS C:\Users\aditya.shah1> $names = @("Muffin", "Romeo", "Noodle", "Zoe", "Jack", "Luna", "Gracie",
"mittens", "Phoebe", "Peanut", "Harley", "Jake")
>>
>> $names | Sort-Object
Gracie
Harley
Jack
Jake
Luna
mittens
Muffin
Noodle
Peanut
Phoebe
Romeo
Zoe
```

```

PS C:\Users\aditya.shah1> $names = @("Muffin","Romeo","Noodle","Zoe","Jack","Luna","Gracie",
"mittens","Phoebe","Peanut","Harley","Jake")
>>
>> $names | Sort-Object -Descending
Zoe
Romeo
Phoebe
Peanut
Noodle
Muffin
mittens
Luna
Jake
Jack
Harley
Gracie
> PS C:\Users\aditya.shah1> $names = @("Muffin","muffin","Noodle","zoe","zoe","Luna","Gracie",
"peanut","Phoebe","Peanut","Harley","Jake")
>>
>> $names | Sort-Object -CaseSensitive
Gracie
Harley
Jake
Luna
muffin
Muffin
Noodle
peanut
Peanut
Phoebe
zoe
Zoe
PS C:\Users\aditya.shah1> $names = @("Muffin","muffin","Noodle","zoe","zoe","Luna","Gracie",
"peanut","Phoebe","Peanut","Harley","Jake")
>>
>> $names | Sort-Object -Unique
Gracie
Harley
Jake
Luna
muffin
Noodle
Peanut
Phoebe
zoe
> PS C:\Users\aditya.shah1> $files = Get-ChildItem -Path $env:TEMP
>> $files | Sort-Object -Property LastWriteTime | Where-Object{$_._PSIsContainer -eq $false}

Directory: C:\Users\aditya.shah1\AppData\Local\Temp

Mode                LastWriteTime        Length Name
----                -----        ---- 
-a----       15-12-2023 09:33 PM          899 wct2026.tmp
-a----       31-01-2024 09:38 PM         2619 wct6CB0.tmp
-a----       31-01-2024 09:38 PM         2619 wct31BB.tmp
-a----       31-01-2024 09:38 PM         2619 wctBF22.tmp
-a----       01-02-2024 10:12 AM            0 mat-debug-7364.log
-a----       01-02-2024 11:19 AM            0 mat-debug-15480.log
-a----       01-02-2024 11:19 AM            0 mat-debug-15472.log
-a----       01-02-2024 11:19 AM           53 bc3902d8132f43e3ae086a009979fa88.db.ses
-a----       01-02-2024 11:19 AM            0 mat-debug-16816.log
-a----       01-02-2024 11:19 AM            0 mat-debug-17144.log
-a----       01-02-2024 11:19 AM            0 mat-debug-18328.log
-a----       01-02-2024 11:21 AM            0 mat-debug-7528.log
-a----       01-02-2024 11:23 AM          {1A86AD96-B4E7-4BBC-8B47-8DDEC89D82CE} - 0
ProcSessId.dat
-a----       01-02-2024 11:27 AM          {3158A33F-739C-4ED0-8098-5F39A035CB0E} - 0
ProcSessId.dat

```

21) Custom Objects

```
PS C:\Users\aditya.shah1> # Old style of creating an object
PS C:\Users\aditya.shah1> $object1 = New-Object PSObject
PS C:\Users\aditya.shah1>
PS C:\Users\aditya.shah1> Add-Member -InputObject $object1 -MemberType NoteProperty -Name prop1 -Value "value1"
PS C:\Users\aditya.shah1> Add-Member -InputObject $object1 -MemberType NoteProperty -Name prop2 -Value "value2"
PS C:\Users\aditya.shah1> $object1
prop1  prop2
-----  -----
value1 value2

PS C:\Users\aditya.shah1> $object1.GetType()

IsPublic IsSerial Name                                     BaseType
-----  -----  --
True     False    PSCustomObject                      System.Object

PS C:\Users\aditya.shah1> # New style of creating an object
>> $object2 = [PSCustomObject]@{
>>     prop1 = "value1"
>>     prop2 = "value2"
>> }
>>
>> $object2
prop1  prop2
-----  -----
value1 value2
```

22) Splatting

