

AUTOMATION

Create Virtual Machine and Install IIS Server in windows VM, and Apache Server in Linux using ARM and Bicep. Configure the below task using ARM, Bicep: Virtual Networking Peering B/W two VNets.

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1. Introduction

This document provides a comprehensive guide on creating virtual machines (VMs) in Microsoft Azure and installing web servers on them. Specifically, it covers the steps to set up a Windows VM with IIS and a Linux VM with Apache using both ARM templates and Bicep. Additionally, it details the configuration of virtual network peering between two VNets, allowing seamless network communication between the VMs.

2. Prerequisites

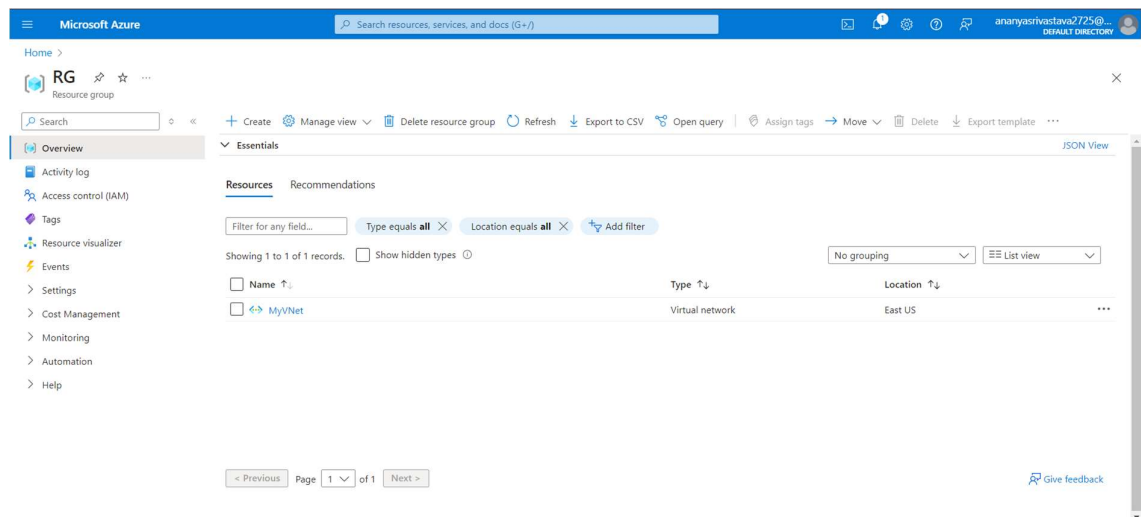
Before proceeding with the tasks outlined in this document, ensure you have the following:

- An active Azure subscription.
- Azure CLI or Azure PowerShell installed and configured.
- Basic knowledge of Azure Resource Manager (ARM) templates and Bicep.

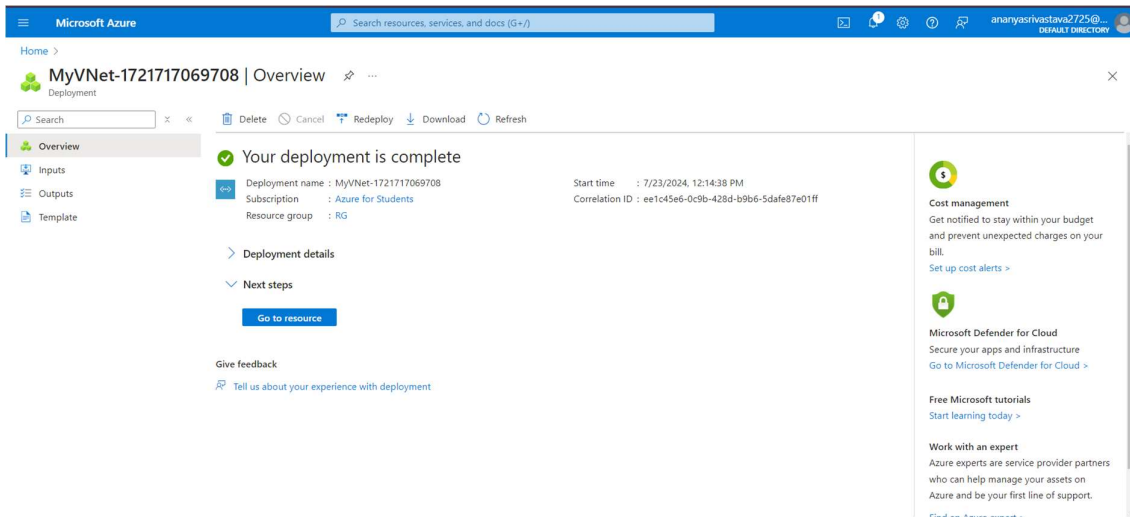
3. Creating Virtual Machines and Installing Web Servers

