

MAJOR PROJECT

NAME- RISHAL PANDA

ROLL NO.: - 25/CC-T8/AUG-6370

SUB:- CLOUD COMPUTING

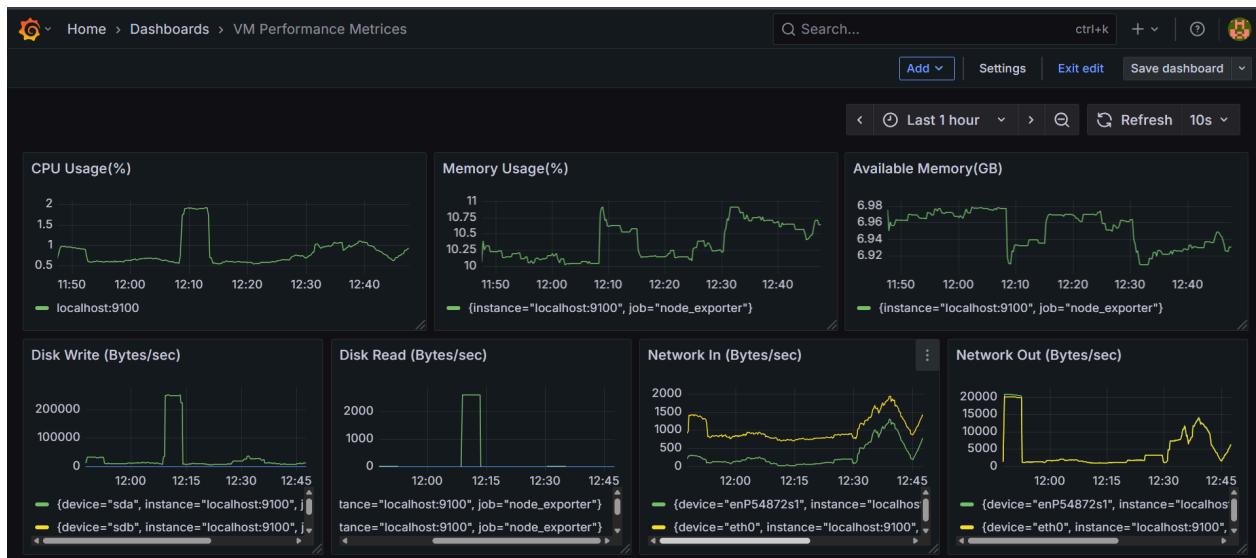
Task 1: Grafana Dashboard for VM Metrics

Create a Grafana dashboard and analyze the performance metrics of your Azure VM.

Expected Output: CPU, memory, disk & network metrics visible in Grafana.

Ans: Provided the link of my Dashboard below.

<http://74.225.200.115:3000/d/ad97m4q/vm-performance-metrics?orgId=1&from=now-1h&to=now&timezone=browser&refresh=10s>



VM PERFORMANCE METRICE

Task 2: Website Deployment using Azure App Service

Deploy a sample website using Azure App Service.

Expected Output: Website accessible via Azure App Service URL.

Ans:

The screenshot shows the Microsoft Azure portal interface for App Services. At the top, there's a navigation bar with 'Microsoft Azure' and a search bar. Below it, the 'App Services' section is visible. A message indicates the user is viewing a new version of the experience. The main area shows a table with one row of data:

Name	Status	Location	Pricing Tier	App Service Plan	Subscription	App Type
Rishal-WebPage	Running	Central India	Free	ASP-MyProjectRG-1	Azure for Students	Web App

At the bottom, it says 'Showing 1 - 1 of 1. Display count: auto' and has a 'Give feedback' link.

Azure Portal - App Service Overview

- Showing the App Service name.
- Showing status as "Running."

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the Microsoft Azure logo, a search bar with the placeholder "Search resources, services, and docs (G+)", and a Copilot button. The top right corner shows the user's email address "pandarishal568@gmail.com" and the "DEFAULT DIRECTORY".

The main content area is titled "App Services" under "Default Directory". On the left, there is a list of services with "Rishal-WebPage" selected. A message box indicates: "You are viewing a new version of Browse experience. Click here to access the old experience." Below this, there are two filter options: "Name ↑" and "Rishal-WebPage".

The main panel displays the "Rishal-WebPage" web app details. At the top, there are several actions: "Browse", "Stop", "Swap", "Restart", "Delete", "Refresh", "Download publish profile", "Reset publish profile", and "..." (More). To the right of these actions is a "JSON View" link.

