

AZURE-MULTI-TIER ARCHITECTURE DEPLOYMENT PROJECT

This project involves deploying a secure multi-tier architecture on Microsoft Azure using Azure CLI and GitHub for version control.

Multi-tier architecture means you divide your application into logical layers, each doing a different job. The architecture consists of a virtual network [VNET] divided into three subnets, Web, App and Database with network security groups [NSGs] configured to enforce tier-to-tier communication rules. The project demonstrates automation, network segmentation, and security in cloud infrastructure.

Objectives

- Create a VNet with three subnets: Web, App and DB.
- Provision Linux VNs in each subnet.
- Create NSGs to allow only necessary communication [Web-App-DB].
- SSH into each VM and verify connectivity rules [ping tests].
- Write a Bash script to automate the full deployment.

Tools and Resource Used

- Azure portal
- Azure CLI
- Ubuntu 22.04 LTS
- GitHub [for version control]
- Bash scripting

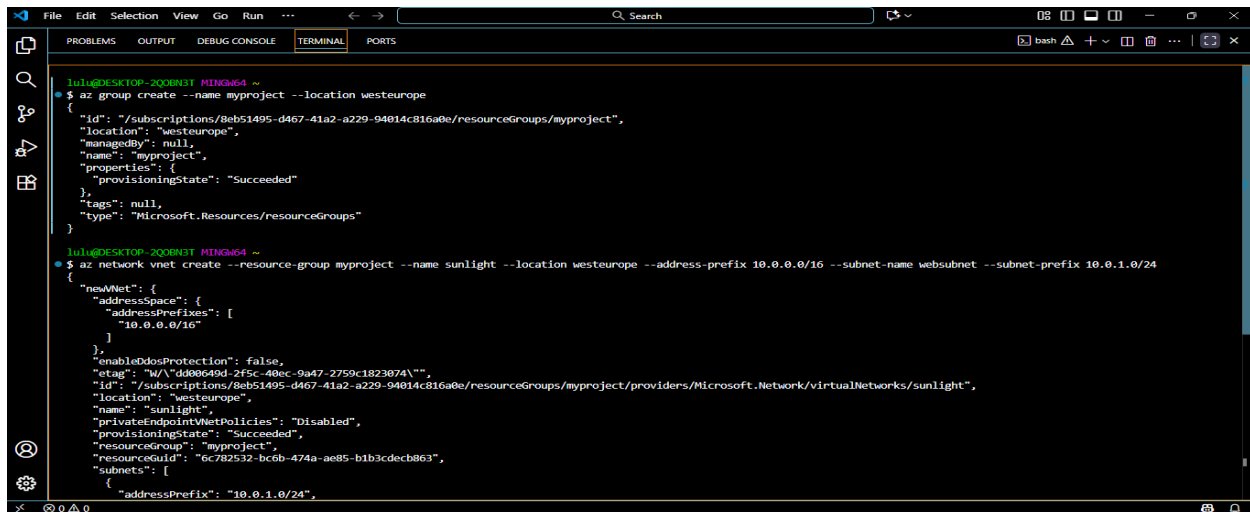
Steps involved

Step 1: Resource group creation

Created a resource group [myproject]; which serves as the central management unit for all that is deployed in the multi-tier architecture.

- Azure CLI command

```
az group create --name myproject --location westeurope
```



```
Julia@DESKTOP-2Q0R83T MINGW64 ~
$ az group create --name myproject --location westeurope
{
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject",
  "location": "westeurope",
  "managedBy": null,
  "name": "myproject",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}

Julia@DESKTOP-2Q0R83T MINGW64 ~
$ az network vnet create --resource-group myproject --name sunlight --location westeurope --address-prefix 10.0.0.0/16 --subnet-name websubnet --subnet-prefix 10.0.1.0/24
{
  "newVnet": {
    "addressSpace": {
      "addressPrefixes": [
        "10.0.0.0/16"
      ]
    },
    "enableDdosProtection": false,
    "etag": "W/\"d80640d-2f5c-40ec-9a47-2759c1823074\"",
    "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight",
    "location": "westeurope",
    "name": "sunlight",
    "privateEndpointNetworkPolicies": "Disabled",
    "provisioningState": "Succeeded",
    "resourceGroup": "myproject",
    "resourceId": "6c782532-bc6b-474a-ae85-b1b3cdecb863",
    "subnets": [
      {
        "addressPrefix": "10.0.1.0/24",

```

Step 2: VNet and subnet creation

The virtual network is a building block for private network communication, it allows resources to securely connect with each other

Created a virtual network named "sunlight" with an address 10.0.0.0./16 and added three subnets, each subnet has its own address prefix.

Azure CLI command

- `az network vnet create --resource-group myproject --name sunlight --location westeurope --address-prefix 10.0.0.0/16 --subnet-name dbsubnet --subnet-prefix 10.0.3.0/24`



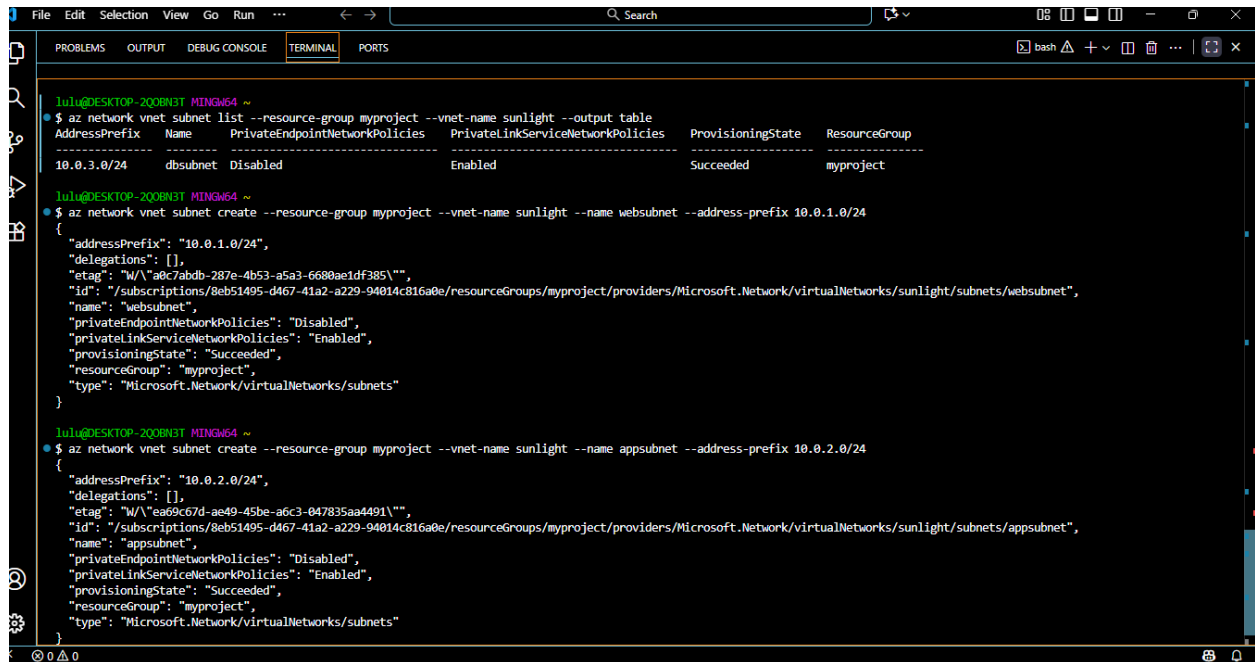
```
Julia@DESKTOP-2Q0R83T MINGW64 ~
$ az network vnet create --resource-group myproject --name sunlight --location westeurope --address-prefix 10.0.0.0/16 --subnet-name appsubnet --subnet-prefix 10.0.2.0/24
{
  "newVnet": {
    "addressSpace": {
      "addressPrefixes": [
        "10.0.0.0/16"
      ]
    },
    "enableDdosProtection": false,
    "etag": "W/\"d80640d-2f5c-40ec-9a47-2759c1823074\"",
    "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight",
    "location": "westeurope",
    "name": "sunlight",
    "privateEndpointNetworkPolicies": "Disabled",
    "provisioningState": "Succeeded",
    "resourceGroup": "myproject",
    "resourceId": "6c782532-bc6b-474a-ae85-b1b3cdecb863",
    "subnets": [
      {
        "addressPrefix": "10.0.2.0/24",
        "delegations": [],
        "etag": "W/\"d80640d-2f5c-40ec-9a47-2759c1823074\"",
        "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight/subnets/appsubnet",
        "name": "appsubnet",
        "privateEndpointNetworkPolicies": "Disabled",
        "privateLinkServiceNetworkPolicies": "Enabled",
        "provisioningState": "Succeeded",
        "resourceGroup": "myproject",
        "type": "Microsoft.Network/virtualNetworks/subnets"
      },
      {
        "addressPrefix": "10.0.1.0/24",
        "delegations": [],
        "etag": "W/\"d80640d-2f5c-40ec-9a47-2759c1823074\"",
        "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight/subnets/websubnet",
        "name": "websubnet",
        "privateEndpointNetworkPolicies": "Disabled",
        "privateLinkServiceNetworkPolicies": "Enabled",
        "provisioningState": "Succeeded",
        "resourceGroup": "myproject",
        "type": "Microsoft.Network/virtualNetworks/subnets"
      },
      {
        "addressPrefix": "10.0.3.0/24",
        "delegations": [],
        "etag": "W/\"d80640d-2f5c-40ec-9a47-2759c1823074\"",
        "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight/subnets/dbsubnet",
        "name": "dbsubnet",
        "privateEndpointNetworkPolicies": "Disabled",
        "privateLinkServiceNetworkPolicies": "Enabled",
        "provisioningState": "Succeeded",
        "resourceGroup": "myproject",
        "type": "Microsoft.Network/virtualNetworks/subnets"
      }
    ],
    "type": "Microsoft.Network/virtualNetworks",
    "virtualNetworkPeerings": []
  }
}
```

Then went ahead to add three subnets, each subnet has its own address prefix.