3.1 Windows VM with IIS

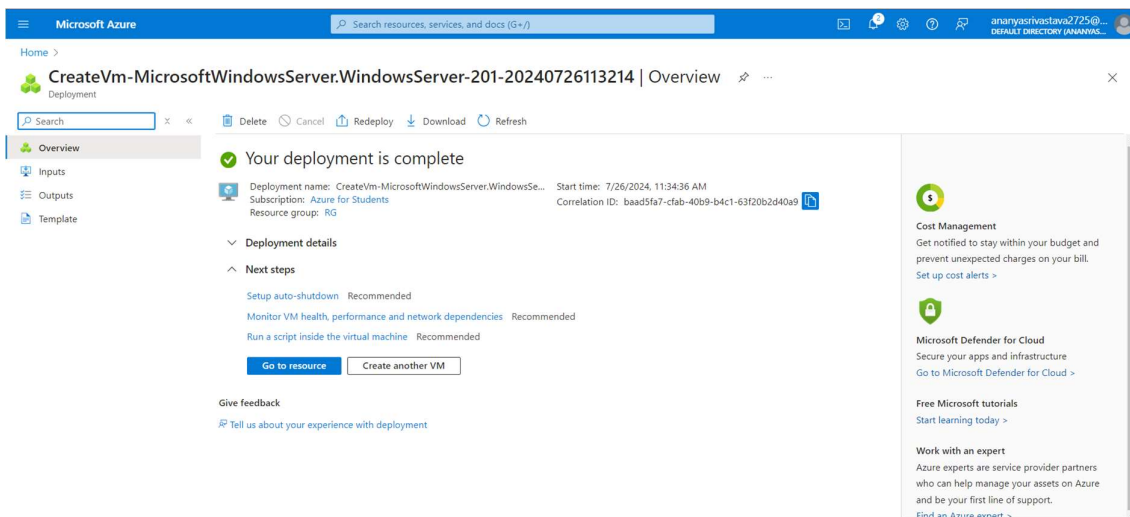
1. Create a Resource Group



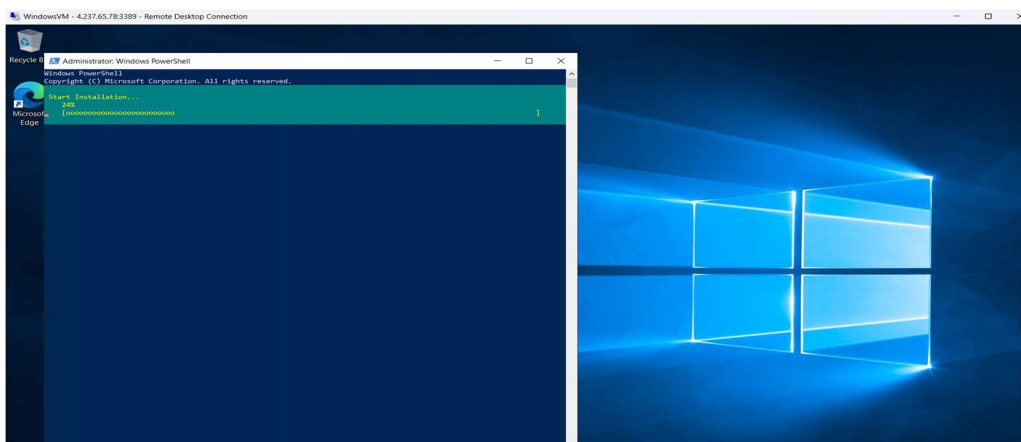
2. Create a Virtual Network

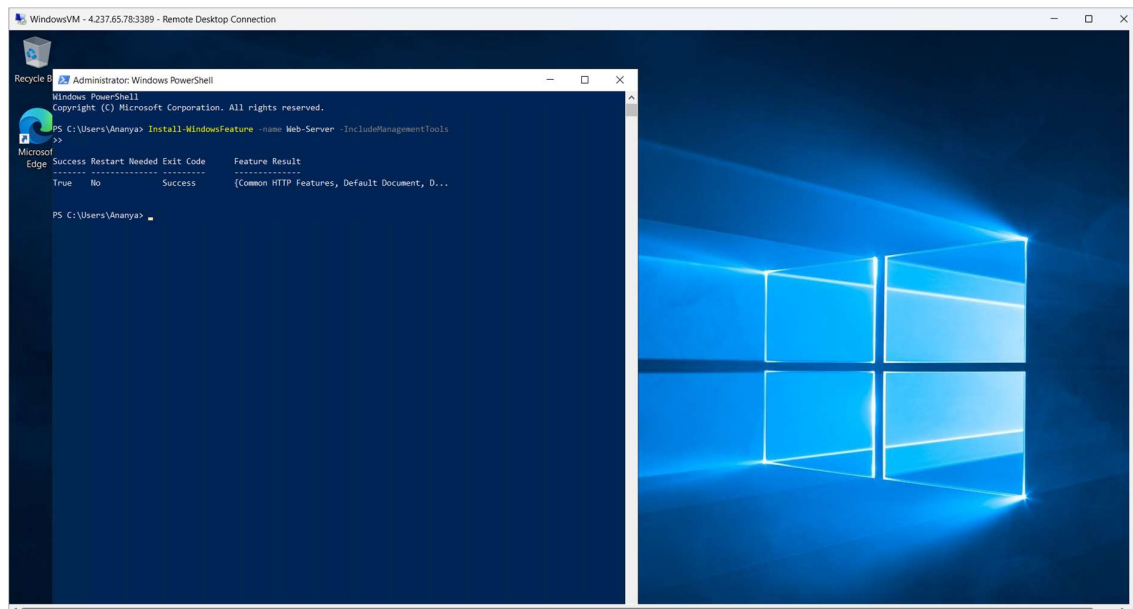


3. Create a Windows VM and Install IIS



4. Install IIS

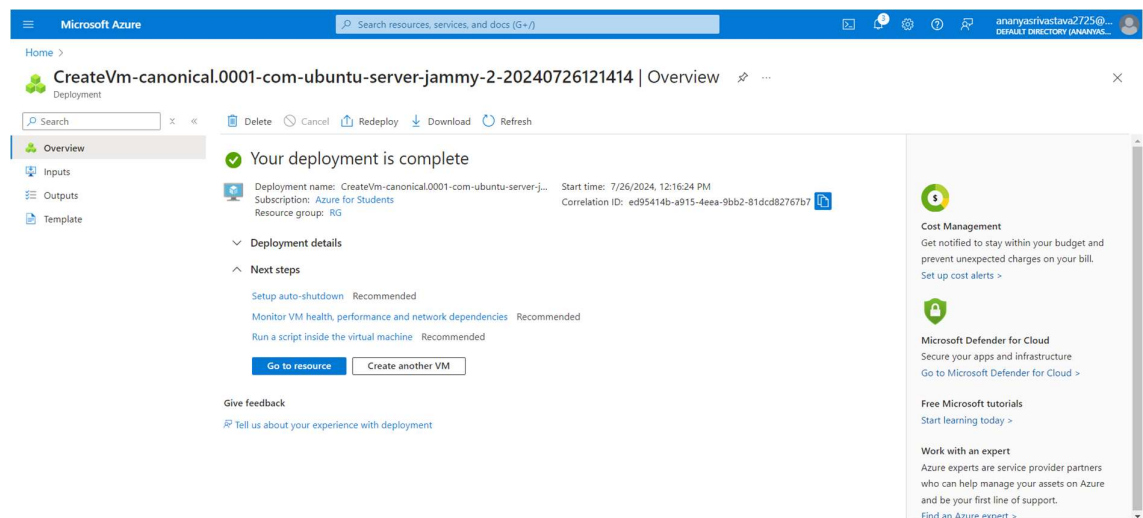




3.2 Create a Linux VM and Install Apache

Linux VM with Apache

1. Create a New VM:



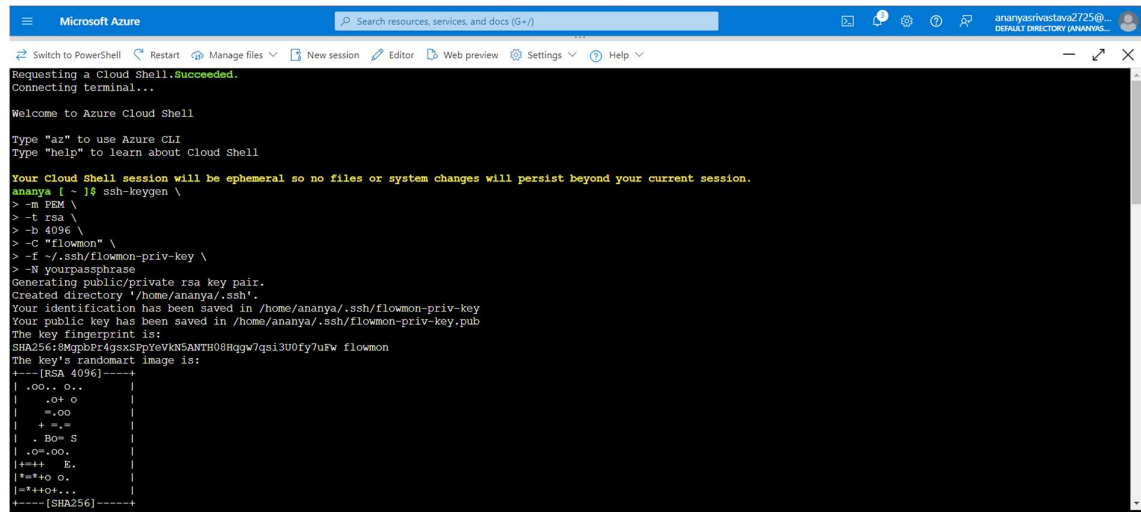
2. Install Apache

```
Ananya@LinuxVM: ~  
Microsoft Windows [Version 10.0.22631.3810]  
(c) Microsoft Corporation. All rights reserved.  
  
C:\Users\Hp>ssh azure ananya@4.198.171.200  
ssh: Could not resolve hostname azure: No such host is known.  
  
C:\Users\Hp>ssh azure Ananya@4.198.171.200  
ssh: Could not resolve hostname azure: No such host is known.  
  
C:\Users\Hp>ssh Ananya@4.198.171.200  
The authenticity of host '4.198.171.200 (4.198.171.200)' can't be established.  
ED25519 key fingerprint is SHA256:spvNzWPoEXVIFvI+nVMds9c5g20rfN02oxtyLB/VyE.  
This key is not known by any other names  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '4.198.171.200' (ED25519) to the list of known hosts.  
Ananya@4.198.171.200's password:  
Permission denied, please try again.  
Ananya@4.198.171.200's password:  
Welcome to Ubuntu 22.04.4 LTS (GNU/Linux 6.5.0-1024-azure x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/pro  
  
System information as of Fri Jul 26 06:55:28 UTC 2024  
  
System load:  0.0               Processes:    115  
Usage of /:   5.1% of 28.89GB   Users logged in:  0  
Memory usage: 3%               IPv4 address for eth0: 10.0.0.5  
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.
```

```
Ananya@LinuxVM: ~  
Ananya@LinuxVM:~$ sudo apt update  