```
PS C:\Users\aditya.shah1> Get-ChildItem -Path $env:TEMP -Include "*.*" -Depth 2 -Recurse

Directory: C:\Users\aditya.shah1\AppData\Local\Temp\acrobat_sbx

Mode                LastWriteTime          Length Name
----                -----          ----  --
-a---    04-02-2024 12:39 AM           12108 acroNGLLog.txt

Directory: C:\Users\aditya.shah1\AppData\Local\Temp\eoID1D9.tmp\features\org.eclipse.ecf.filetransfer.feature_3.14.1800.v20230422-0242

Mode                LastWriteTime          Length Name
----                -----          ----  --
-a---    01-02-2024 12:23 PM           11358 asl-v20.txt

Directory: C:\Users\aditya.shah1\AppData\Local\Temp\eoID1D9.tmp\features\org.eclipse.ecf.filetransfer.httpClient5.feature_1.1.701.v20230423-0417
```

```

PS C:\Users\aditya.shah1> $params = @{
>>     Path = $env:TEMP
>>     Include = "*.txt"
>>     Depth = 2
>>     Recurse = $true
>> }
>> Get-ChildItem @params

Directory: C:\Users\aditya.shah1\AppData\Local\Temp\acrobat_sbx

Mode                LastWriteTime         Length Name
----                -----          ----- 
-a----   04-02-2024 12:39 AM           12108 acroNGLLog.txt

Directory: C:\Users\aditya.shah1\AppData\Local\Temp\eoID1D9.tmp\features\org.eclipse.ecf.filetransfer.feature_3.14.1800.v20230422-0242

Mode                LastWriteTime         Length Name
----                -----          ----- 
-a----   01-02-2024 12:23 PM           11358 asl-v20.txt

Directory: C:\Users\aditya.shah1\AppData\Local\Temp\eoID1D9.tmp\features\org.eclipse.ecf.filetransfer.httpclient5.feature_1.1.701.v20230423-0417

```

23) Classes

```

PS C:\Users\aditya.shah1> class Tree {
>>     [int]$Height
>>     [int]$Age
>>     [string]$Color
>> }
>>
>> $tree1 = new-object Tree
>> $tree2 = [Tree]::new()
>>
>> $tree1.Height = 10
>> $tree1.Age = 5
>> $tree1.Color = "Red"
>>
>> $tree2.Height = 20
>> $tree2.Age = 10
>> $tree2.Color = "Green"
>>
>> $tree1
>> $tree2

Height Age Color
----- 
    10    5 Red
    20   10 Green

```

```

PS C:\Users\aditya.shah1> class Tree {
>>     [int]$Height
>>     [int]$Age
>>     [string]$Color
>>
>>     Tree() {
>>         $this.Height = 1
>>         $this.Age = 0
>>         $this.Color = "Green"
>>     }
>>
>>     Tree([int]$Height, [int]$Age, [string]$Color) {
>>         $this.Height = $Height;
>>         $this.Age = $Age;
>>         $this.Color = $Color;
>>     }
>> }
>>
>> $tree1 = [Tree]::New()
>> $tree2 = New-Object Tree 5, 2, "Red"
>>
>> $tree1
>> $tree2

Height Age Color
----- -- -----
    1   0 Green
    5   2 Red

```

```

PS C:\Users\aditya.shah1> class Tree {
>>     [int]$Height
>>     [int]$Age
>>     [string]$Color
>>
>>     # Initialize the tree by setting default values
>>     Tree() {
>>         $this.Height = 1
>>         $this.Age = 0
>>         $this.Color = "Green"
>>     }
>>
>>     # Create a constructor with parameters a.k.a. constructor overloading
>>     Tree([int]$Height, [int]$Age, [string]$Color) {
>>         $this.Height = $Height
>>         $this.Age = $Age
>>         $this.Color = $Color
>>     }
>>
>>     [void]Grow() {
>>         # Get a random height because plants and trees don't grow the same each year
>>         $heightIncrease = Get-Random -Min 1 -Max 5;
>>         $this.Height += $heightIncrease;
>>         $this.Age += 1
>>     }
>> }
>>
>> $tree = [Tree]::New()
>>
>> # Let the tree grow for 10 years
>> for ($i = 0; $i -lt 10; $i++) {
>>     $tree.Grow()
>>     $tree
>> }

```

Height	Age	Color
4	1	Green
5	2	Green
9	3	Green
13	4	Green
15	5	Green
17	6	Green
18	7	Green
20	8	Green
23	9	Green
24	10	Green