The "Essentials" section provides key information:

Resource group	Default domain
MyProject-RG	rishal-webpage-bugzfhcubge6d5a6.centralindia-01.azurewebsite...

Other details include:

Status	App Service Plan
Running	ASP-MyProjectRG-9cd4 (F1: 1)

Location	Operating System
Central India	Linux

Subscription	Health Check
Azure for Students	Not Configured

Subscription ID: e41b0d37-a090-4174-a0fc-abd1f682ed0a

Tags: [Tags \(edit\)](#) [Add tags](#)

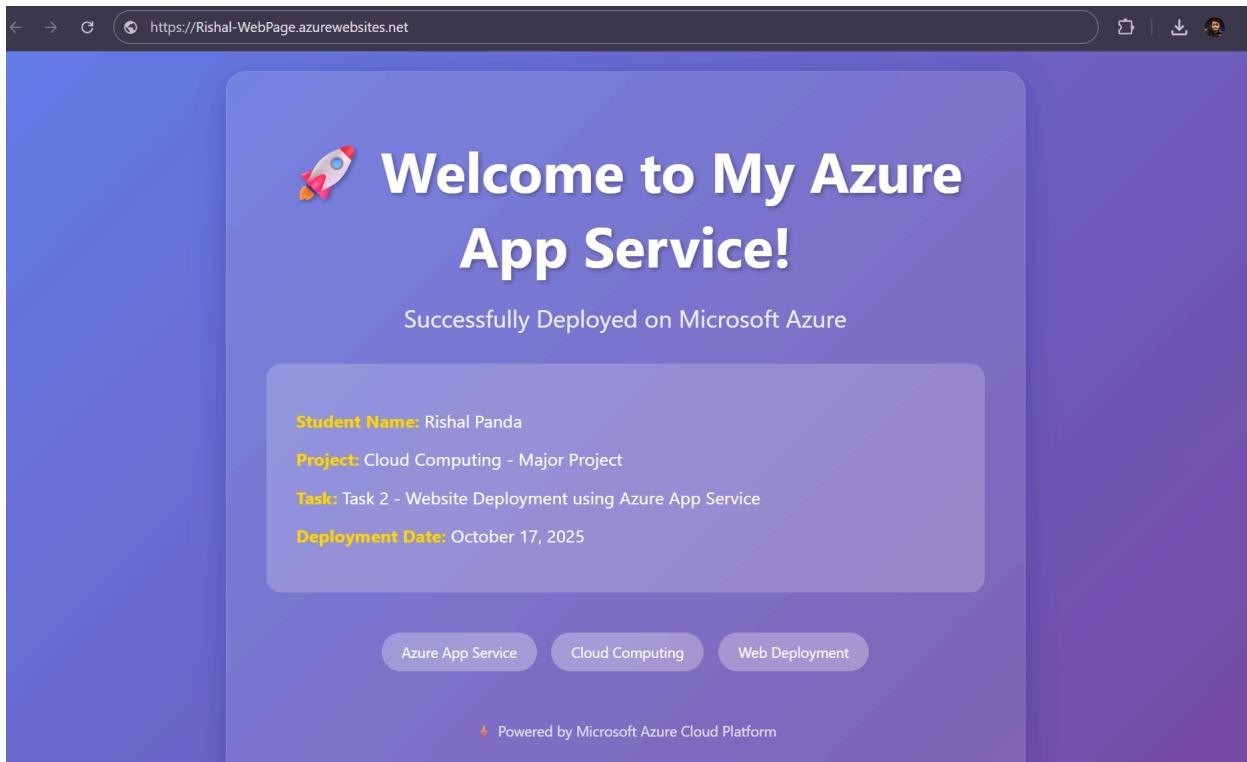
The "Properties" tab is selected, showing the following configuration:

Web app
Name: Rishal-WebPage
Publishing model: Code
Runtime Stack: Node - 20-lts

Below the properties, there is a "Domains" section.

Azure Portal–Web page Overview

- Showing the URL/Default domain
- Showing status as "Running"



Website in Browser

- Showing the full website
- The URL is visible in the address bar
- It displays My name and project info

Task 3: VM Backup using Recovery Services Vault

Configure a backup for your VM using Recovery Vault and perform a backup operation.