sudo apt install apache2 -y  
Hit:1 http://azure.archive.ubuntu.com/ubuntu jammy InRelease  
Get:2 http://azure.archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]  
Get:3 http://azure.archive.ubuntu.com/ubuntu jammy-backports InRelease [127 kB]  
Get:4 http://azure.archive.ubuntu.com/ubuntu jammy-security InRelease [129 kB]  
Get:5 http://azure.archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [14.1 MB]  
Get:6 http://azure.archive.ubuntu.com/ubuntu jammy/universe Translation-en [5652 kB]  
Get:7 http://azure.archive.ubuntu.com/ubuntu jammy/universe amd64 c-n-f Metadata [286 kB]  
Get:8 http://azure.archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [217 kB]  
Get:9 http://azure.archive.ubuntu.com/ubuntu jammy/multiverse Translation-en [112 kB]  
Get:10 http://azure.archive.ubuntu.com/ubuntu jammy/multiverse amd64 c-n-f Metadata [8372 B]  
Get:11 http://azure.archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1888 kB]  
Get:12 http://azure.archive.ubuntu.com/ubuntu jammy-updates/main Translation-en [337 kB]  
Get:13 http://azure.archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [2238 kB]  
Get:14 http://azure.archive.ubuntu.com/ubuntu jammy-updates/restricted Translation-en [384 kB]  
Get:15 http://azure.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1188 kB]  
Get:16 http://azure.archive.ubuntu.com/ubuntu jammy-updates/universe Translation-en [258 kB]  
Get:17 http://azure.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 c-n-f Metadata [26.4 kB]  
Get:18 http://azure.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [43.3 kB]  
Get:19 http://azure.archive.ubuntu.com/ubuntu jammy-updates/multiverse Translation-en [10.8 kB]  