```
PS C:\Users\aditya.shah1> class Tree {
>>     [int]$Height
>>     [int]$Age
>>     [string]$Color
>>
>>     Tree() {
>>         $this.Height = 1;
>>         $this.Age = 0
>>         $this.Color = "Green"
>>     }
>>
>>     Tree([int]$Height, [int]$Age, [string]$Color) {
>>         $this.Height = $Height;
>>         $this.Age = $Age;
>>         $this.Color = $Color;
>>     }
>>
>>     [void]Grow() {
>>         # Get a random height because plants and trees don't grow the same each year
>>         $heightIncrease = Get-Random -Min 1 -Max 5;
>>         $this.Height += $heightIncrease;
>>         $this.Age += 1
>>     }
>> }
>>
>> class AppleTree : Tree {
>>     [string]$Species = "Apple"
>> }
>>
>> $tree = [AppleTree]::new()
>> $tree

Species Height Age Color
----- - - - -
Apple      1    0 Green
```

24) JSON

```
PS C:\Users\aditya.shah1> $url = "https://gist.githubusercontent.com/sanderstad/1c47c1add7476945857bff4d8dc2be59/raw/d12f30e4aaef9d2ee18e4539b394a12e63dea0c9c/SampleJSON1.json"
>> $json = (New-Object System.Net.WebClient).DownloadString($url)
>>
>> $data = $json | ConvertFrom-Json
>>
>> $data.colors

color category type      code
----- - - - - -
black  hue      primary  @{rgba=System.Object[]; hex=#000}
white  value    primary  @{rgba=System.Object[]; hex=#FFF}
red    hue      primary  @{rgba=System.Object[]; hex=#FF0}
blue   hue      primary  @{rgba=System.Object[]; hex=#00F}
yellow hue      primary  @{rgba=System.Object[]; hex=#FF0}
green  hue      secondary @{rgba=System.Object[]; hex=#0F0}
```

```

PS C:\Users\aditya.shah1> $data | ConvertTo-Json | Out-File $env:temp\json.txt -Force
>> Get-Content $env:temp\json.txt
{
    "colors": [
        {
            "color": "black",
            "category": "hue",
            "type": "primary",
            "code": "@{rgba=System.Object[]; hex=#000}"
        },
        {
            "color": "white",
            "category": "value",
            "type": "primary",
            "code": "@{rgba=System.Object[]; hex=#FFF}"
        },
        {
            "color": "red",
            "category": "hue",
            "type": "primary",
            "code": "@{rgba=System.Object[]; hex=#FF0}"
        },
        {
            "color": "blue",
            "category": "hue",
            "type": "primary",
            "code": "@{rgba=System.Object[]; hex=#00F}"
        },
        {
            "color": "yellow",
            "category": "hue",
            "type": "primary",
            "code": "@{rgba=System.Object[]; hex=#FF0}"
        },
        {
            "color": "green",
            "category": "hue",
            "type": "secondary",
            "code": "@{rgba=System.Object[]; hex=#0F0}"
        }
    ]
}

```

25) XML

```

PS C:\Users\aditya.shah1> # Creating a simple XML document
>> $xmlDocument = New-Object System.Xml.XmlDocument
>>
>> # Adding a root element
>> $rootElement = $xmlDocument.CreateElement("Root")
>> $xmlDocument.AppendChild($rootElement)
>>
>> # Adding child elements
>> $childElement1 = $xmlDocument.CreateElement("Child1")
>> $childElement1.InnerText = "Value1"
>> $rootElement.AppendChild($childElement1)
>>
>> $childElement2 = $xmlDocument.CreateElement("Child2")
>> $childElement2.InnerText = "Value2"
>> $rootElement.AppendChild($childElement2)
>>
>> # Save the XML to a file
>> $xmlDocument.Save("C:\Path\To\Your\File.xml")

```