- Websubnet [10.0.1.0/24]
- Appsubnet [10.0.2.0/24]
- Dbsubnet [10.0.3.0/24]

Azure CLI command

- `az network vnet subnet create --resource-group myproject --vnet-name sunlight --name websubnet --address-prefix 10.0.1.0/24`
- `az network vnet subnet create --resource-group myproject --vnet-name sunlight --name appsubnet --address-prefix 10.0.2.0/24`



```
lulu@DESKTOP-2Q0BNBT MINGW64 ~
$ az network vnet subnet list --resource-group myproject --vnet-name sunlight --output table
AddressPrefix  Name      PrivateEndpointNetworkPolicies  PrivateLinkServiceNetworkPolicies  ProvisioningState  ResourceGroup
-----
10.0.3.0/24    dbsubnet  Disabled                        Enabled                             Succeeded          myproject

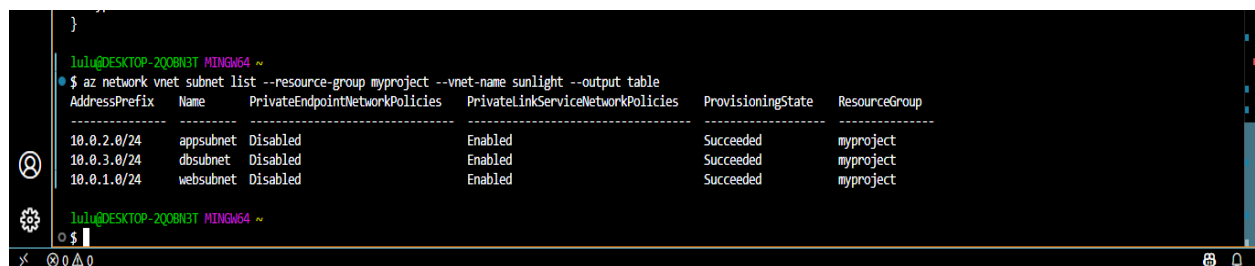
lulu@DESKTOP-2Q0BNBT MINGW64 ~
$ az network vnet subnet create --resource-group myproject --vnet-name sunlight --name websubnet --address-prefix 10.0.1.0/24
{
  "addressPrefix": "10.0.1.0/24",
  "delegations": [],
  "etag": "W/\"a0c7abdb-287e-4b53-a5a3-6680ae1df385\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight/subnets/websubnet",
  "name": "websubnet",
  "privateEndpointNetworkPolicies": "Disabled",
  "privateLinkServiceNetworkPolicies": "Enabled",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "type": "Microsoft.Network/virtualNetworks/subnets"
}

lulu@DESKTOP-2Q0BNBT MINGW64 ~
$ az network vnet subnet create --resource-group myproject --vnet-name sunlight --name appsubnet --address-prefix 10.0.2.0/24
{
  "addressPrefix": "10.0.2.0/24",
  "delegations": [],
  "etag": "W/\"ea69c67d-ae49-45be-a6c3-047835aa4491\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight/subnets/appsubnet",
  "name": "appsubnet",
  "privateEndpointNetworkPolicies": "Disabled",
  "privateLinkServiceNetworkPolicies": "Enabled",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "type": "Microsoft.Network/virtualNetworks/subnets"
}
```

- To view the list of created subnets

Azure CLI command

- `az network vnet subnet list --resource-group myproject --vnet-name sunlight --output table`



```
lulu@DESKTOP-2Q0BNBT MINGW64 ~
$ az network vnet subnet list --resource-group myproject --vnet-name sunlight --output table
AddressPrefix  Name      PrivateEndpointNetworkPolicies  PrivateLinkServiceNetworkPolicies  ProvisioningState  ResourceGroup
-----
10.0.2.0/24    appsubnet  Disabled                        Enabled                             Succeeded          myproject
10.0.3.0/24    dbsubnet  Disabled                        Enabled                             Succeeded          myproject
10.0.1.0/24    websubnet  Disabled                        Enabled                             Succeeded          myproject

lulu@DESKTOP-2Q0BNBT MINGW64 ~
$
```

Step 3: Virtual machine deployment

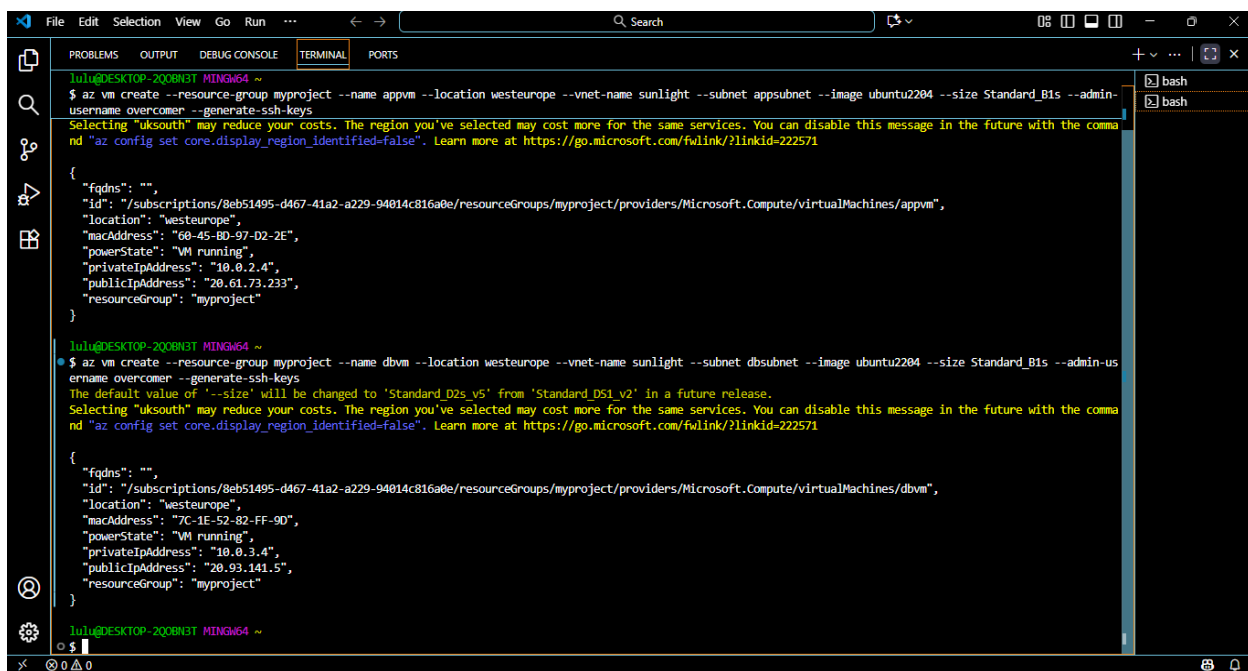
Deployed three [3] linux virtual machines [VMs] each placed in its corresponding subnet [web, app and database], used Ubuntu 22.04 image and Standard_B1s.

Azure CLI command

- `az vm create --resource-group myproject --name appvm --location westeurope --vnet-name sunlight --subnet appsubnet --image Ubuntu2204 --size Standard_B1s --admin-username overcomer --generate-ssh-keys.`
- `az vm create --resource-group myproject --name webvm --location westeurope --vnet-name sunlight --subnet websubnet --image Ubuntu2204 --size Standard_B1s --admin-username overcomer --generate-ssh-keys.`
- `az vm create --resource-group myproject --name dbvm --location westeurope --vnet-name sunlight --subnet dbsubnet --image Ubuntu2204 --size Standard_B1s --admin-username overcomer --generate-ssh-keys.`



```
Julia@DESKTOP-2Q0R3T3 MINGW64 ~  
$ az vm create --resource-group myproject --name appvm --location westeurope --vnet-name sunlight --subnet appsubnet --image ubuntu2204 --size Standard_B1s --admin-username overcomer --generate-ssh-keys  
The default value of '--size' will be changed to 'Standard_D2s_v5' from 'Standard_D51_v2' in a future release.  
Selecting 'uksouth' may reduce your costs. The region you've selected may cost more for the same services. You can disable this message in the future with the command 'az config set core.display_region_identified=false'. Learn more at https://go.microsoft.com/fwlink/?linkid=222571  
{  
  "fqdns": "",  
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94814c816a0e/resourceGroups/myproject/providers/Microsoft.Compute/virtualMachines/appvm",  
  "location": "westeurope",  
  "macAddress": "68-45-BD-97-D2-2E",  
  "powerState": "VM running",  
  "privateIpAddress": "10.0.2.4",  
  "publicIpAddress": "20.61.73.233",  
  "resourceGroup": "myproject"  
}
```



```
Julia@DESKTOP-2Q0R3T3 MINGW64 ~  
$ az vm create --resource-group myproject --name appvm --location westeurope --vnet-name sunlight --subnet appsubnet --image ubuntu2204 --size Standard_B1s --admin-username overcomer --generate-ssh-keys  
The default value of '--size' will be changed to 'Standard_D2s_v5' from 'Standard_D51_v2' in a future release.  
Selecting 'uksouth' may reduce your costs. The region you've selected may cost more for the same services. You can disable this message in the future with the command 'az config set core.display_region_identified=false'. Learn more at https://go.microsoft.com/fwlink/?linkid=222571  
{  
  "fqdns": "",  
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94814c816a0e/resourceGroups/myproject/providers/Microsoft.Compute/virtualMachines/appvm",  
  "location": "westeurope",  
  "macAddress": "68-45-BD-97-D2-2E",  
  "powerState": "VM running",  
  "privateIpAddress": "10.0.2.4",  
  "publicIpAddress": "20.61.73.233",  
  "resourceGroup": "myproject"  
}  
  
Julia@DESKTOP-2Q0R3T3 MINGW64 ~  
$ az vm create --resource-group myproject --name dbvm --location westeurope --vnet-name sunlight --subnet dbsubnet --image ubuntu2204 --size Standard_B1s --admin-username overcomer --generate-ssh-keys  
The default value of '--size' will be changed to 'Standard_D2s_v5' from 'Standard_D51_v2' in a future release.  
Selecting 'uksouth' may reduce your costs. The region you've selected may cost more for the same services. You can disable this message in the future with the command 'az config set core.display_region_identified=false'. Learn more at https://go.microsoft.com/fwlink/?linkid=222571  
{  
  "fqdns": "",  
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94814c816a0e/resourceGroups/myproject/providers/Microsoft.Compute/virtualMachines/dbvm",  
  "location": "westeurope",  
  "macAddress": "7C-1E-52-82-FF-9D",  
  "powerState": "VM running",  
  "privateIpAddress": "10.0.3.4",  
  "publicIpAddress": "20.93.141.5",  
  "resourceGroup": "myproject"  
}
```