Expected Output: Backup job completed successfully and restore option available.

Ans: We'll configure backup for your Azure VM so you can restore it if needed. This involves creating a Recovery Services Vault, enabling backup, and performing a backup operation.

Step-1

The screenshot shows the Microsoft Azure portal interface for a Recovery Services vault named "Rishal-RecoveryVault". The left sidebar contains navigation links for Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Resource visualizer, Settings, Getting started, Protected items, Backup items, and Replicated items. The main content area displays "Backup Jobs" with 0 In progress and 0 Failed jobs. Below this is the "Usage" section, which includes "Backup items" (1 item) and "Backup Storage" (Cloud - LRS: 0 B, Cloud - GRS: 7.26 GB, Cloud - ZRS: 0 B, Cloud - RAGRS: 0 B, Archive - LRS: 0 B, Archive - GRS: 0 B). A promotional message at the top right encourages trying Azure Backup for SQL.

Recovery Services Vault Overview

STEP-2

The screenshot shows the Microsoft Azure portal interface for the "Backup items" section of the "Rishal-RecoveryVault" Recovery Services vault. The left sidebar is identical to the previous screenshot. The main content area displays a table of backup management types and their counts: Azure Virtual Machine (1), Azure Backup Agent (0), Azure Backup Server (0), DPM (0), Azure Storage (Azure Files) (0), SQL Database in Azure VM (0), SAP HANA in Azure VM (0), and SAP ASE (Sybase) in Azure VM (0). Navigation buttons for Primary Region and Secondary Region are visible above the table.

VM listed with backup status

STEP-3

The screenshot shows the Microsoft Azure portal interface for a backup item named "RishalVM". The "Essentials" section provides basic information about the vault, subscription, and backup policy. Below this, the "Recovery points" section lists three recovery points, each with a green bar indicating "FILE SYSTEM CONSISTENT". The table details the creation time, consistency type, recovery type, and expiry time for each point.

Creation time ↑	Consistency	Recovery type	Expiry time
10/19/2025, 1:40:44 PM	File-system Consistent	Snapshot and Vault-Standard	...
10/18/2025, 1:41:02 PM	File-system Consistent	Snapshot and Vault-Standard	...
10/17/2025, 8:48:07 PM	File-system Consistent	Vault-Standard	11/16/2025, 3:17:53 PM

- **Restore Successfully:** Showing the job with status "Completed" Showing start time, end time, duration

Step-4

The screenshot shows the "Restore Virtual Machine" configuration page. It starts with a summary of the restore point and data store. The "Restore configuration" section allows selecting the restore target (Create new or Replace existing). Below this, detailed configuration fields are shown for restore type, virtual machine name, subscription, resource group, virtual network, and subnet. A note at the bottom suggests using PowerShell cmdlets for alternate configurations.

- **Restore VM Option:** This proves restore option is available and the task is completed successfully.

Task 4: Azure Blob Storage

Create Azure Blob/Container Storage and mount it over Linux/Windows VM.

Expected Output: Blob container mounted and accessible from VM.

Ans: We'll create an Azure Storage Account, create a Blob Container, and mount it on your Linux VM so you can access it like a local folder.

STEP-1:

The screenshot shows the Microsoft Azure portal's Overview page for a storage account named "rishalstorage".

Storage Account Details:

- Resource group (move):** MyProject-RG
- Location:** centralindia
- Subscription (move):** Azure for Students
- Subscription ID:** e41b0d37-a090-4174-a0fc-abd1f682ed0a
- Disk state:** Available
- Tags (edit):** Add tags

Blob service settings:

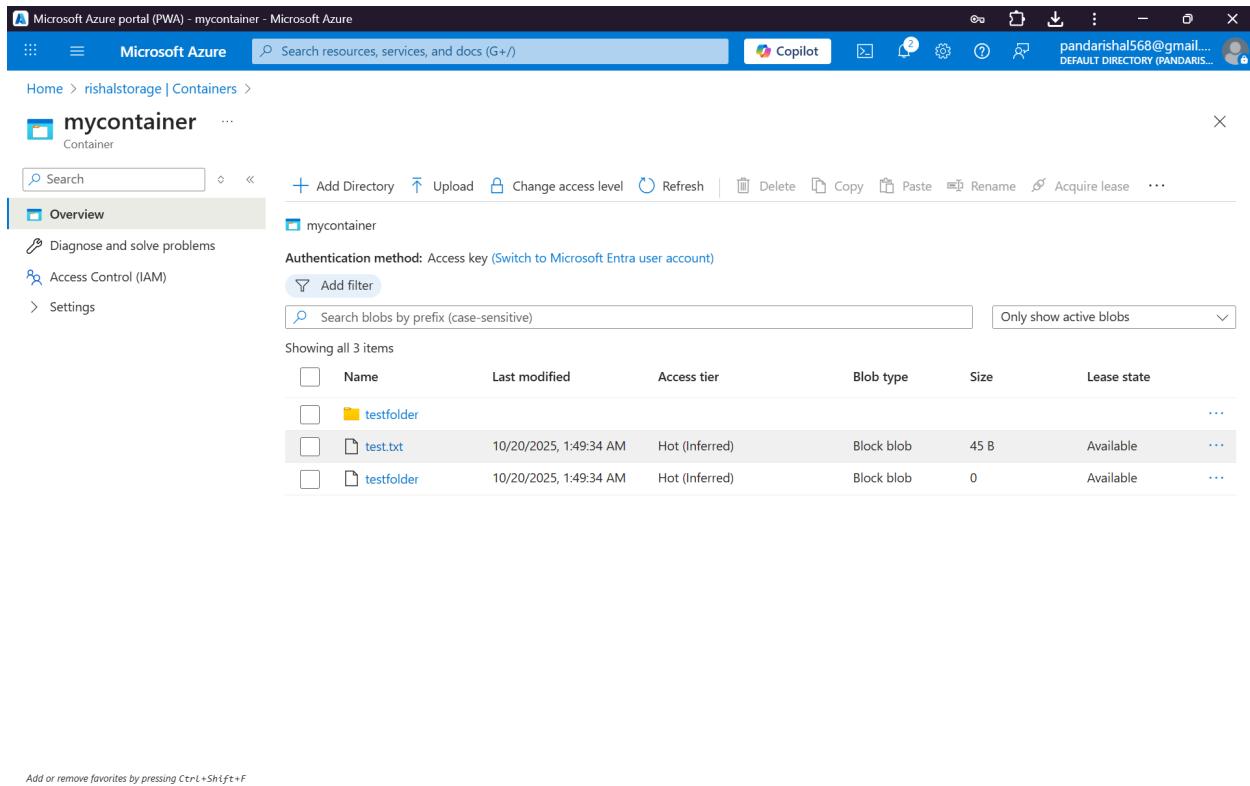
Setting	Status
Hierarchical namespace	Disabled
Default access tier	Hot
Blob anonymous access	Disabled
Blob soft delete	Enabled (7 days)
Container soft delete	Enabled (7 days)
Versioning	Disabled
Change feed	Disabled
NFS v3	Disabled

Networking settings:

Setting	Status
Require secure transfer for REST API operations	Enabled
Storage account key access	Enabled
Minimum TLS version	Version 1.2
Infrastructure encryption	Disabled
Public network access	Enabled
Public network access scope	Enable from all networks

Storage Account in Azure Portal—Overview

STEP-2:

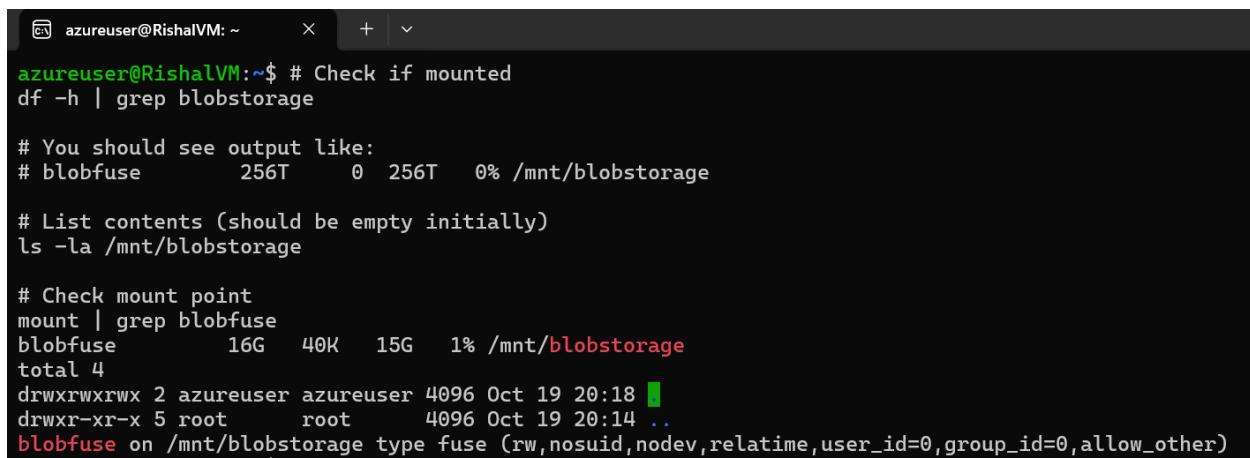


The screenshot shows the Microsoft Azure portal interface for a blob storage container named 'mycontainer'. The left sidebar has 'Overview' selected. The main area shows a table of items:

	Name	Last modified	Access tier	Blob type	Size	Lease state	...
	test.txt	10/20/2025, 1:49:34 AM	Hot (Inferred)	Block blob	45 B	Available	...
	testfolder	10/20/2025, 1:49:34 AM	Hot (Inferred)	Block blob	0	Available	...

- **Blob Container:** Showing the test.txt file and testfolder created successfully.

STEP-3:



```
azureuser@RishalVM:~$ # Check if mounted
df -h | grep blobstorage

# You should see output like:
# blobfuse      256T      0  256T   0% /mnt/blobstorage

# List contents (should be empty initially)
ls -la /mnt/blobstorage

# Check mount point
mount | grep blobfuse
blobfuse      16G    40K   15G   1% /mnt/blobstorage
total 4
drwxrwxrwx 2 azureuser azureuser 4096 Oct 19 20:18 [redacted]
drwxr-xr-x 5 root      root      4096 Oct 19 20:14 ..
blobfuse on /mnt/blobstorage type fuse (rw,nosuid,nodev,relatime,user_id=0,group_id=0,allow_other)
```

VM Terminal: Mount Verification in my SSH session, running and showing the output successfully.

STEP-4:

```
azureuser@RishalVM: ~      + | x
ls -la /mnt/blobstorage
# Check mount point
mount | grep blobfuse
blobfuse      16G   40K   1% /mnt/blobstorage
total 4
drwxrwxrwx 2 azureuser azureuser 4096 Oct 19 20:18 .
drwxr-xr-x 5 root      root     4096 Oct 19 20:14 ..
blobfuse on /mnt/blobstorage type fuse (rw,nosuid,nodev,relatime,user_id=0,group_id=0,allow_other)
azureuser@RishalVM:~$ # Create a test file
echo "Hello from Azure Blob Storage - Rishal Panda" | sudo tee /mnt/blobstorage/test.txt

# Verify file was created
ls -l /mnt/blobstorage/
# Read the file
cat /mnt/blobstorage/test.txt

# Create a directory
sudo mkdir /mnt/blobstorage/testfolder

# Create another file
echo "This is Task 4 - Blob Storage" | sudo tee /mnt/blobstorage/testfolder/info.txt

# List everything
ls -lR /mnt/blobstorage/
Hello from Azure Blob Storage - Rishal Panda
total 4
-rw-rw-rwx 1 root root 45 Oct 19 20:19 test.txt
Hello from Azure Blob Storage - Rishal Panda
This is Task 4 - Blob Storage
/mnt/blobstorage/:
total 8
-rw-rw-rwx 1 root root 45 Oct 19 20:19 test.txt
drwxrwxrwx 2 root root 4096 Oct 19 20:19 testfolder
/mnt/blobstorage/testfolder:
total 4
-rw-rw-rwx 1 root root 30 Oct 19 20:19 info.txt
azureuser@RishalVM:~$ |
```

VM Terminal: (i) Directory Listing—showing test.txt and testfolder.
(ii) File Contents—showing file contents.