```

Name : Root
LocalName : Root
NamespaceURI :
Prefix :
NodeType : Element
ParentNode : #document
OwnerDocument : #document
IsEmpty : True
Attributes : {}
HasAttributes : False
SchemaInfo : System.Xml.XmlName
InnerXml :
InnerText :
NextSibling :
PreviousSibling :
Value :
ChildNodes : {}
FirstChild :
LastChild :
HasChildNodes : False
IsReadOnly : False
OuterXml : <Root />
BaseURI :
PreviousText :

#text : Value1
#text : Value2

Exception calling "Save" with "1" argument(s): "Could not find a part of the path
'C:\Path\To\Your\File.xml'.
At line:18 char:1
+ $xmlDocument.Save("C:\Path\To\Your\File.xml")
+ ~~~~~
+ CategoryInfo          : NotSpecified: (:) [], MethodInvocationException
+ FullyQualifiedErrorId : DotNetMethodException

```

Task 2 VNET -

Step 1 az group create --name rg-03feb-aditya --location eastus

```

Requesting a Cloud Shell.Succeeded.
Connecting terminal...

```

```

aditya [ ~ ]$ az group create --name rg-03feb-aditya --location eastus
{
  "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya",
  "location": "eastus",
  "managedBy": null,
  "name": "rg-03feb-aditya",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}

```

Step 2 (i) az network vnet create \
--name vn1aditya \
--resource-group rg-03feb-aditya \
--address-prefixes 10.0.0.0/16 \
--subnet-name Subnet1 \
--subnet-prefix 10.0.0.0/24

```

aditya [ ~ ]$ az network vnet create \
--name vn1aditya \
--resource-group rg-03feb-aditya \
--address-prefixes 10.0.0.0/16 \
--subnet-name Subnet1 \
--subnet-prefix 10.0.0.0/24
Command group 'az network' is in preview and under development. Reference and support levels:
https://aka.ms/CLI\_refstatus
{
  "newVNet": {
    "addressSpace": {
      "addressPrefixes": [
        "10.0.0.0/16"
      ]
    },
    "enableDdosProtection": false,
    "etag": "W/\\"60be1448-654b-45b9-9662-b82438aa72dc\\\"",
    "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya/providers/Microsoft.Network/virtualNetworks/vn1aditya",
    "location": "eastus",
    "name": "vn1aditya",
    "provisioningState": "Succeeded",
    "resourceGroup": "rg-03feb-aditya",
    "resourceGuid": "7a1fe12d-eb52-4d9b-9392-42709fc8dd1a",
    "subnets": [
      {
        "addressPrefix": "10.0.0.0/24",
        "delegations": [],
        "etag": "W/\\"60be1448-654b-45b9-9662-b82438aa72dc\\\"",
        "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya/providers/Microsoft.Network/virtualNetworks/vn1aditya/subnets/Subnet1",
        "name": "Subnet1",
        "privateEndpointNetworkPolicies": "Disabled",
        "privateLinkServiceNetworkPolicies": "Enabled",
        "provisioningState": "Succeeded",
        "resourceGroup": "rg-03feb-aditya",
        "type": "Microsoft.Network/virtualNetworks/subnets"
      }
    ],
    "type": "Microsoft.Network/virtualNetworks",
    "virtualNetworkPeerings": []
  }
}