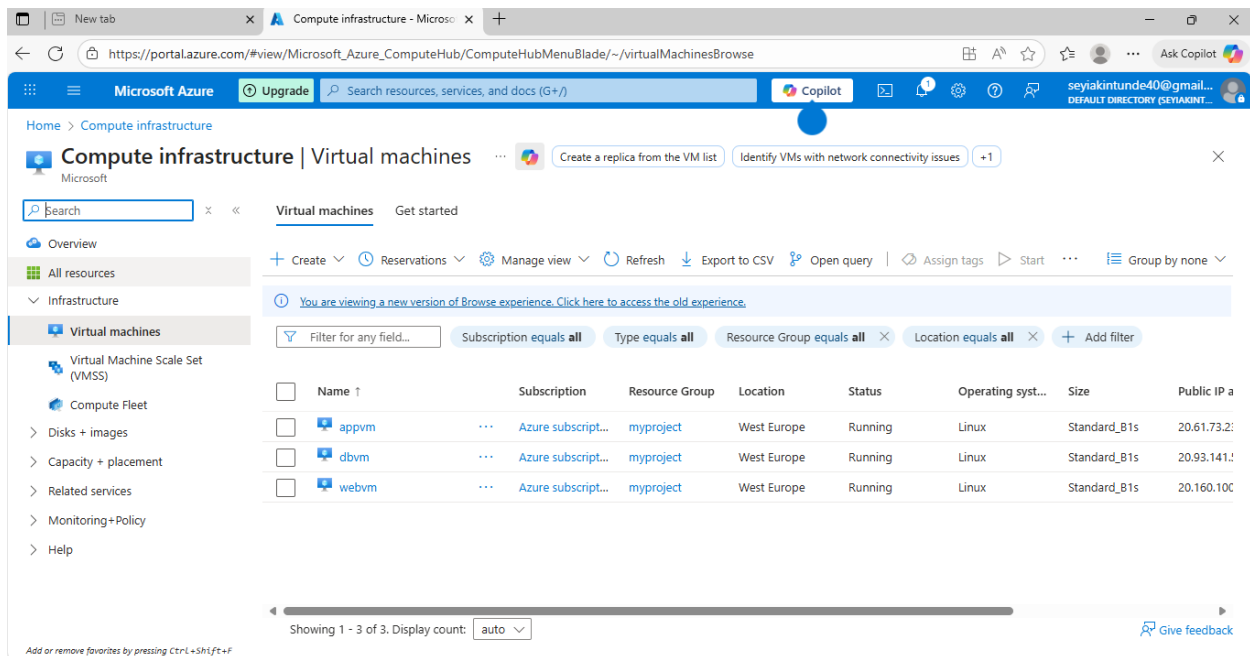
- ❖ One major challenge encountered was virtual machine deployment failure due to unavailable VM size in my initial region [uksouth], had to make research on available VM size in the region, after learning that not all size are supported in every region due to capacity limits or subscription restriction

Then had to create a new resource group in West Europe and deployed all VMs there successfully using VM size Standard_B1s.

- ❖ Initially, encountered issues with SSH key configuration, as I was not sure where my key was saved.

To resolve this I used the `--generate-ssh-keys` command during VM creation, which automatically created and stored the SSH key pair needed.

Each VM was successfully deployed and associated with its respective subnet to maintain the structure of the multi-tier architecture.



Step 4: Network security group [NSGs] creation

To enhance security and enforce proper traffic flow between the subnets within the virtual networks [Web, App and DB]

Created three [3] separate NSGs i.e webNSG, appNSG and dbNSG; then linked each subnet with their respective NSG as it requires its own NSG to ensure customized and controlled access rules.

Azure CLI command

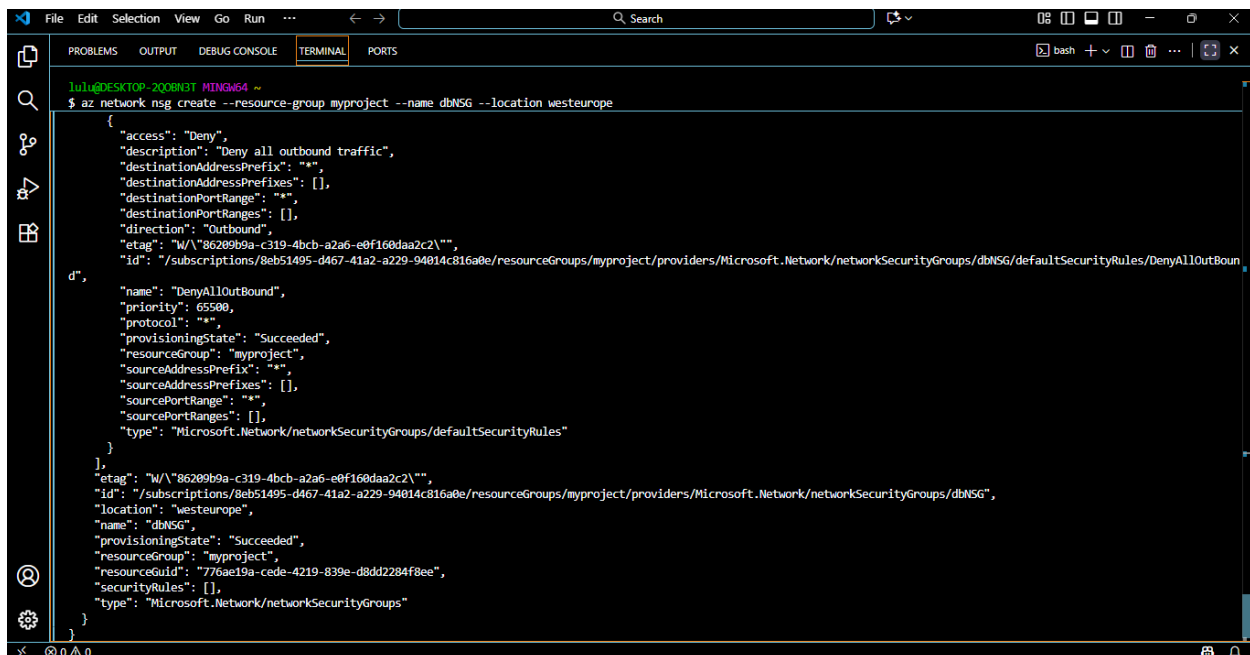
- `az network nsg create --resource-group myproject --name webNSG --location westeurope`

```
File Edit Selection View Go Run ... Search
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
july@DESKTOP-2Q0BN3T MINGW64 ~
$ az network nsg create --resource-group myproject --name webNSG --location westeurope
{
  "access": "Deny",
  "description": "Deny all outbound traffic",
  "destinationAddressPrefix": "**",
  "destinationAddressPrefixes": [],
  "destinationPortRange": "**",
  "destinationPortRanges": [],
  "direction": "Outbound",
  "etag": "W/\"ca7e4ad9-85c9-4f40-a7d8-ce6065435f96\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/webNSG/defaultSecurityRules/DenyAllOutBou",
  "name": "DenyAllOutBound",
  "priority": 65500,
  "protocol": "**",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "sourceAddressPrefix": "**",
  "sourceAddressPrefixes": [],
  "sourcePortRange": "**",
  "sourcePortRanges": [],
  "type": "Microsoft.Network/networkSecurityGroups/defaultSecurityRules"
},
{
  "etag": "W/\"ca7e4ad9-85c9-4f40-a7d8-ce6065435f96\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/webNSG",
  "location": "westeurope",
  "name": "webNSG",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "resourceGuid": "b302a2d0-f161-46ef-b409-6c42486bde6d",
  "securityRules": [],
  "type": "Microsoft.Network/networkSecurityGroups"
}
```