Get:20 http://azure.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 c-n-f Metadata [444 B]  
Get:21 http://azure.archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [67.1 kB]  
Get:22 http://azure.archive.ubuntu.com/ubuntu jammy-backports/main Translation-en [11.8 kB]  
Get:23 http://azure.archive.ubuntu.com/ubuntu jammy-backports/main amd64 c-n-f Metadata [388 B]  
Get:24 http://azure.archive.ubuntu.com/ubuntu jammy-backports/restricted amd64 c-n-f Metadata [116 B]  
Get:25 http://azure.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [28.8 kB]  
Get:26 http://azure.archive.ubuntu.com/ubuntu jammy-backports/universe Translation-en [16.5 kB]  
Get:27 http://azure.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 c-n-f Metadata [672 B]  
Get:28 http://azure.archive.ubuntu.com/ubuntu jammy-backports/multiverse amd64 c-n-f Metadata [116 B]  
Get:29 http://azure.archive.ubuntu.com/ubuntu jammy-security/main amd64 Packages [1673 kB]  
Get:30 http://azure.archive.ubuntu.com/ubuntu jammy-security/main Translation-en [279 kB]  
Get:31 http://azure.archive.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [2171 kB]  
Get:32 http://azure.archive.ubuntu.com/ubuntu jammy-security/restricted Translation-en [372 kB]  
Get:33 http://azure.archive.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [886 kB]  
Get:34 http://azure.archive.ubuntu.com/ubuntu jammy-security/universe Translation-en [173 kB]  
Get:35 http://azure.archive.ubuntu.com/ubuntu jammy-security/universe amd64 c-n-f Metadata [18.9 kB]  
Get:36 http://azure.archive.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [37.2 kB]  
Get:37 http://azure.archive.ubuntu.com/ubuntu jammy-security/multiverse Translation-en [7588 B]
```

Linux VM with Apache (Bicep)