```

Step 2(ii) az network vnet create \

```

--name vn2aditya \
--resource-group rg-03feb-aditya \
--address-prefixes 10.1.0.0/16 \
--subnet-name Subnet1 \
--subnet-prefix 10.1.0.0/24
aditya [ ~ ]$ az network vnet create \
--name vn2aditya \
--resource-group rg-03feb-aditya \
--address-prefixes 10.1.0.0/16 \
--subnet-name Subnet1 \
--subnet-prefix 10.1.0.0/24
Command group 'az network' is in preview and under development. Reference and support levels:
https://aka.ms/CLI\_refstatus
{
  "newVNet": {
    "addressSpace": {
      "addressPrefixes": [
        "10.1.0.0/16"
      ]
    },
    "enableDdosProtection": false,
    "etag": "W/\\"60be1448-654b-45b9-9662-b82438aa72dc\\\"",
    "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya/providers/Microsoft.Network/virtualNetworks/vn2aditya",
    "location": "eastus",
    "name": "vn2aditya",
    "provisioningState": "Succeeded",
    "resourceGroup": "rg-03feb-aditya",
    "resourceGuid": "7a1fe12d-eb52-4d9b-9392-42709fc8dd1a",
    "subnets": [
      {
        "addressPrefix": "10.1.0.0/24",
        "delegations": [],
        "etag": "W/\\"60be1448-654b-45b9-9662-b82438aa72dc\\\"",
        "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya/providers/Microsoft.Network/virtualNetworks/vn2aditya/subnets/Subnet1",
        "name": "Subnet1",
        "privateEndpointNetworkPolicies": "Disabled",
        "privateLinkServiceNetworkPolicies": "Enabled",
        "provisioningState": "Succeeded",
        "resourceGroup": "rg-03feb-aditya",
        "type": "Microsoft.Network/virtualNetworks/subnets"
      }
    ],
    "type": "Microsoft.Network/virtualNetworks",
    "virtualNetworkPeerings": []
  }
}

```

```

    "enableDdosProtection": false,
    "etag": "W/\\"accea96b-8721-466d-88ce-860fb6423f8d\\\"",
    "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya/providers/Microsoft.Network/virtualNetworks/vn2aditya",
    "location": "eastus",
    "name": "vn2aditya",
    "provisioningState": "Succeeded",
    "resourceGroup": "rg-03feb-aditya",
    "resourceGuid": "b7c927f1-f03d-40b5-b5fb-b8050ea612da",
    "subnets": [
        {
            "addressPrefix": "10.1.0.0/24",
            "delegations": [],
            "etag": "W/\\"accea96b-8721-466d-88ce-860fb6423f8d\\\"",
            "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya/providers/Microsoft.Network/virtualNetworks/vn2aditya/subnets/Subnet1",
            "name": "Subnet1",
            "privateEndpointNetworkPolicies": "Disabled",
            "privateLinkServiceNetworkPolicies": "Enabled",
            "provisioningState": "Succeeded",
            "resourceGroup": "rg-03feb-aditya",
            "type": "Microsoft.Network/virtualNetworks/subnets"
        }
    ],
    "type": "Microsoft.Network/virtualNetworks",
    "virtualNetworkPeerings": []
}
}

```

Step 3 (i) vNet1Id=\$(az network vnet show \
--resource-group rg-03feb-aditya \
--name vn1aditya \
--query id \
--out tsv)

```

aditya [ ~ ]$ vNet1Id=$(az network vnet show \  

--resource-group rg-03feb-aditya \  

--name vn1aditya \  

--query id \  

--out tsv)
WARNING: Command group 'az network' is in preview and under development. Reference and support levels: https://aka.ms/CLI\_refstatus

```

Step 3 (ii) vNet2Id=\$(az network vnet show \
--resource-group rg-03feb-aditya \
--name vn2aditya \
--query id \
--out tsv)

```

aditya [ ~ ]$ vNet2Id=$(az network vnet show \  

--resource-group rg-03feb-aditya \  

--name vn2aditya \  

--query id \  

--out tsv)
WARNING: Command group 'az network' is in preview and under development. Reference and support levels: https://aka.ms/CLI\_refstatus