- az network nsg create --resource-group myproject --name appNSG --location westeurope

```
File Edit Selection View Go Run ... Search
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
july@DESKTOP-2Q0BN3T MINGW64 ~
$ az network nsg create --resource-group myproject --name appNSG --location westeurope
{
  "destinationAddressPrefix": "**",
  "destinationAddressPrefixes": [],
  "destinationPortRange": "**",
  "destinationPortRanges": [],
  "direction": "Outbound",
  "etag": "W/\"090ebf1b-794f-498f-821c-5b25ed7e3fe0\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/appNSG/defaultSecurityRules/DenyAllOutBou",
  "name": "DenyAllOutBound",
  "priority": 65500,
  "protocol": "**",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "sourceAddressPrefix": "**",
  "sourceAddressPrefixes": [],
  "sourcePortRange": "**",
  "sourcePortRanges": [],
  "type": "Microsoft.Network/networkSecurityGroups/defaultSecurityRules"
},
{
  "etag": "W/\"090ebf1b-794f-498f-821c-5b25ed7e3fe0\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/appNSG",
  "location": "westeurope",
  "name": "appNSG",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "resourceGuid": "9da15df6-3df2-484b-a190-fa0a03081cc",
  "securityRules": [],
  "type": "Microsoft.Network/networkSecurityGroups"
}
```

- az network nsg create --resource-group myproject --name dbNSG --location westeurope



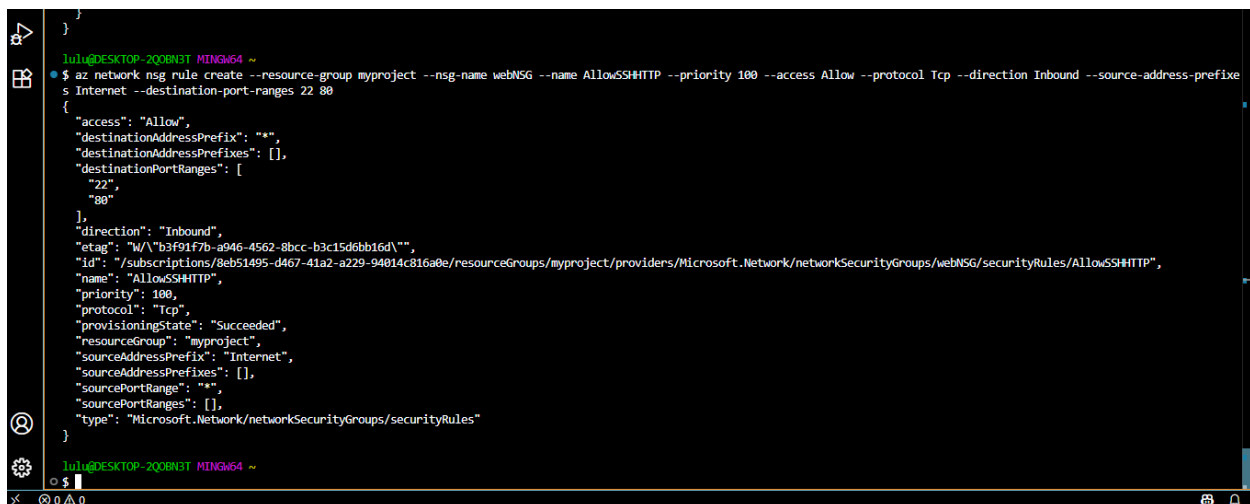
```
lulu@DESKTOP-2Q0BNBT MINGW64 ~
$ az network nsg create --resource-group myproject --name dbNSG --location westeurope
{
  "access": "Deny",
  "description": "Deny all outbound traffic",
  "destinationAddressPrefix": "**",
  "destinationAddressPrefixes": [],
  "destinationPortRange": "**",
  "destinationPortRanges": [],
  "direction": "Outbound",
  "etag": "W/\"86209b9a-c319-4bcb-a2a6-e0f160daa2c2\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/dbNSG/defaultSecurityRules/DenyAllOutBound",
  "name": "DenyAllOutBound",
  "priority": 65500,
  "protocol": "**",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "sourceAddressPrefix": "**",
  "sourceAddressPrefixes": [],
  "sourcePortRange": "**",
  "sourcePortRanges": [],
  "type": "Microsoft.Network/networkSecurityGroups/defaultSecurityRules"
},
{
  "etag": "W/\"86209b9a-c319-4bcb-a2a6-e0f160daa2c2\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/dbNSG",
  "location": "westeurope",
  "name": "dbNSG",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "resourceGuid": "776ae19a-cede-4219-839e-d8dd2284f8ee",
  "securityRules": [],
  "type": "Microsoft.Network/networkSecurityGroups"
}
```

To enforce access control between tiers and external access, configuration of specific inbound rules for each NSG was carried out.

- WebNSG
- inbound:
 - Allow SSH [port 22] from the internet for remote access.
 - Allow HTTP [port 80] from the internet to serve web traffic.

Azure CLI command

- az network nsg rule create --resource-group myproject --nsg-name webNSG --name AllowSSHHTTP --priority 100 --access Allow --protocol Tcp --direction Inbound --source-address-prefixes Internet --destination-port-ranges 22 80.



```
lulu@DESKTOP-2Q0BNBT MINGW64 ~
$ az network nsg rule create --resource-group myproject --nsg-name webNSG --name AllowSSHHTTP --priority 100 --access Allow --protocol Tcp --direction Inbound --source-address-prefixes Internet --destination-port-ranges 22 80
{
  "access": "Allow",
  "destinationAddressPrefix": "**",
  "destinationAddressPrefixes": [],
  "destinationPortRanges": [
    "22",
    "80"
  ],
  "direction": "Inbound",
  "etag": "W/\"b3f91f7b-a946-4562-8bcc-b3c15d6bb16d\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/webNSG/securityRules/AllowSSHHTTP",
  "name": "AllowSSHHTTP",
  "priority": 100,
  "protocol": "Tcp",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "sourceAddressPrefix": "Internet",
  "sourceAddressPrefixes": [],
  "sourcePortRange": "**",
  "sourcePortRanges": [],
  "type": "Microsoft.Network/networkSecurityGroups/securityRules"
}
```

- AppNSG

- Inbound:
 - Allow HTTP [port 80] traffic only from the web subnet

Azure CLI command

- `az network nsg rule create --resource-group myproject --nsg-name appNSG --name AllowWebToApp --priority 100 --access Allow --protocol Tcp --direction Inbound --source-address-prefixes 10.0.1.0/24 --destination-port-ranges 22 80`



```

Julia@DESKTOP-2Q0BN31 MINGW64 ~
$ az network nsg rule create --resource-group myproject --nsg-name appNSG --name AllowWebToApp --priority 100 --access Allow --protocol Tcp --direction Inbound --source-address-prefixes 10.0.1.0/24 --destination-port-ranges 22 80
{
  "access": "Allow",
  "destinationAddressPrefix": "*",
  "destinationAddressPrefixes": [],
  "destinationPortRanges": [
    "22",
    "80"
  ],
  "direction": "Inbound",
  "etag": "W/\"edad1d35-36fa-418f-a779-f951bd63223d\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/appNSG/securityRules/AllowWebToApp",
  "name": "AllowWebToApp",
  "priority": 100,
  "protocol": "Tcp",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "sourceAddressPrefix": "10.0.1.0/24",
  "sourceAddressPrefixes": [],
  "sourcePortRange": "*",
  "sourcePortRanges": [],
  "type": "Microsoft.Network/networkSecurityGroups/securityRules"
}

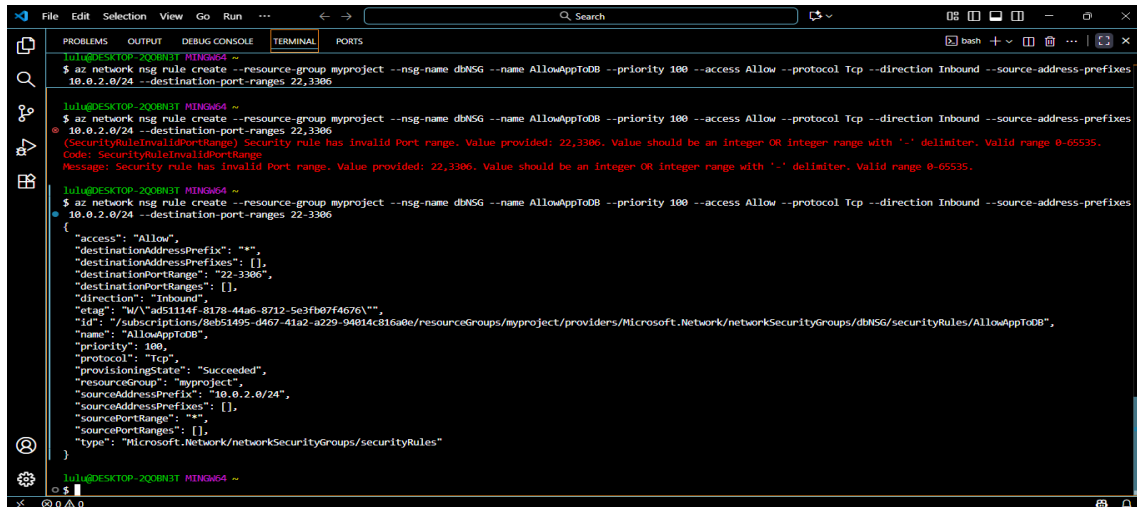
```

- DbNSG
- Inbound:
 - Allow traffic from app subnet on port 3306

After deploying the virtual machines and configuring the NSGs, then went ahead to test the connectivity between the subnets to ensure that the access control rules were functioning.