STEP-5:

The screenshot shows the Microsoft Azure portal interface for a blob named 'test.txt' located in the 'mycontai' container. The 'Overview' tab is selected. Key details shown include:

- URL:** https://rishalstorage.blob.core.windows.net/test.txt
- LAST MODIFIED:** 10/20/2025, 1:49:34 AM
- CREATION TIME:** 10/20/2025, 1:49:34 AM
- VERSION ID:** -
- TYPE:** Block blob
- SIZE:** 45 B
- ACCESS TIER:** Hot (Inferred)
- ACCESS TIER LAST MODIFIED:** N/A
- ARCHIVE STATUS:** -
- REHYDRATE PRIORITY:** -
- SERVER ENCRYPTED:** true
- ETAG:** 0x8DE0F4CD1DFA271
- VERSION-LEVEL IMMUTABILITY POLICY:** Disabled
- CACHE-CONTROL:** (empty)
- CONTENT-TYPE:** application/octet-stream
- CONTENT-MDS:** ZnQ+JmNlq03nBeX1b5DV9...
- CONTENT-ENCODING:** (empty)
- CONTENT-LANGUAGE:** (empty)
- CONTENT-DISPOSITION:** (empty)

At the bottom, it shows 'LEASE STATUS: Unlocked'.

Azure Portal: File download option available, showing along with the file details (size, last modified, etc.)

- **This confirms blob storage is mounted and working successfully.**

Task 5: Azure File Share (38 GB Quota)

Create an Azure File Share with a quota of 38 GB and mount it on a Linux VM using SMB protocol.

Expected Output: File Share mounted successfully and accessible from Linux VM

Ans:

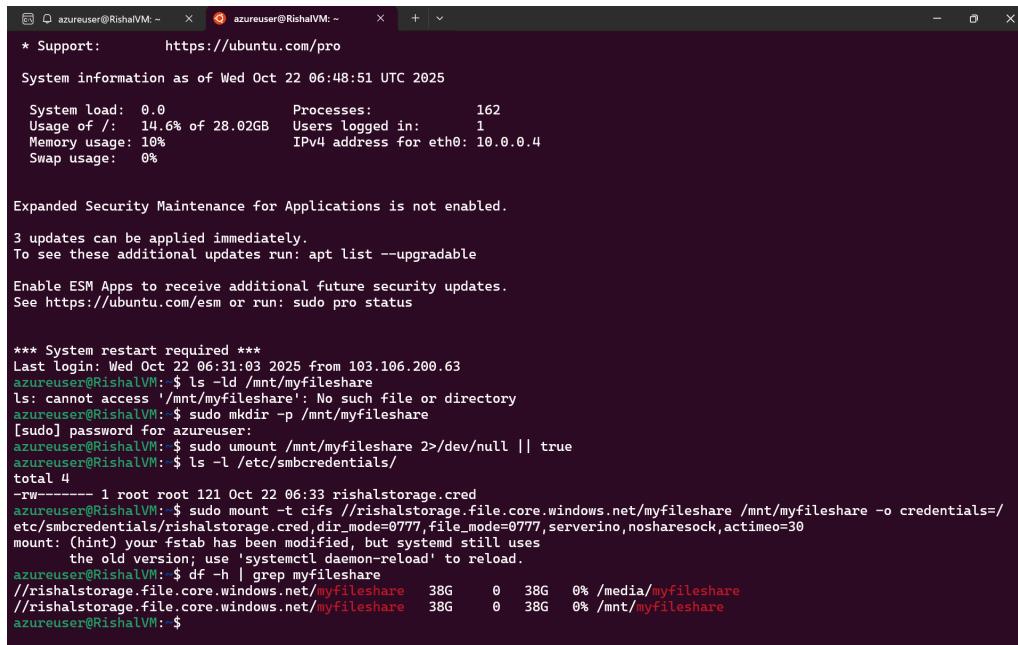
STEP-1:

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes 'Microsoft Azure', a search bar, and user information. Below the header, the URL 'Home > rishalstorage' is visible. The main content area is titled 'rishalstorage | File shares'. A 'File share settings' card is open, showing 'Identity-based access: Not configured', 'Default share-level permissions: Disabled', 'Soft delete: 7 days', 'Maximum capacity: 100 TiB', and 'Security: Maximum compatibility'. A 'Give feedback' button is highlighted. Below this, a table lists the file share 'myfileshare'. The table columns are 'Name', 'Modified', 'Access tier', and 'Quota'. The 'myfileshare' row shows 'Name: myfileshare', 'Modified: 10/22/2025, 11:55:06 AM', 'Access tier: Transaction optimized', and 'Quota: 38 GiB'. There is also a 'Show deleted shares' toggle switch.