```

Step 4 (i) az network vnet peering create \
--name myVirtualNetwork1-myVirtualNetwork2 \
--resource-group rg-03feb-aditya \
--vnet-name vn1aditya \
--remote-vnet \$vNet2Id \
--allow-vnet-access

```
aditya [ ~ ]$ az network vnet peering create \  
--name myVirtualNetwork1-myVirtualNetwork2 \  
--resource-group rg-03feb-aditya \  
--vnet-name vn1aditya \  
--remote-vnet $vNet2Id \  
--allow-vnet-access  
Command group 'az network' is in preview and under development. Reference and support levels: https://aka.ms/CLI_refstatus  
{  
    "allowForwardedTraffic": false,  
    "allowGatewayTransit": false,  
    "allowVirtualNetworkAccess": true,  
    "doNotVerifyRemoteGateways": false,  
    "etag": "W/\"4e802a4a-d24f-40ce-9c0d-71b919baf622\"",  
    "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya/providers/Microsoft.Network/virtualNetworks/vn1aditya/virtualNetworkPeerings/myVirtualNetwork1-myVirtualNetwork2",  
    "name": "myVirtualNetwork1-myVirtualNetwork2",  
    "peeringState": "Initiated",  
    "peeringSyncLevel": "RemoteNotInSync",  
    "provisioningState": "Succeeded",  
    "remoteAddressSpace": {  
        "addressPrefixes": [  
            "10.1.0.0/16"  
        ]  
    },  
    "remoteVirtualNetwork": {  
        "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-aditya/providers/Microsoft.Network/virtualNetworks/vn2aditya",  
        "resourceGroup": "rg-03feb-aditya"  
    },  
    "remoteVirtualNetworkAddressSpace": {  
        "addressPrefixes": [  
            "10.1.0.0/16"  
        ]  
    },  
    "resourceGroup": "rg-03feb-aditya",  
    "resourceGuid": "cdd6c6dc-1b6f-0d2e-2669-fa75916ecfc0",  
    "type": "Microsoft.Network/virtualNetworks/virtualNetworkPeerings",  
    "useRemoteGateways": false  
}
```

Step 4 (ii) az network vnet peering create \
--name myVirtualNetwork1-myVirtualNetwork2 \
--resource-group rg-03feb-aditya \
--vnet-name vn2aditya \
--remote-vnet \$vNet1Id \
--allow-vnet-access

```
aditya [ ~ ]$ az network vnet peering create \
--name myVirtualNetwork1-myVirtualNetwork2 \
--resource-group rg-03feb-aditya \
--vnet-name vn2aditya \
--remote-vnet $vNet1Id \
--allow-vnet-access
Command group 'az network' is in preview and under development. Reference and support
levels: https://aka.ms/CLI\_refstatus
{
  "allowForwardedTraffic": false,
  "allowGatewayTransit": false,
  "allowVirtualNetworkAccess": true,
  "doNotVerifyRemoteGateways": false,
  "etag": "W/\"f9c1bb06-9cbe-4204-aee7-474817552925\"",
  "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-a
ditya/providers/Microsoft.Network/virtualNetworks/vn2aditya/virtualNetworkPeerings/myV
irtualNetwork1-myVirtualNetwork2",
  "name": "myVirtualNetwork1-myVirtualNetwork2",
  "peeringState": "Connected",
  "peeringSyncLevel": "FullyInSync",
  "provisioningState": "Succeeded",
  "remoteAddressSpace": {
    "addressPrefixes": [
      "10.0.0.0/16"
    ]
  },
  "remoteVirtualNetwork": {
    "id": "/subscriptions/a29fc8ef-0107-407b-9ee0-927783c402aa/resourceGroups/rg-03feb-
aditya/providers/Microsoft.Network/virtualNetworks/vn1aditya",
    "resourceGroup": "rg-03feb-aditya"
  },
  "remoteVirtualNetworkAddressSpace": {
    "addressPrefixes": [
      "10.0.0.0/16"
    ]
  },
  "resourceGroup": "rg-03feb-aditya",
  "resourceGuid": "cdd6c6dc-1b6f-0d2e-2669-fa75916ecfc0",
  "type": "Microsoft.Network/virtualNetworks/virtualNetworkPeerings",
  "useRemoteGateways": false
}
```

Step 5 az network vnet peering show \
--name myVirtualNetwork1-myVirtualNetwork2 \
--resource-group rg-03feb-aditya \
--vnet-name vn1aditya \
--query peeringState

```
aditya [ ~ ]$ az network vnet peering show \
--name myVirtualNetwork1-myVirtualNetwork2 \
--resource-group rg-03feb-aditya \
--vnet-name vn1aditya \
--query peeringState
Command group 'az network' is in preview and under development. Reference and support
levels: https://aka.ms/CLI\_refstatus
"Connected"
```