Azure CLI command

- `az network rule create --resource-group myproject --nsg-name dbNSG --name AllowAppToDB --priority 100 --Access Allow --protocol Tcp --direction Inbound --source-address-prefixes 10.0.2.0/24 --destination-port-ranges 22-3306.`



```
lulu@DESKTOP-2Q0R83T MINGW64 ~
$ az network nsg rule create --resource-group myproject --nsg-name dbNSG --name AllowAppToDB --priority 100 --access Allow --protocol Tcp --direction Inbound --source-address-prefixes 10.0.2.0/24 --destination-port-ranges 22,3306

lulu@DESKTOP-2Q0R83T MINGW64 ~
$ az network nsg rule create --resource-group myproject --nsg-name dbNSG --name AllowAppToDB --priority 100 --access Allow --protocol Tcp --direction Inbound --source-address-prefixes 10.0.2.0/24 --destination-port-ranges 22,3306
(SecurityRuleInvalidPortRange) Security rule has invalid Port range. Value provided: 22,3306. Value should be an Integer OR Integer range with '-' delimiter. Valid range 0-65535.
Code: SecurityRuleInvalidPortRange
Message: Security rule has invalid Port range. Value provided: 22,3306. Value should be an Integer OR Integer range with '-' delimiter. Valid range 0-65535.

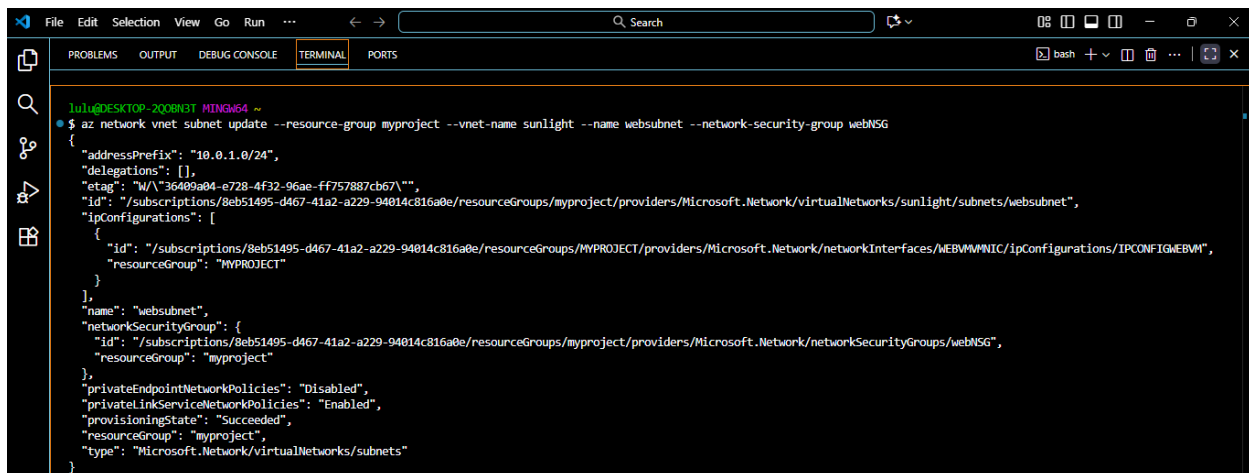
lulu@DESKTOP-2Q0R83T MINGW64 ~
$ az network nsg rule create --resource-group myproject --nsg-name dbNSG --name AllowAppToDB --priority 100 --access Allow --protocol Tcp --direction Inbound --source-address-prefixes 10.0.2.0/24 --destination-port-ranges 22-3306
{
  "access": "Allow",
  "destinationAddressPrefix": "*",
  "destinationAddressPrefixes": [],
  "destinationPortRange": "22-3306",
  "destinationPortRanges": [],
  "direction": "Inbound",
  "etag": "W/\"a51114f-8178-44a6-8712-5e3fb07f4676\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/dbNSG/securityRules/AllowAppToDB",
  "name": "AllowAppToDB",
  "priority": 100,
  "protocol": "Tcp",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "sourceAddressPrefix": "10.0.2.0/24",
  "sourceAddressPrefixes": [],
  "sourcePortRange": "*",
  "sourcePortRanges": [],
  "type": "Microsoft.Network/networkSecurityGroups/securityRules"
}
```

Step 5: Associate NSG to subnet

This is to link a specific NSG to a subnet within vnet under the resource group [myproject], this helps control inbound and outbound traffic based on defined security rules.

Azure CLI command

- `az network vnet subnet update --resource-group myproject --vnet-name sunlight --name websubnet --network-security-group webNSG`



```
lulu@DESKTOP-2Q0R83T MINGW64 ~
$ az network vnet subnet update --resource-group myproject --vnet-name sunlight --name websubnet --network-security-group webNSG
{
  "addressPrefix": "10.0.1.0/24",
  "delegations": [],
  "etag": "W/\"36409a04-e728-4f32-96ae-ff757887cb67\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight/subnets/websubnet",
  "ipConfigurations": [
    {
      "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/MYPROJECT/providers/Microsoft.Network/networkInterfaces/WEBMMNIC/ipConfigurations/IPCONFIGWEBVM",
      "resourceGroup": "MYPROJECT"
    }
  ],
  "name": "websubnet",
  "networkSecurityGroup": {
    "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/webNSG",
    "resourceGroup": "myproject"
  },
  "privateEndpointNetworkPolicies": "Disabled",
  "privateLinkServiceNetworkPolicies": "Enabled",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "type": "Microsoft.Network/virtualNetworks/subnets"
}
```

- az network vnet subnet update --resource-group myproject --vnet-name sunlight --name appsubnet --network-security-group appNSG

```
lulu@DESKTOP-2Q0BN3T MINGW64 ~
$ az network vnet subnet update --resource-group myproject --vnet-name sunlight --name appsubnet --network-security-group appNSG
{
  "addressPrefix": "10.0.2.0/24",
  "delegations": [],
  "etag": "W/\"552f8337-3c83-4c83-a9a1-f7b47e0d44d9\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight/subnets/appsubnet",
  "ipConfigurations": [
    {
      "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/MYPROJECT/providers/Microsoft.Network/networkInterfaces/APPMVMNIC/ipConfigurations/IPCONFIGAPPM",
      "resourceGroup": "MYPROJECT"
    }
  ],
  "name": "appsubnet",
  "networkSecurityGroup": {
    "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/appNSG",
    "resourceGroup": "myproject"
  },
  "privateEndpointNetworkPolicies": "Disabled",
  "privateLinkServiceNetworkPolicies": "Enabled",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "type": "Microsoft.Network/virtualNetworks/subnets"
}
```

- az network vnet subnet update --resource-group myproject --vnet-name sunlight --name dbsubnet --network-security-group dbNSG

```
lulu@DESKTOP-2Q0BN3T MINGW64 ~
$ az network vnet subnet update --resource-group myproject --vnet-name sunlight --name dbsubnet --network-security-group dbNSG
{
  "addressPrefix": "10.0.3.0/24",
  "delegations": [],
  "etag": "W/\"207f208c-530e-4482-8db4-5ac446817f15\"",
  "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/virtualNetworks/sunlight/subnets/dbsubnet",
  "ipConfigurations": [
    {
      "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/MYPROJECT/providers/Microsoft.Network/networkInterfaces/DBVMVMNIC/ipConfigurations/IPCONFIGDBVM",
      "resourceGroup": "MYPROJECT"
    }
  ],
  "name": "dbsubnet",
  "networkSecurityGroup": {
    "id": "/subscriptions/8eb51495-d467-41a2-a229-94014c816a0e/resourceGroups/myproject/providers/Microsoft.Network/networkSecurityGroups/dbNSG",
    "resourceGroup": "myproject"
  },
  "privateEndpointNetworkPolicies": "Disabled",
  "privateLinkServiceNetworkPolicies": "Enabled",
  "provisioningState": "Succeeded",
  "resourceGroup": "myproject",
  "type": "Microsoft.Network/virtualNetworks/subnets"
}
```

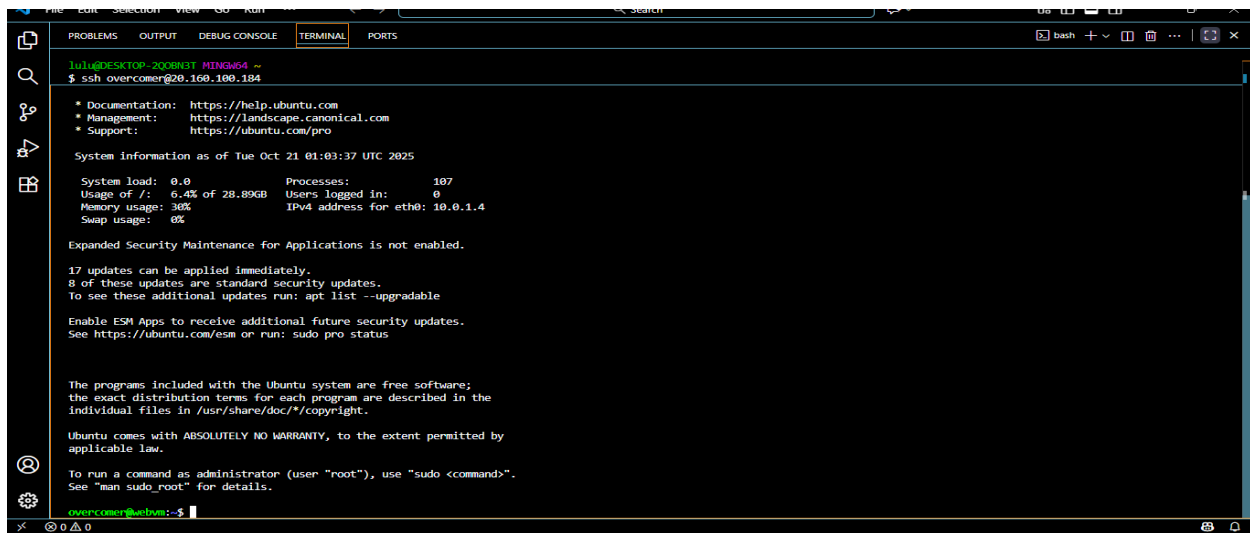
Step 6: Connected to each VM using SSH.