1. **Create a Resource Group:** Create a resource group if not already created.
2. **Define the Bicep Template:** Develop a Bicep template for the Linux VM, detailing the network configuration and VM properties.
3. **Deploy the Template:** Deploy the Bicep template using Azure CLI, setting up the Linux VM and installing Apache.



```
Microsoft Azure
Search resources, services, and docs (G+/)
ananyasrivastava2725@...
DEFAULT DIRECTORY (ANANYAS...)

Switch to PowerShell Restart Manage files New session Editor Web preview Settings Help

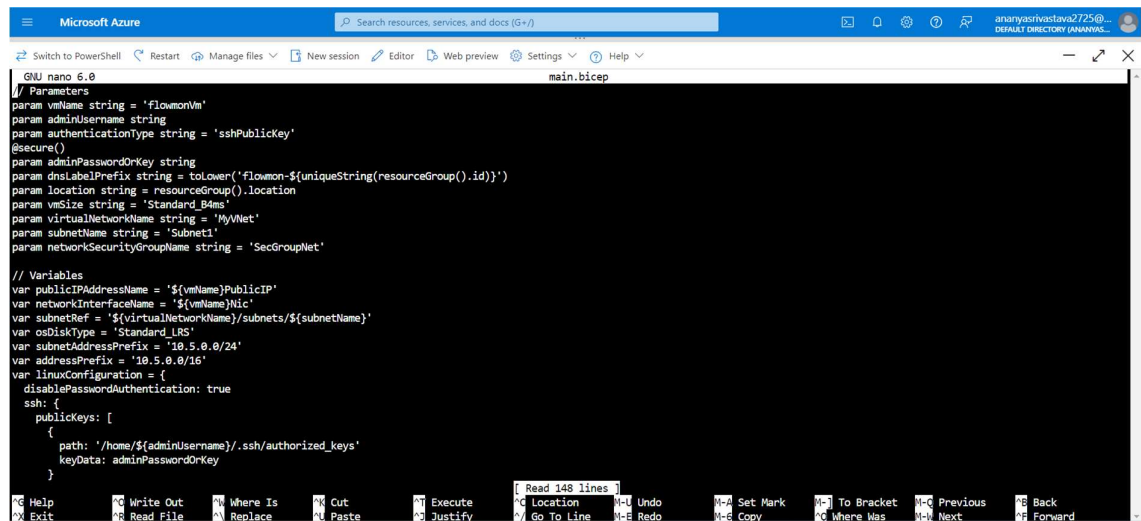
Requesting a cloud shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

Your Cloud Shell session will be ephemeral so no files or system changes will persist beyond your current session.

ananya [ ~ ]$ ssh-keygen \
> -m PEM \
> -t rsa \
> -b 4096 \
> -C "flowmon" \
> -f ~/.ssh/flowmon-priv-key \
> -N yourpassphrase
Generating public/private rsa key pair.
Created directory /home/ananya/.ssh/.
Your identification has been saved in /home/ananya/.ssh/flowmon-priv-key
Your public key has been saved in /home/ananya/.ssh/flowmon-priv-key.pub
The key fingerprint is:
SHA256:8MpbPr4gxSPryeVKN5ANTH08Hqgw7qsl3U0fy7uFW flowmon
The key's randomart image is:
+----[RSA 4096]-----+
| .OO.. O.. |
| .O+ O |
| =.OO |
| + .- |
| .BQ= S |
| .O=.OO. |
| +++++ E. |
|*=+O O. |
|+++=+... |
+----[SHA256]-----+
```



```
Microsoft Azure
Search resources, services, and docs (G+/)
ananyasrivastava2725@...
DEFAULT DIRECTORY (ANANYAS...)

Switch to PowerShell Restart Manage files New session Editor Web preview Settings Help

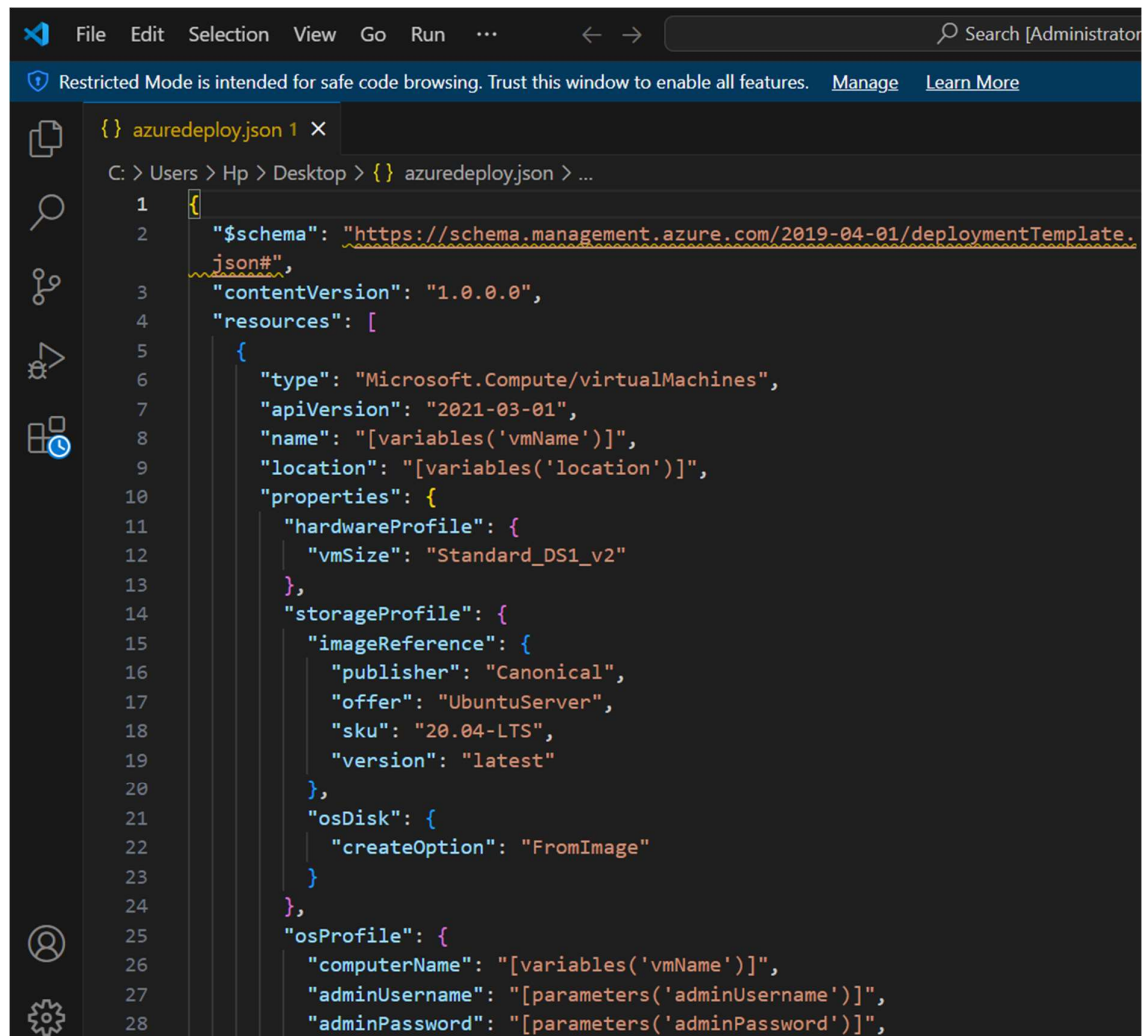
GNU nano 6.0 main.bicep
// Parameters
param vmName string = 'flowmonVm'
param adminUsername string
param authenticationType string = 'sshPublicKey'
@secure()
param adminPasswordOrKey string
param dnsLabelPrefix string = toLower('flowmon-${uniqueString(resourceGroup().id)}')
param location string = resourceGroup().location
param vmSize string = 'Standard_B4ms'
param virtualNetworkName string = 'MyVNet'
param subnetName string = 'Subnet1'
param networkSecurityGroupName string = 'SecGroupNet'

// Variables
var publicIPAddressName = '${vmName}PublicIP'
var networkInterfaceName = '${vmName}Nic'
var subnetRef = '${virtualNetworkName}/subnets/${subnetName}'
var osDiskType = 'Standard_LRS'
var subnetAddressPrefix = '10.5.0.0/24'
var addressPrefix = '10.5.0.0/16'
var linuxConfiguration = {
  disablePasswordAuthentication: true
  ssh: {
    publicKeys: [
      {
        path: '/home/${adminUsername}/.ssh/authorized_keys'
        keyData: adminPasswordOrKey
      }
    ]
  }
}
```