Name	Modified	Access tier	Quota
myfileshare	10/22/2025, 11:55:06 AM	Transaction optimized	38 GiB

Azure Portal - File share with 38 GiB quota visible

STEP-2:



```
* Support: https://ubuntu.com/pro

System information as of Wed Oct 22 06:48:51 UTC 2025

System load: 0.0 Processes: 162
Usage of /: 14.6% of 28.02GB Users logged in: 1
Memory usage: 10% IPv4 address for eth0: 10.0.0.4
Swap usage: 0%

Expanded Security Maintenance for Applications is not enabled.

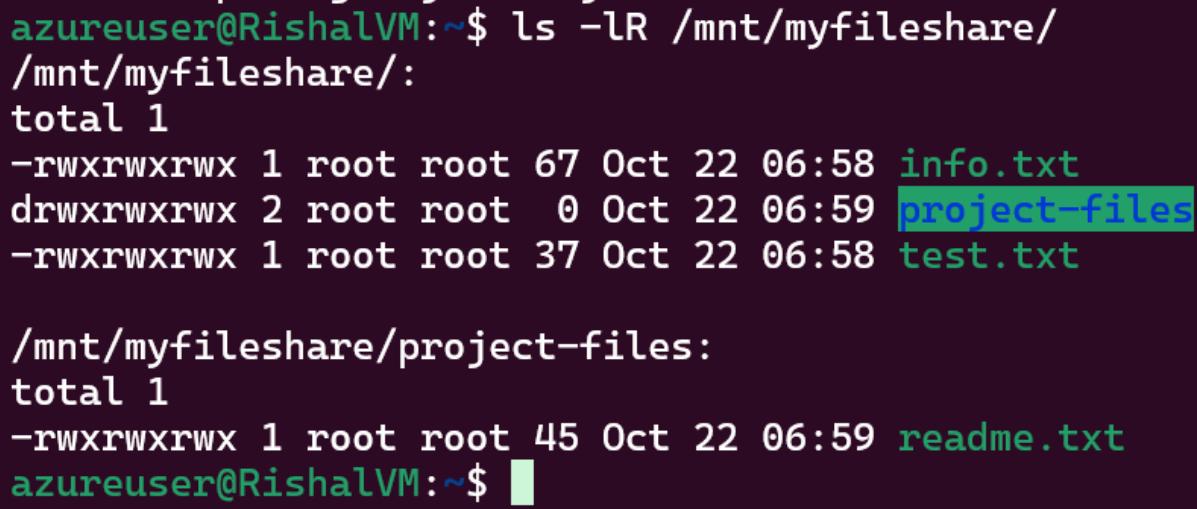
3 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

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

*** System restart required ***
Last login: Wed Oct 22 06:31:03 2025 from 103.106.200.63
azureuser@RishalVM:~$ ls -ld /mnt/myfileshare
ls: cannot access '/mnt/myfileshare': No such file or directory
azureuser@RishalVM:~$ sudo mkdir -p /mnt/myfileshare
[sudo] password for azureuser:
azureuser@RishalVM:~$ sudo umount /mnt/myfileshare 2>/dev/null || true
azureuser@RishalVM:~$ ls -l /etc/smbcredentials/
total 4
-rw----- 1 root root 121 Oct 22 06:33 rishalstorage.cred
azureuser@RishalVM:~$ sudo mount -t cifs //rishalstorage.file.core.windows.net/myfileshare /mnt/myfileshare -o credentials=/etc/smbcredentials/rishalstorage.cred,dir_mode=0777,file_mode=0777,serverino,nosharesock,actimeo=30
mount: (hint) your fstab has been modified, but systemd still uses
      the old version; use 'systemctl daemon-reload' to reload.
azureuser@RishalVM:~$ df -h | grep myfileshare
//rishalstorage.file.core.windows.net/myfileshare 38G  0  38G  0% /media/myfileshare
//rishalstorage.file.core.windows.net/myfileshare 38G  0  38G  0% /mnt/myfileshare
azureuser@RishalVM:~$
```

Terminal - `df -h | grep myfileshare` showing 38G

STEP-3:



```
azureuser@RishalVM:~$ ls -lR /mnt/myfileshare/
/mnt/myfileshare/:
total 1
-rwxrwxrwx 1 root root 67 Oct 22 06:58 info.txt

/mnt/myfileshare/project-files:
total 1
-rwxrwxrwx 1 root root 45 Oct 22 06:59 readme.txt
azureuser@RishalVM:~$
```

