Full Azure Deployment Project Report (AZ-104)
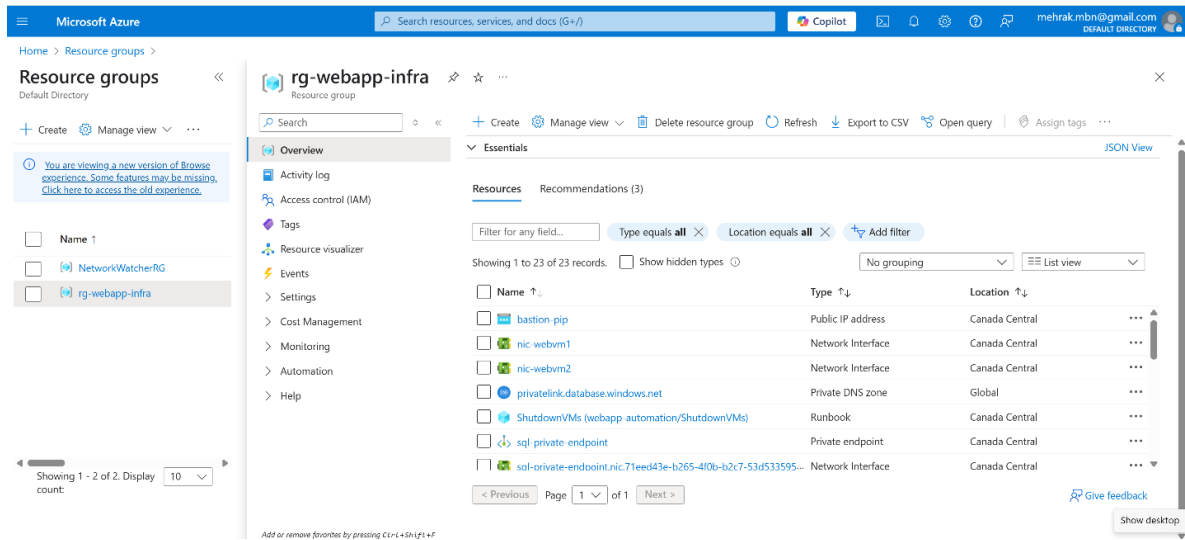
1. Resource Group:

To logically group all related Azure resources under one container, making it easier to manage, deploy, monitor, and delete resources as a unit.

az group create --name rg-webapp-infra --location canadacentral

2. Virtual Network and Subnets:

To create an isolated and secure network environment for the application infrastructure. Subnets allow for separation of services (web, database, etc.) for better organization and security.

az network vnet create --resource-group rg-webapp-infra --name vnet-webapp --address-prefix 10.0.0.0/16 --subnet-name web --subnet-prefix 10.0.1.0/24

az network vnet subnet create --resource-group rg-webapp-infra --vnet-name vnet-webapp --name db --address-prefix 10.0.2.0/24
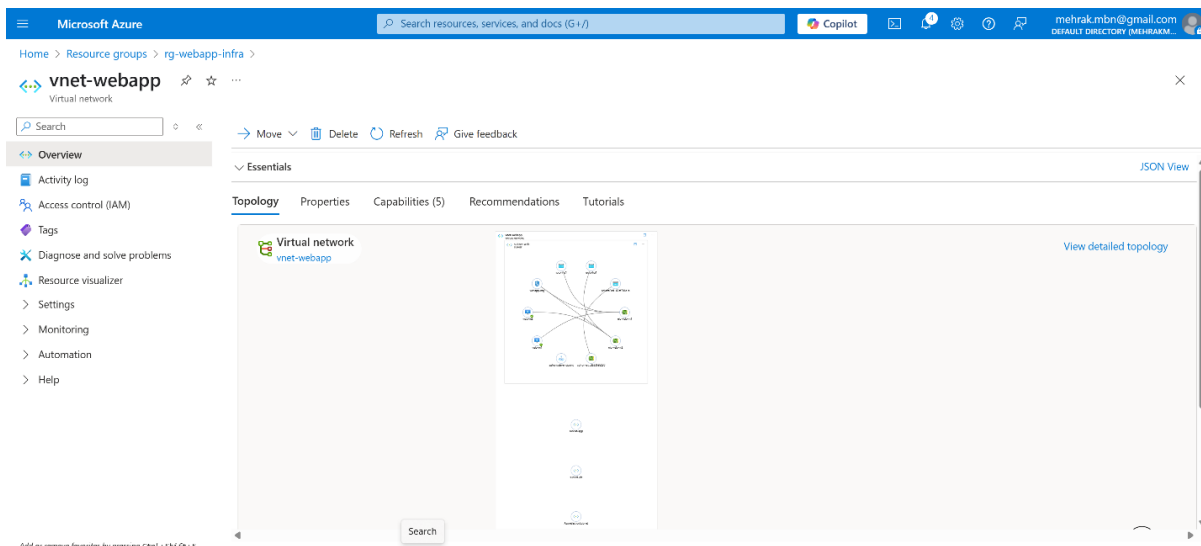
3. **Network Security Group (NSG):**
   To define inbound and outbound access rules to tightly control which traffic can reach the virtual machines. For example, only allow HTTP (port 80) and RDP (port 3389) from appropriate sources.