Linux VM with Apache (ARM)

1. Create the ARM Template

- Step 1: Open a Text Editor
- Step 2: Define the ARM Template
- Step 3: Save the File



```
{
  "$schema": "https://schema.management.azure.com/2019-04-01/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "resources": [
    {
      "type": "Microsoft.Compute/virtualMachines",
      "apiVersion": "2021-03-01",
      "name": "[variables('vmName')]",
      "location": "[variables('location')]",
      "properties": {
        "hardwareProfile": {
          "vmSize": "Standard_DS1_v2"
        },
        "storageProfile": {
          "imageReference": {
            "publisher": "Canonical",
            "offer": "UbuntuServer",
            "sku": "20.04-LTS",
            "version": "latest"
          },
          "osDisk": {
            "createOption": "FromImage"
          }
        },
        "osProfile": {
          "computerName": "[variables('vmName')]",
          "adminUsername": "[parameters('adminUsername')]",
          "adminPassword": "[parameters('adminPassword')]"
        }
      }
    }
  ]
}
```

2. Create the Installation Script

- Step 1: Open a Text Editor
- Step 2: Add the Script Content
- Add the following content to the file:


```
bash
Copy code
#!/bin/bash
sudo apt-get update
sudo apt-get install -y apache2
sudo systemctl start apache2
sudo systemctl enable apache2
```

- Step 3: Save and Upload

4. Deploy the ARM Template

- Using Azure CLI:

1. Open a terminal or command prompt.
2. Run the following command:

```
sh
Copy code
az deployment group create --resource-group <your-resource-group> --
template-file azuredeploy.json
```

- Using PowerShell:

1. Open PowerShell.
2. Run the following command:

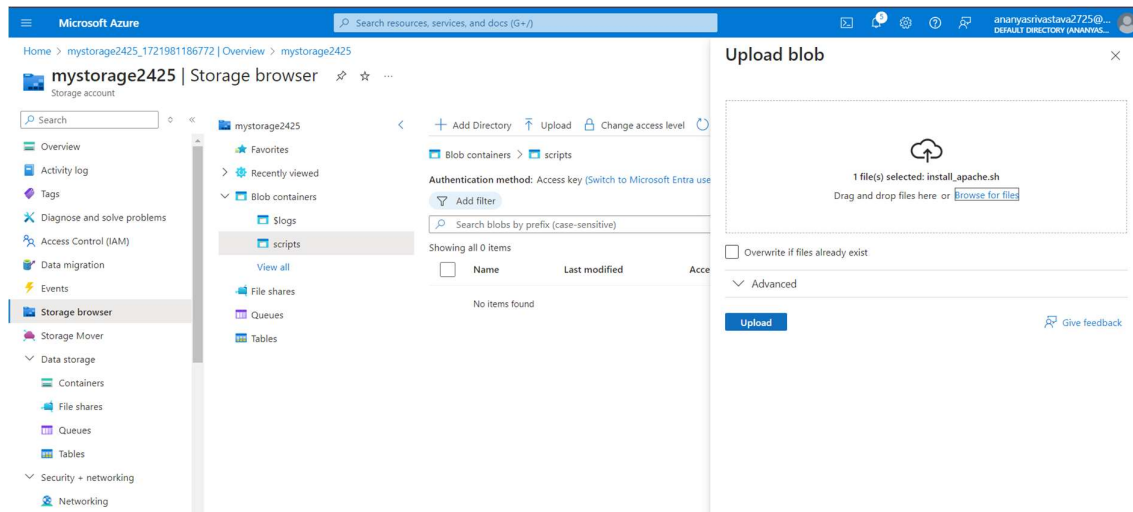
```
powershell
Copy code
New-AzResourceGroupDeployment -ResourceGroupName <RG> -TemplateFile
azuredeploy.json
```