Successfully connected to each VM via SSH using their public/private key pairs, confirming that the VMs were accessible and operational.

SSH connection to webvm; this allows remote access to the webvm to verify configuration and perform connectivity tests.

Azure CLI command

- ssh overcomer@20.160.100.184 [overcomer here is the admin username]



```
lulu@DESKTOP-200H3BT MINGW64 ~
$ ssh overcomer@20.160.100.184

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

System information as of Tue Oct 21 01:03:37 UTC 2025

System load:  0.0          Processes:    107
Usage of /:   6.4% of 28.89GB Users logged in:  0
Memory usage: 30%         IPv4 address for eth0: 10.0.1.4
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

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

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.

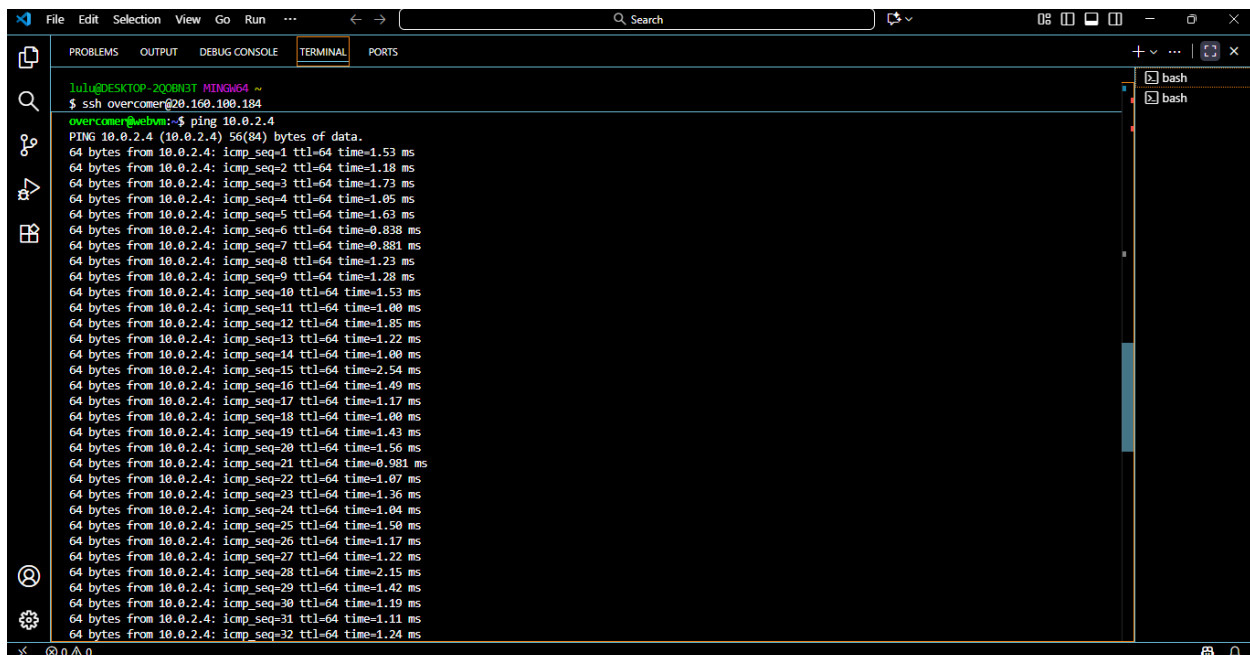
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

overcomer@ubuntu:~$
```

From the webVM, I ran a ping command to the appVM's private IP, the connection was successful.

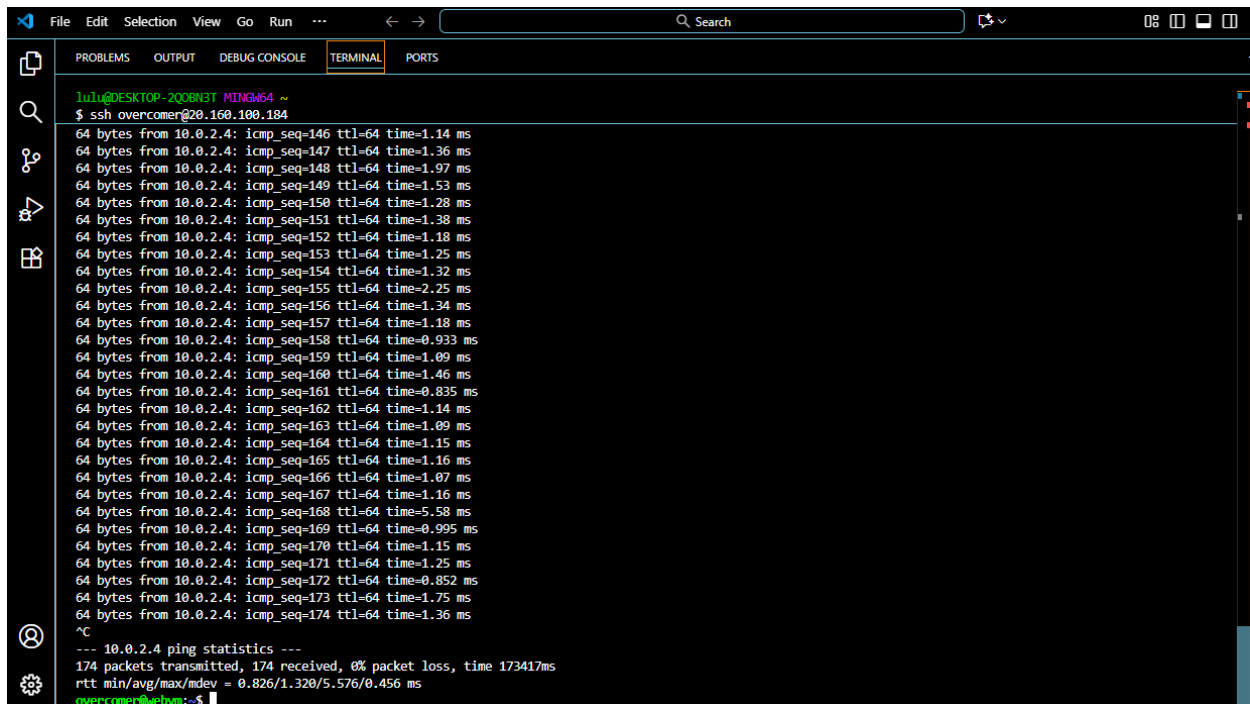
Azure CLI command

- ping 10.0.2.4



```
lulu@DESKTOP-200H3BT MINGW64 ~
$ ssh overcomer@20.160.100.184

overcomer@ubuntu:~$ ping 10.0.2.4
PING 10.0.2.4 (10.0.2.4) 56(84) bytes of data:
64 bytes from 10.0.2.4: icmp_seq=1 ttl=64 time=1.53 ms
64 bytes from 10.0.2.4: icmp_seq=2 ttl=64 time=1.18 ms
64 bytes from 10.0.2.4: icmp_seq=3 ttl=64 time=1.72 ms
64 bytes from 10.0.2.4: icmp_seq=4 ttl=64 time=1.06 ms
64 bytes from 10.0.2.4: icmp_seq=5 ttl=64 time=1.63 ms
64 bytes from 10.0.2.4: icmp_seq=6 ttl=64 time=0.838 ms
64 bytes from 10.0.2.4: icmp_seq=7 ttl=64 time=0.881 ms
64 bytes from 10.0.2.4: icmp_seq=8 ttl=64 time=1.23 ms
64 bytes from 10.0.2.4: icmp_seq=9 ttl=64 time=1.28 ms
64 bytes from 10.0.2.4: icmp_seq=10 ttl=64 time=1.53 ms
64 bytes from 10.0.2.4: icmp_seq=11 ttl=64 time=1.00 ms
64 bytes from 10.0.2.4: icmp_seq=12 ttl=64 time=1.85 ms
64 bytes from 10.0.2.4: icmp_seq=13 ttl=64 time=1.22 ms
64 bytes from 10.0.2.4: icmp_seq=14 ttl=64 time=1.00 ms
64 bytes from 10.0.2.4: icmp_seq=15 ttl=64 time=2.54 ms
64 bytes from 10.0.2.4: icmp_seq=16 ttl=64 time=1.49 ms
64 bytes from 10.0.2.4: icmp_seq=17 ttl=64 time=1.17 ms
64 bytes from 10.0.2.4: icmp_seq=18 ttl=64 time=1.00 ms
64 bytes from 10.0.2.4: icmp_seq=19 ttl=64 time=1.43 ms
64 bytes from 10.0.2.4: icmp_seq=20 ttl=64 time=1.56 ms
64 bytes from 10.0.2.4: icmp_seq=21 ttl=64 time=0.981 ms
64 bytes from 10.0.2.4: icmp_seq=22 ttl=64 time=1.07 ms
64 bytes from 10.0.2.4: icmp_seq=23 ttl=64 time=1.36 ms
64 bytes from 10.0.2.4: icmp_seq=24 ttl=64 time=1.04 ms
64 bytes from 10.0.2.4: icmp_seq=25 ttl=64 time=1.50 ms
64 bytes from 10.0.2.4: icmp_seq=26 ttl=64 time=1.17 ms
64 bytes from 10.0.2.4: icmp_seq=27 ttl=64 time=1.22 ms
64 bytes from 10.0.2.4: icmp_seq=28 ttl=64 time=2.15 ms
64 bytes from 10.0.2.4: icmp_seq=29 ttl=64 time=1.42 ms
64 bytes from 10.0.2.4: icmp_seq=30 ttl=64 time=1.19 ms
64 bytes from 10.0.2.4: icmp_seq=31 ttl=64 time=1.11 ms
64 bytes from 10.0.2.4: icmp_seq=32 ttl=64 time=1.24 ms
```