   az network nsg create --resource-group rg-webapp-infra --name webapp-nsg

   az network nsg rule create --resource-group rg-webapp-infra --nsg-name webapp-nsg --name allow-rdp --protocol Tcp --direction Inbound --source-address-prefixes '*' --source-port-ranges '*' --destination-address-prefixes '*' --destination-port-ranges 3389 --access Allow --priority 200

   az network nsg rule create --resource-group rg-webapp-infra --nsg-name webapp-nsg --name allow-http --protocol Tcp --direction Inbound --source-address-prefixes '*' --source-port-ranges '*' --destination-address-prefixes '*' --destination-port-ranges 80 --access Allow --priority 100

4. **Public IP and Load Balancer:**
   To ensure high availability and load distribution across web VMs. The public IP provides external access, while the Load Balancer routes traffic and monitors health with probes.

   az network public-ip create --resource-group rg-webapp-infra --name webapp-pip --sku Standard --allocation-method static --location canadacentral

   az network lb create --resource-group rg-webapp-infra --name webapp-lb --sku Standard --public-ip-address webapp-pip --frontend-ip-name webapp-fe --backend-pool-name webapp-be

az network lb probe create --resource-group rg-webapp-infra --lb-name webapp-lb --name webapp-probe --protocol tcp --port 80

az network lb rule create --resource-group rg-webapp-infra --lb-name webapp-lb --name http-rule --protocol tcp --frontend-port 80 --backend-port 80 --frontend-ip-name webapp-fe --backend-pool-name webapp-be --probe-name webapp-probe
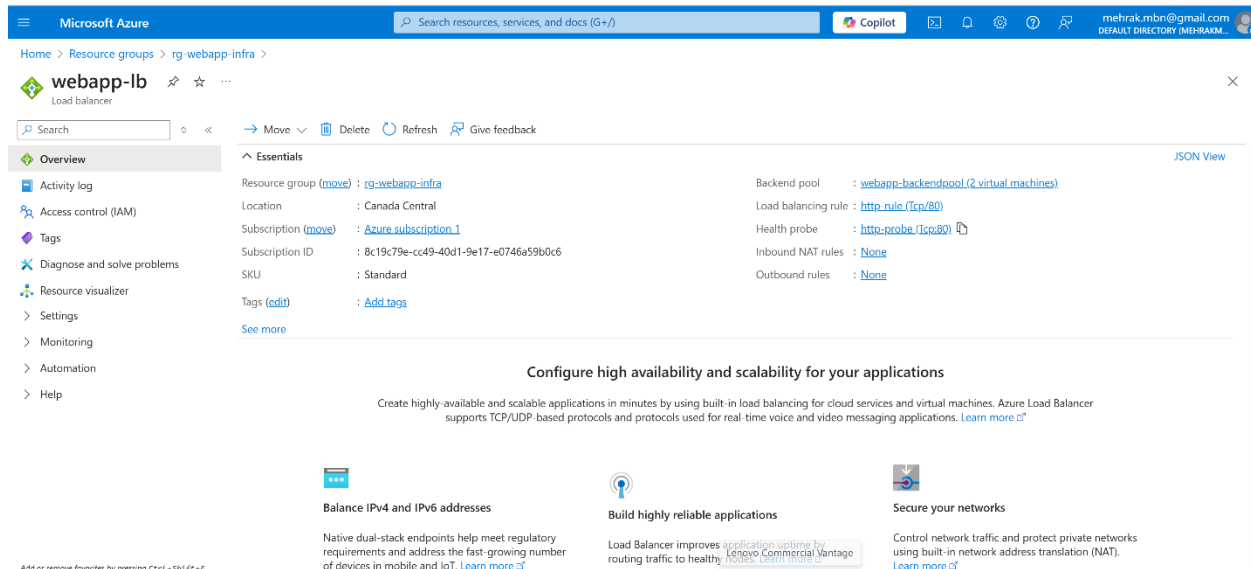
5. Virtual Machines:

To host the web application in an IaaS model. Two Windows Server VMs ensure redundancy. IIS was installed to serve web content and test Load Balancer behavior.