3. Install Apache Server on the VM

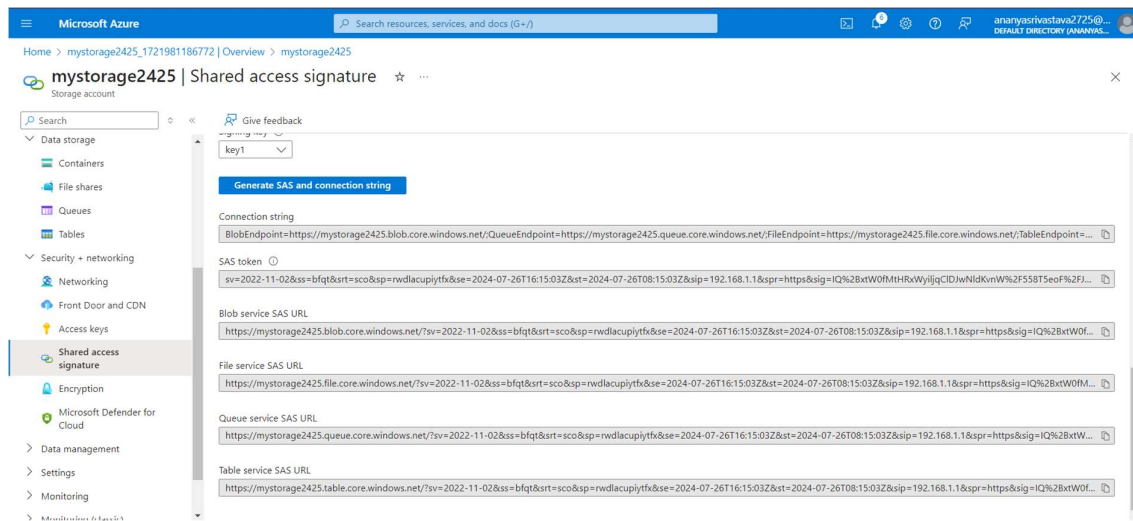
- Add a Custom Script Extension to the ARM Template:
- 'install_apache.sh' Script
- Upload the Script to Azure Storage Account

The screenshot displays the Microsoft Azure portal interface. At the top, the navigation bar shows 'Microsoft Azure' and a search bar. Below the navigation bar, the breadcrumb trail indicates 'Home > mystorage2425_1721981186772 | Overview'. The main content area shows a deployment overview for the resource group 'mystorage2425_1721981186772'. A green checkmark icon and the text 'Your deployment is complete' are prominently displayed. Below this, the deployment details are listed: 'Deployment name: mystorage2425_1721981186772', 'Subscription: Azure for Students', and 'Resource group: RG'. The start time is '7/26/2024, 1:36:46 PM' and the correlation ID is 'c2eb087e-bd5c-44e9-8a96-e8cabeffd4c0'. A 'Go to resource' button is visible. On the right side, there are several informational cards: 'Cost Management' (Get notified to stay within your budget and prevent unexpected charges on your bill), 'Microsoft Defender for Cloud' (Secure your apps and infrastructure), 'Free Microsoft tutorials' (Start learning today), and 'Work with an expert' (Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support).