Step 6 ssh-keygen -t rsa -b 2048 -f ~/ssh/aditya_lock

```
aditya [ ~ ]$ ssh-keygen -t rsa -b 2048 -f ~/ssh/aditya_lock
Generating public/private rsa key pair.
Created directory '/home/aditya/.ssh'.
Enter passphrase (empty for no passphrase):
```

Step 7 (i) az vm create \

```
--resource-group rg-03feb-aditya \
--name myVm1 \
--image Ubuntu2204 \
--public-ip-sku Standard \
--vnet-name vn1aditya \
--subnet Subnet1 \
--ssh-key-value ~/ssh/aditya_lock.pub \
--no-wait
```

```
aditya [ ~ ]$ az vm create \
--resource-group rg-03feb-aditya \
--name myVm1 \
--image Ubuntu2204 \
--public-ip-sku Standard \
--vnet-name vn1aditya \
--subnet Subnet1 \
--ssh-key-value ~/ssh/aditya_lock.pub \
--no-wait
```

Step 7 (ii) az vm create \

```
--resource-group rg-03feb-aditya \
--name myVm2 \
--image Ubuntu2204 \
--public-ip-sku Standard \
--vnet-name vn2aditya \
--subnet Subnet1 \
--ssh-key-value ~/ssh/aditya_lock.pub \
--no-wait
```

```
aditya [ ~ ]$ az vm create \
--resource-group rg-03feb-aditya \
--name myVm2 \
--image Ubuntu2204 \
--public-ip-sku Standard \
--vnet-name vn2aditya \
--subnet Subnet1 \
--ssh-key-value ~/ssh/aditya_lock.pub \
--no-wait
```

Step 8 ssh -i ~/ssh/aditya_lock aditya@74.235.212.45

```
aditya [ ~ ]$ ssh -i ~/ssh/aditya_lock aditya@74.235.212.45
The authenticity of host '74.235.212.45 (74.235.212.45)' can't be established.
ED25519 key fingerprint is SHA256:TgjNR/cejKXAMjMmdl8mxYSou3oNXvtowZdXanMbtQ.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '74.235.212.45' (ED25519) to the list of known hosts.
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1019-azure x86_64)
```

```
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/pro

System information as of Mon Feb  5 06:05:23 UTC 2024

System load: 0.36962890625    Processes:          103
Usage of /: 5.1% of 28.89GB   Users logged in:      0
Memory usage: 8%              IPv4 address for eth0: 10.0.0.4
Swap usage: 0%

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge
```

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See <https://ubuntu.com/esm> or run: sudo pro status

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

Step 9 ping 10.0.0.4 -c 4

```
aditya@myVm1:~$ ping 10.0.0.4 -c 4
PING 10.0.0.4 (10.0.0.4) 56(84) bytes of data.
64 bytes from 10.0.0.4: icmp_seq=1 ttl=64 time=0.024 ms
64 bytes from 10.0.0.4: icmp_seq=2 ttl=64 time=0.039 ms
64 bytes from 10.0.0.4: icmp_seq=3 ttl=64 time=0.041 ms
64 bytes from 10.0.0.4: icmp_seq=4 ttl=64 time=0.037 ms

--- 10.0.0.4 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3071ms
rtt min/avg/max/mdev = 0.024/0.035/0.041/0.006 ms
```

Step 10 az group delete --name rg-03feb-aditya --yes

```
aditya [ ~ ]$ az group delete --name rg-03feb-aditya --yes
[]/ Running ..
```

All the Resources Deleted -

Microsoft Azure [Upgrade](#) aditya.shah1@incedo...
INCEDO TECHNOLOGY SOUTIO...

Home >

Resource groups ...
Inedo Technology Solutions Ltd. (inedoin.onmicrosoft.com)

+ Create Manage view Refresh Export to CSV Open query Assign tags

Subscription equals all Location equals all Add filter

Showing 1 to 2 of 2 records.

<input type="checkbox"/> Name ↑↓	Subscription ↑↓	Location ↑↓	...
<input type="checkbox"/> cloud-shell-storage-centralindia	Azure Training	Central India	
<input type="checkbox"/> NetworkWatcherRG	Azure Training	East US	

No grouping List view

< Previous Page of 1 Next > Give feedback