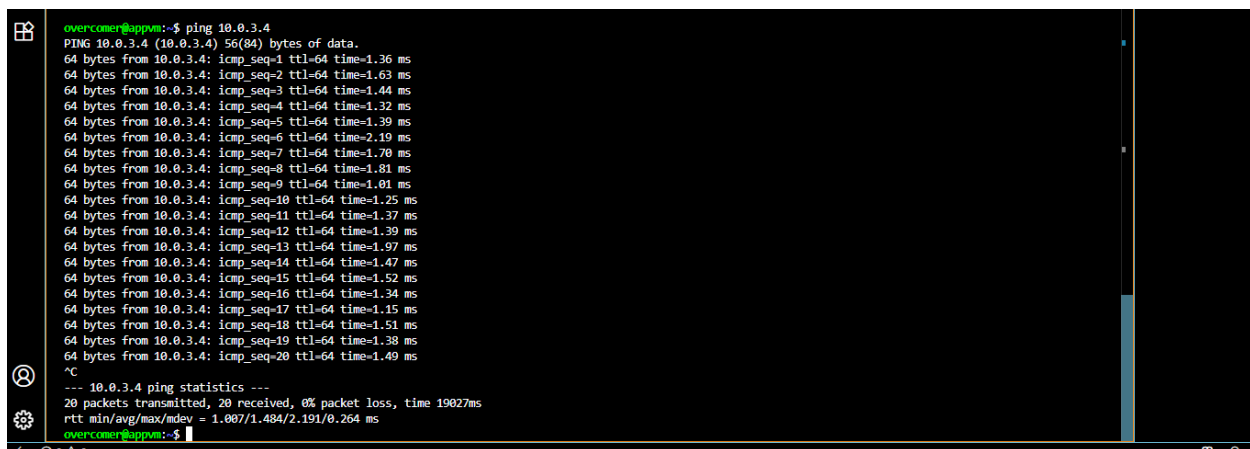


```
lulug@DESKTOP-200BN31 MINGW64 ~  
$ ssh overcomer@20.160.100.184  
64 bytes from 10.0.2.4: icmp_seq=146 ttl=64 time=1.14 ms  
64 bytes from 10.0.2.4: icmp_seq=147 ttl=64 time=1.36 ms  
64 bytes from 10.0.2.4: icmp_seq=148 ttl=64 time=1.97 ms  
64 bytes from 10.0.2.4: icmp_seq=149 ttl=64 time=1.53 ms  
64 bytes from 10.0.2.4: icmp_seq=150 ttl=64 time=1.28 ms  
64 bytes from 10.0.2.4: icmp_seq=151 ttl=64 time=1.38 ms  
64 bytes from 10.0.2.4: icmp_seq=152 ttl=64 time=1.18 ms  
64 bytes from 10.0.2.4: icmp_seq=153 ttl=64 time=1.25 ms  
64 bytes from 10.0.2.4: icmp_seq=154 ttl=64 time=1.32 ms  
64 bytes from 10.0.2.4: icmp_seq=155 ttl=64 time=2.25 ms  
64 bytes from 10.0.2.4: icmp_seq=156 ttl=64 time=1.34 ms  
64 bytes from 10.0.2.4: icmp_seq=157 ttl=64 time=1.18 ms  
64 bytes from 10.0.2.4: icmp_seq=158 ttl=64 time=0.933 ms  
64 bytes from 10.0.2.4: icmp_seq=159 ttl=64 time=1.09 ms  
64 bytes from 10.0.2.4: icmp_seq=160 ttl=64 time=1.46 ms  
64 bytes from 10.0.2.4: icmp_seq=161 ttl=64 time=0.835 ms  
64 bytes from 10.0.2.4: icmp_seq=162 ttl=64 time=1.14 ms  
64 bytes from 10.0.2.4: icmp_seq=163 ttl=64 time=1.09 ms  
64 bytes from 10.0.2.4: icmp_seq=164 ttl=64 time=1.15 ms  
64 bytes from 10.0.2.4: icmp_seq=165 ttl=64 time=1.16 ms  
64 bytes from 10.0.2.4: icmp_seq=166 ttl=64 time=1.07 ms  
64 bytes from 10.0.2.4: icmp_seq=167 ttl=64 time=1.16 ms  
64 bytes from 10.0.2.4: icmp_seq=168 ttl=64 time=5.58 ms  
64 bytes from 10.0.2.4: icmp_seq=169 ttl=64 time=0.995 ms  
64 bytes from 10.0.2.4: icmp_seq=170 ttl=64 time=1.15 ms  
64 bytes from 10.0.2.4: icmp_seq=171 ttl=64 time=1.25 ms  
64 bytes from 10.0.2.4: icmp_seq=172 ttl=64 time=0.852 ms  
64 bytes from 10.0.2.4: icmp_seq=173 ttl=64 time=1.75 ms  
64 bytes from 10.0.2.4: icmp_seq=174 ttl=64 time=1.36 ms  
^C  
--- 10.0.2.4 ping statistics ---  
174 packets transmitted, 174 received, 0% packet loss, time 173417ms  
rtt min/avg/max/mdev = 0.826/1.320/5.576/0.456 ms  
overcomer@webvm:~$
```

- ssh [overcomer@20.61.73.233](#)

From the appVM, I ran a ping command to the dbVM's private IP

- ping 10.0.3.4



```
overcomer@appvm:~$ ping 10.0.3.4  
PING 10.0.3.4 (10.0.3.4) 56(84) bytes of data:  
64 bytes from 10.0.3.4: icmp_seq=1 ttl=64 time=1.36 ms  
64 bytes from 10.0.3.4: icmp_seq=2 ttl=64 time=1.63 ms  
64 bytes from 10.0.3.4: icmp_seq=3 ttl=64 time=1.44 ms  
64 bytes from 10.0.3.4: icmp_seq=4 ttl=64 time=1.32 ms  
64 bytes from 10.0.3.4: icmp_seq=5 ttl=64 time=1.39 ms  
64 bytes from 10.0.3.4: icmp_seq=6 ttl=64 time=2.19 ms  
64 bytes from 10.0.3.4: icmp_seq=7 ttl=64 time=1.78 ms  
64 bytes from 10.0.3.4: icmp_seq=8 ttl=64 time=1.81 ms  
64 bytes from 10.0.3.4: icmp_seq=9 ttl=64 time=1.01 ms  
64 bytes from 10.0.3.4: icmp_seq=10 ttl=64 time=1.25 ms  
64 bytes from 10.0.3.4: icmp_seq=11 ttl=64 time=1.37 ms  
64 bytes from 10.0.3.4: icmp_seq=12 ttl=64 time=1.39 ms  
64 bytes from 10.0.3.4: icmp_seq=13 ttl=64 time=1.97 ms  
64 bytes from 10.0.3.4: icmp_seq=14 ttl=64 time=1.47 ms  
64 bytes from 10.0.3.4: icmp_seq=15 ttl=64 time=1.52 ms  
64 bytes from 10.0.3.4: icmp_seq=16 ttl=64 time=1.34 ms  
64 bytes from 10.0.3.4: icmp_seq=17 ttl=64 time=1.15 ms  
64 bytes from 10.0.3.4: icmp_seq=18 ttl=64 time=1.51 ms  
64 bytes from 10.0.3.4: icmp_seq=19 ttl=64 time=1.38 ms  
64 bytes from 10.0.3.4: icmp_seq=20 ttl=64 time=1.49 ms  
^C  
--- 10.0.3.4 ping statistics ---  
20 packets transmitted, 20 received, 0% packet loss, time 19027ms  
rtt min/avg/max/mdev = 1.007/1.484/2.191/0.264 ms  
overcomer@appvm:~$
```

To verify application layer connectivity, I used “curl” from the webVM to the appVM's private IP.

The response was “**Thank you for using nginx**” confirming that the webserver was running and accessible.