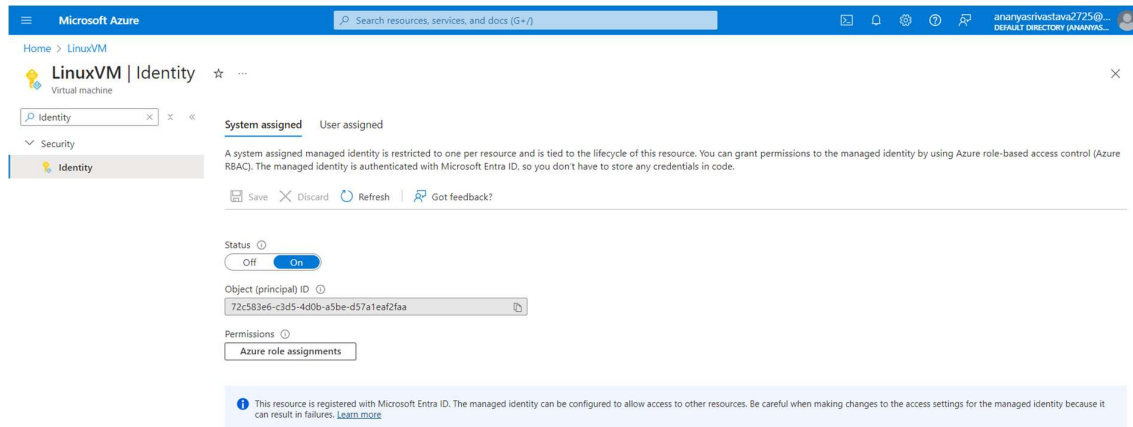
- Access the Blob Container



- Configure Access with a Shared Access Signature (SAS) Token

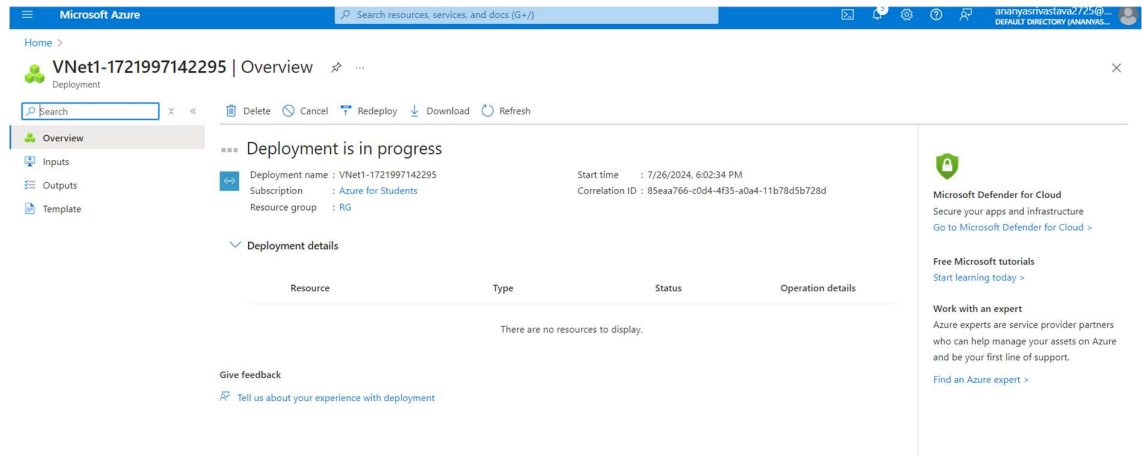


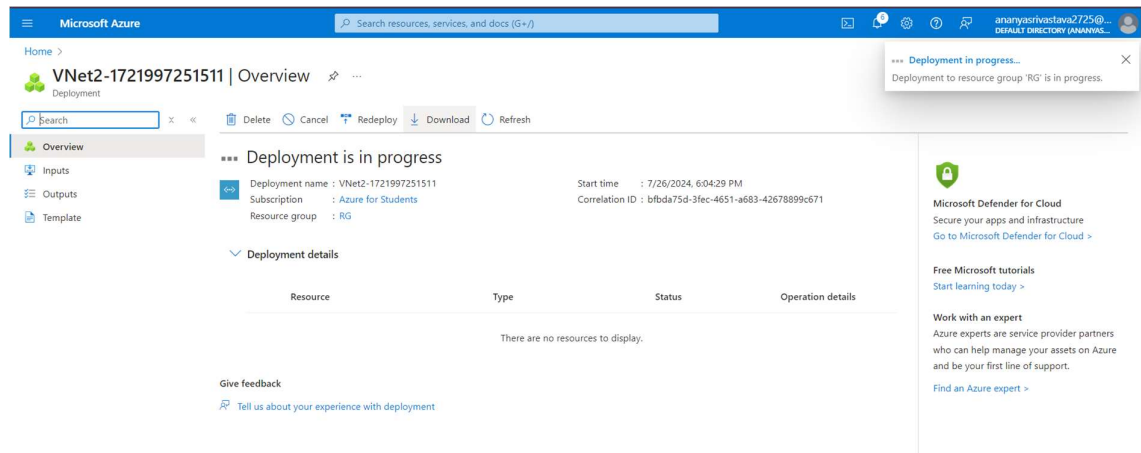
- Ensure MSI is Enabled:



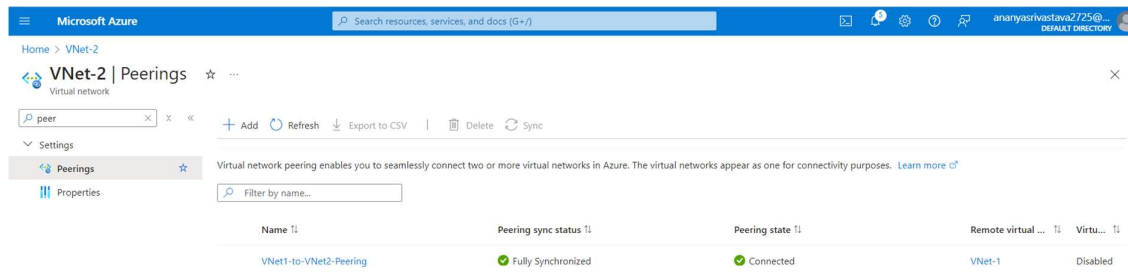
4. Configuring Virtual Network Peering

- **Navigate to Virtual Networks:** In the Azure Portal, go to "Virtual networks."
- **Select the First VNet:**
 - Click on the virtual network.





- Go to "Peerings" under "Settings" and click "Add."
- Enter a name for the peering.
- Select the second VNet for peering.
- Configure the peering settings:
 - **Allow virtual network access:** Enable.
 - **Allow forwarded traffic:** Enable if needed.
 - **Allow gateway transit:** Enable if needed.
 - **Use remote gateways:** Enable if needed.
- Click "OK" to create the peering.



5. References

- Microsoft Azure Documentation - <https://learn.microsoft.com/en-us/azure/?product=popular>
- Azure Resource Manager Templates - <https://learn.microsoft.com/en-us/azure/azure-resource-manager/templates/overview>
- Bicep Documentation - <https://learn.microsoft.com/en-us/azure/azure-resource-manager/bicep/>
- Youtube- <https://youtu.be/eeBm2H1Yuok?si=znFYR3ax6ujzLCkM>