az vm create --resource-group rg-webapp-infra --name webvm1 --image Win2022Datacenter --admin-username azureuser --admin-password Pa$$w0rd1234! --size Standard_B2s --vnet-name vnet-webapp --subnet web --nsg webapp-nsg --public-ip-address "" --nics "" --no-wait

<Repeat for webvm2>

On VM via Bastion:

Install-WindowsFeature -name Web-Server -IncludeManagementTools

6. Azure SQL + Private Endpoint:

To store structured application data in a secure managed service. Using a Private Endpoint ensures that the SQL server is not exposed to the public internet, and only accessible from the VNet.

az sql server create --name webappsqlserver1234 --resource-group rg-webapp-infra --location canadacentral --admin-user sqladmin --admin-password P@ssw0rd123!

az sql db create --resource-group rg-webapp-infra --server webappsqlserver1234 --name webappdb --service-objective S0

az network private-endpoint create --name sql-private-endpoint --resource-group rg-webapp-infra --vnet-name vnet-webapp --subnet db --private-connection-resource-id <SQL_RESOURCE_ID> --group-id sqlServer --connection-name sql-vnet-connection --location canadacentral

az network private-dns zone create --resource-group rg-webapp-infra --name

privatelink.database.windows.net

az network private-dns link vnet create --resource-group rg-webapp-infra --zone-name

privatelink.database.windows.net --name sql-dns-link --virtual-network vnet-webapp --registration-enabled false

7. **Azure File Share:**
   To enable both VMs to share files such as logs, configuration data, or app content. Mounting it as a drive simplifies access and collaboration between servers.

   az storage account create --name webappstor1234 --resource-group rg-webapp-infra --location canadacentral --sku Standard_LRS --kind StorageV2

   az storage share-rm create --resource-group rg-webapp-infra --storage-account webappstor1234 --name webappshare

PowerShell to mount:

New-PSDrive -Name "Z" -PSProvider FileSystem -Root

"\webappstor1234.file.core.windows.net\webappshare" -Persist -Credential (New-Object
PSCredential("webappstor1234", (ConvertTo-SecureString "<key>"-AsPlainText -Force)))
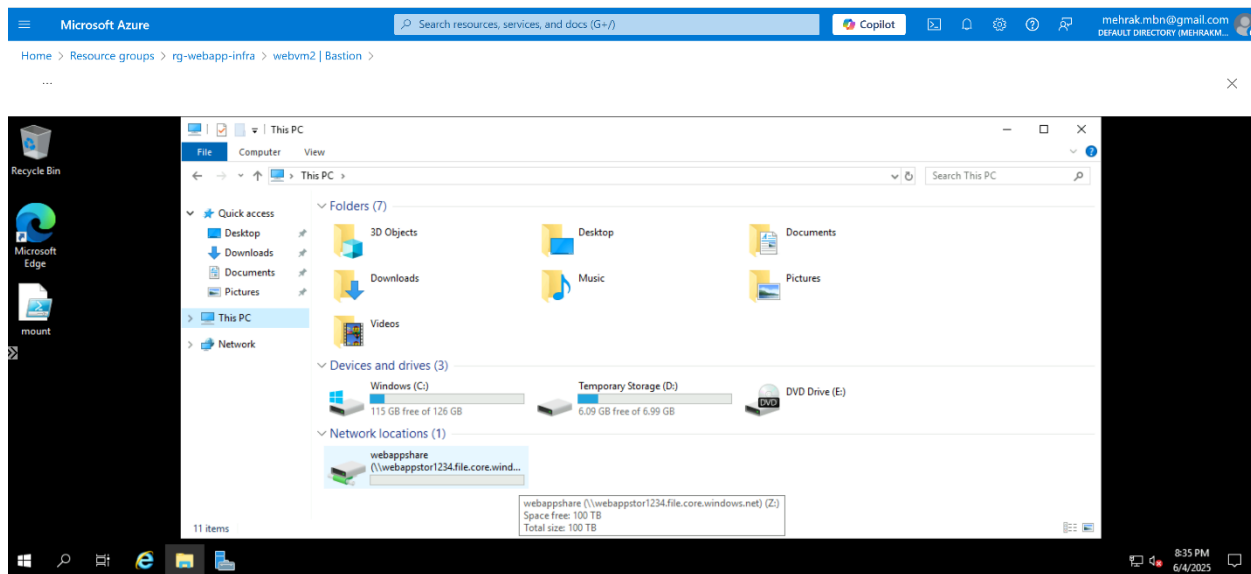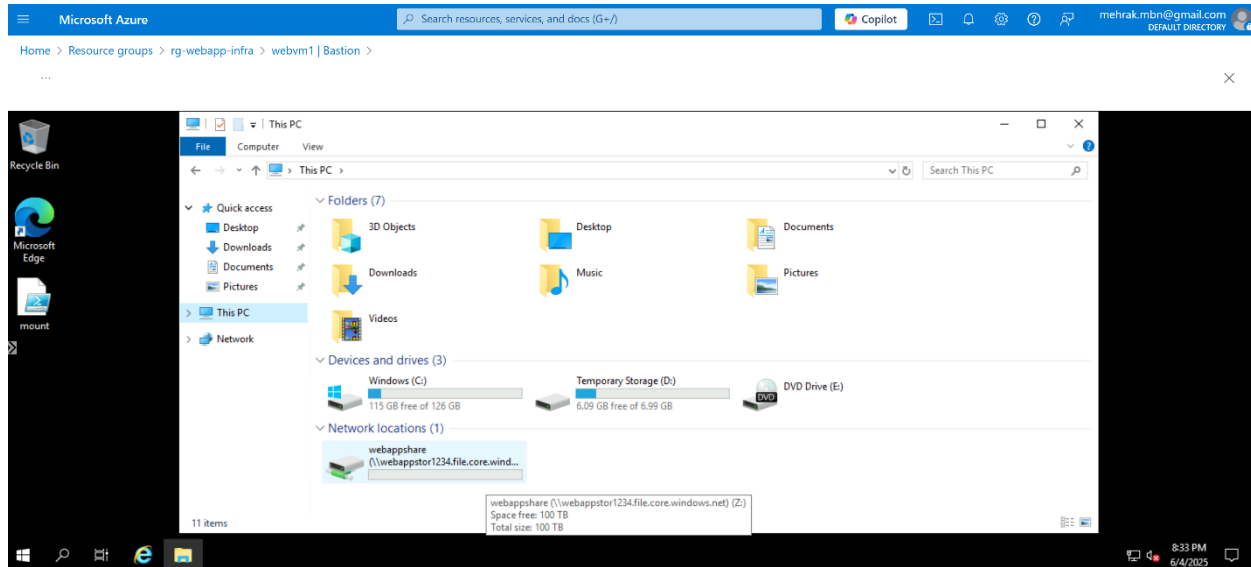
8. Monitoring and Alerts:

To collect telemetry from the infrastructure (CPU, memory, disk, etc.) using Log Analytics. Alerts notify administrators if certain thresholds are exceeded (e.g., CPU > 80%).

az monitor log-analytics workspace create --resource-group rg-webapp-infra --workspace-name webapp-law

az vm extension set --publisher Microsoft.Azure.Monitor --name AzureMonitorWindowsAgent --resource-group rg-webapp-infra --vm-name webvm1 --version 1.0 --enable-auto-upgrade true

az monitor metrics alert create --name HighCPUAlert --resource-group rg-webapp-infra --scopes <VM_RESOURCE_ID> --condition "avg Percentage CPU > 80" --window-size 5m --evaluation-frequency 1m

9. Automation:

To save cost by automatically shutting down VMs at night when they're not needed. Azure Automation with scheduled Runbooks ensures operational efficiency with minimal manual effort.

az automation account create --resource-group rg-webapp-infra --name webapp-automation --location canadacentral --sku Free

Runbook: ShutdownVMs.ps1

$vmNames = @("webvm1", "webvm2")

foreach ($vm in $vmNames) {

Stop-AzVM -Name $vm -ResourceGroupName "rg-webapp-infra" -Force

}

Schedule:

az automation schedule create --resource-group rg-webapp-infra \

--automation-account-name webapp-automation --name NightlyShutdown \

--start-time "2024-06-07T03:00:00+00:00" --frequency Day --interval 1 --time-zone "UTC"

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webapp-automation | Runbooks
Automation Account

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⚠ PowerShell 7.1 and Python 2.7 are no longer supported by their respective parent products PowerShell and Python. It is strongly recommended to update outdated runbooks to latest supported versions using Runtime environment. Learn more

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Runbook type : All   Authoring Status : All

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Name	Next run
NightlyShutdown	6/7/2025, 3:00 AM

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NightlyShutdown
Schedule

💾 Save   ✖ Discard   🔗 Unlink

Properties

Last modified
6/4/2025, 3:23 PM

Enabled *
◉ Yes   ○ No

Description
[   ]

Starts * ⓘ
06/07/2025   3:00 AM

Time zone
Coordinated Universal Time

Recurrence
○ Once   ◉ Recurring

Recurrence Details

Recur every *
1   Day

Set expiration
○ Yes   ◉ No