Validation via azure portal

Home > Resource Manager | Resource groups >

myproject Resource group

How to manage these changes more efficiently with deployment tools? Help me generate Terraform for this resource group configuration. +1

Search: S

+ Create Manage view Refresh Export to CSV Open query Assign tags Group by none

Activity log Access control (IAM) Tags Resource visualizer Events Settings Deployments Security Deployment stacks Policies Properties Locks Cost Management Cost analysis

Essentials

Resources Recommendations

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

| Name ↑ | Type | Location |
|--|------------------------|-------------|
| appNSG | Network security group | West Europe |
| appvm | Virtual machine | West Europe |
| appvm_OsDisk_1_351b7cb13f14741a81562c13809f792 | Disk | West Europe |
| appvmNSG | Network security group | West Europe |
| appvmPublicIP | Public IP address | West Europe |
| appvmVMNic | Network Interface | West Europe |
| dbNSG | Network security group | West Europe |
| dbvm | Virtual machine | West Europe |
| appvmVMNic | Network Interface | West Europe |
| dbNSG | Network security group | West Europe |
| dbvm | Virtual machine | West Europe |
| dbvm_OsDisk_1_fd7fd56c8d55479b92faad611ada5804 | Disk | West Europe |
| dbvmNSG | Network security group | West Europe |

Add or remove favorites by pressing Ctrl+Shift+F

Home > Network foundation

Network foundation | Virtual networks Preview

Diagnose connectivity for networks Identify issues across virtual networks Review performance of all Virtual Networks

Search

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

Overview Virtual network Virtual Network overview Virtual networks NAT gateways Public IP addresses Network interfaces Network security groups Application security groups Bastions Route tables Route servers Private Link

Filter for any field... Subscription equals all Resource group equals all Location equals all Add filter

Showing 1 to 1 of 1 records. No grouping List view

| Name ↑↓ | Resource group ↑↓ | Location ↑↓ | Subscription ↑↓ |
|----------|-------------------|-------------|----------------------|
| sunlight | myproject | West Europe | Azure subscription 1 |

< Previous Page 1 of 1 Next >

Give feedback

Add or remove favorites by pressing Ctrl+Shift+F

Home > Network foundation | Virtual networks >

sunlight | Subnets

Virtual network

Analyze connectivity issues in this virtual network

Evaluate routing for this virtual network

Check health of virtual network

Search

+ Subnet Refresh | Manage users Delete Export to CSV

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Resource visualizer

Settings

Address space

Connected devices

Subnets

Bastion

DDoS protection

Firewall

Microsoft Defender for Cloud

Create subnets to segment the virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet.

Search subnets

| | Name ↑ | IPv4 | IPv6 | Available IPs | Delegated to | Security group | Route table | | |
|--------------------------|-----------|-------------|------|---------------|--------------|----------------|-------------|--|--|
| <input type="checkbox"/> | websubnet | 10.0.1.0/24 | - | 250 | - | webNSG | - | | |
| <input type="checkbox"/> | appsubnet | 10.0.2.0/24 | - | 250 | - | appNSG | - | | |
| <input type="checkbox"/> | dbsubnet | 10.0.3.0/24 | - | 250 | - | dbNSG | - | | |

Showing 3 subnets

Give feedback

Add or remove favorites by pressing Ctrl+Shift+F

Home > Resource Manager | Resource groups > myproject >

appNSG

Network security group

How do I create an alert to track firewall metric failures

Analyze security rules for this network security group

Diagnose connectivity issues related to this security group

Search

Move Delete Refresh Give feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Resource visualizer

Settings

Monitoring

Automation

Help

Subscription ID : 8eb51495-d467-41a2-a229-94014c816a0e

Tags (edit) : Add tags

Filter by name

Port == all Protocol == all Source == all Destination == all Action == all

| Priority ↑↓ | Name ↑↓ | Port ↑↓ | Protocol ↑↓ | Source ↑↓ | Destination ↑↓ | Action ↑↓ |
|-------------------------|------------------------|---------|-------------|-------------------|----------------|-----------|
| Inbound Security Rules | | | | | | |
| 100 | AllowWebToApp | 22,80 | Tcp | 10.0.1.0/24 | Any | Allow |
| 200 | AllowSSHFromInt... | 22 | Tcp | Internet | Any | Allow |
| 65000 | AllowVnetInBound | Any | Any | VirtualNetwork | VirtualNetwork | Allow |
| 65001 | AllowAzureLoadBalan... | Any | Any | AzureLoadBalancer | Any | Allow |
| 65500 | DenyAllInBound | Any | Any | Any | Any | Deny |
| Outbound Security Rules | | | | | | |
| 65000 | AllowVnetOutBound | Any | Any | VirtualNetwork | VirtualNetwork | Allow |
| 65001 | AllowInternetOutBound | Any | Any | Any | Internet | Allow |
| 65500 | DenyAllOutBound | Any | Any | Any | Any | Deny |

Add or remove favorites by pressing Ctrl+Shift+F

Home > myproject >

webNSG

Network security group

Analyze security rules for this network security group

How do I create an alert to track firewall metric failures

Diagnose connectivity issues related to this security group

Search

Move Delete Refresh Give feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Resource visualizer

Settings

Monitoring

Automation

Help

Subscription (move) : Azure subscription 1

Subscription ID : 8eb51495-d467-41a2-a229-94014c816a0e

Tags (edit) : Add tags

Filter by name

Port == all

Protocol == all

Source == all

Destination == all

Action == all

| Priority ↑↓ | Name ↑↓ | Port ↑↓ | Protocol ↑↓ | Source ↑↓ | Destination ↑↓ | Action ↑↓ |
|-------------------------|------------------------|---------|-------------|-------------------|----------------|-----------|
| Inbound Security Rules | | | | | | |
| 100 | AllowSSHHTTP | 22,80 | Tcp | Internet | Any | Allow |
| 65000 | AllowVnetInBound | Any | Any | VirtualNetwork | VirtualNetwork | Allow |
| 65001 | AllowAzureLoadBalan... | Any | Any | AzureLoadBalancer | Any | Allow |
| 65500 | DenyAllInBound | Any | Any | Any | Any | Deny |
| Outbound Security Rules | | | | | | |
| 65000 | AllowVnetOutBound | Any | Any | VirtualNetwork | VirtualNetwork | Allow |
| 65001 | AllowInternetOutBound | Any | Any | Any | Internet | Allow |
| 65500 | DenyAllOutBound | Any | Any | Any | Any | Deny |

Add or remove favorites by pressing Ctrl+Shift+F

Home > myproject >

dbvmNSG

Network security group

Retrieve detailed information for troubleshooting security rules

Diagnose connectivity issues related to this security group +1

Search

Move Delete Refresh Give feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Resource visualizer

Settings

Monitoring

Automation

Help

Subscription (move) : Azure subscription 1

Subscription ID : 8eb51495-d467-41a2-a229-94014c816a0e

Tags (edit) : Add tags

Filter by name

Port == all

Protocol == all

Source == all

Destination == all

Action == all

| Priority ↑↓ | Name ↑↓ | Port ↑↓ | Protocol ↑↓ | Source ↑↓ | Destination ↑↓ | Action ↑↓ |
|-------------------------|------------------------|---------|-------------|-------------------|----------------|-----------|
| Inbound Security Rules | | | | | | |
| 1000 | default-allow-ssh | 22 | Tcp | Any | Any | Allow |
| 65000 | AllowVnetInBound | Any | Any | VirtualNetwork | VirtualNetwork | Allow |
| 65001 | AllowAzureLoadBalan... | Any | Any | AzureLoadBalancer | Any | Allow |
| 65500 | DenyAllInBound | Any | Any | Any | Any | Deny |
| Outbound Security Rules | | | | | | |
| 65000 | AllowVnetOutBound | Any | Any | VirtualNetwork | VirtualNetwork | Allow |
| 65001 | AllowInternetOutBound | Any | Any | Any | Internet | Allow |
| 65500 | DenyAllOutBound | Any | Any | Any | Any | Deny |

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What are the requirements for attaching and detaching network interfaces? How can I make this VM secure? +1

Essentials

Network interface : appvmVMNic

Virtual network / sub... : sunlight / appsubnet

Public IP address : 20.61.73.233

Private IP address : 10.0.2.4

Admin security rules : 0 (Configure)

Load balancers : 0 (Configure)

Application security ... : 0 (Configure)

Network security gr... : appvmNSG

Accelerated network... : Disabled

Effective security rules : 0

Rules

Collapse all

Network security group **appNSG** (attached to subnet: appsubnet)
Impacts 1 subnets, 0 network interfaces

+ Create port rule

Search rules

Source == all Destination == all Protocol == all Action == all Port == all

| Priority ↑ | Name | Port | Protocol | Source | Destination | Action |
|------------------------|------|------|----------|--------|-------------|--------|
| Inbound port rules (5) | | | | | | |

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List all my network interfaces for webvm. What are the requirements for attaching or detaching a network interface? How can I make my virtual machine secure? +1

Attach network interface Detach network interface View topology Troubleshoot Refresh Give feedback

Network interface / IP configuration
webvmVMNic (primary) / ipconfigwebvm (primary)

Essentials

Network interface : webvmVMNic

Virtual network / su... : sunlight / websubnet

Public IP address : 20.160.100.184

Private IP address : 10.0.1.4

Admin security rules : 0 (Configure)

Load balancers : 0 (Configure)

Application security ... : 0 (Configure)

Network security gr... : webvmNSG

Accelerate network... : Disabled

Effective security rules : 0

Rules

Collapse all

Network security group **webNSG** (attached to subnet: websubnet)
Impacts 1 subnets, 0 network interfaces

+ Create port rule

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How can I make this VM secure? List all my network interfaces for this VM What are the requirements for attaching and detaching network interfaces? +1

List all my network interfaces for dbvm. What are the requirements for attaching or detaching a network interface? How can I make my virtual machine secure?

Attach network interface Detach network interface View topology Troubleshoot Refresh Give feedback

Network interface / IP configuration
dbvmVMNic (primary) / ipconfigdbvm (primary)

Essentials

Network interface : dbvmVMNic

Virtual network / su... : sunlight / dbsubnet

Public IP address : 20.93.141.5

Private IP address : 10.0.3.4

Admin security rules : 0 (Configure)

Load balancers : 0 (Configure)

Application security ... : 0 (Configure)

Network security gr... : dbvmNSG

Accelerated network... : Disabled

Effective security rules : 0