Terminal - `ls -lR /mnt/myfileshare/` showing files

STEP-4:

Authentication method: Access key ([Switch to Microsoft Entra user account](#))

Name	Type	Size
project-files	Directory	...
info.txt	File	67 B
test.txt	File	37 B

Azure Portal - Browse showing uploaded files

STEP-5:

```
azureuser@RishalVM: $ cat /etc/fstab | grep myfileshare
//rishalstorage.file.core.windows.net/myfileshare /media/myfileshare cifs nofail,credentials=/etc/smbcredentials/rishalstorage.cred,dir_mode=0755,file_mode=0755,serverino,nosharesock,mfsymlinks,actimeo=30
//rishalstorage.file.core.windows.net/myfileshare /media/myfileshare cifs nofail,credentials=/etc/smbcredentials/rishalstorage.cred,dir_mode=0755,file_mode=0755,serverino,nosharesock,mfsymlinks,actimeo=30
//rishalstorage.file.core.windows.net/myfileshare /media/myfileshare cifs nofail,credentials=/etc/smbcredentials/rishalstorage.cred,dir_mode=0755,file_mode=0755,serverino,nosharesock,mfsymlinks,actimeo=30
azureuser@RishalVM: $
```

Showing this fstab entry!

This confirms it will auto-mount on reboot.

STEP-6:

```
azureuser@RishalVM:~$ mount | grep myfileshare
//rishalstorage.file.core.windows.net/myfileshare on /media/myfileshare type cifs (rw,relatime,vers=3.1.1,cache=strict,upcall_l_target=app,username=rishalstorage,uid=0,noforceuid,gid=0,noforcegid,addr=20.209.56.206,file_mode=0755,dir_mode=0755,soft,persistenthandles,nounix,serverino,mapposix,msymlinks,reparse=nfs,nativesocket,symlink=msymlinks,rsize=1048576,wsize=1048576,bsize=1048576,retrans=1,echo_interval=60,nosharesock,actimeo=30,closetimeo=1)
//rishalstorage.file.core.windows.net/myfileshare on /media/myfileshare type cifs (rw,relatime,vers=3.1.1,cache=strict,upcall_l_target=app,username=rishalstorage,uid=0,noforceuid,gid=0,noforcegid,addr=20.209.56.206,file_mode=0755,dir_mode=0755,soft,persistenthandles,nounix,serverino,mapposix,msymlinks,reparse=nfs,nativesocket,symlink=msymlinks,rsize=1048576,wsize=1048576,bsize=1048576,retrans=1,echo_interval=60,nosharesock,actimeo=30,closetimeo=1)
//rishalstorage.file.core.windows.net/myfileshare on /mnt/myfileshare type cifs (rw,relatime,vers=3.1.1,cache=strict,upcall_l_target=app,username=rishalstorage,uid=0,noforceuid,gid=0,noforcegid,addr=20.209.56.206,file_mode=0777,dir_mode=0777,soft,persistenthandles,nounix,serverino,mapposix,reparse=nfs,nativesocket,symlink=native,rsize=1048576,wsize=1048576,bsize=1048576,retrans=1,echo_interval=60,nosharesock,actimeo=30,closetimeo=1)
//rishalstorage.file.core.windows.net/myfileshare on /media/myfileshare type cifs (rw,relatime,vers=3.1.1,cache=strict,upcall_l_target=app,username=rishalstorage,uid=0,noforceuid,gid=0,noforcegid,addr=20.209.56.206,file_mode=0755,dir_mode=0755,soft,persistenthandles,nounix,serverino,mapposix,msymlinks,reparse=nfs,nativesocket,symlink=msymlinks,rsize=1048576,wsize=1048576,bsize=1048576,retrans=1,echo_interval=60,nosharesock,actimeo=30,closetimeo=1)
azureuser@RishalVM:~$
```

Showing it's mounted via CIFS (SMB protocol)

STEP-7:

```
azureuser@RishalVM:~$ df -h /mnt/myfileshare
Filesystem           Size   Used  Avail Use% Mounted on
//rishalstorage.file.core.windows.net/myfileshare  38G   64K   38G   1% /mnt/myfileshare
azureuser@RishalVM:~$
```

Terminal - df -h /mnt/myfileshare (shows 38G)

- File Share mounted successfully and accessible from Linux VM

Task 6: Secure VM via NSG

Configure NSG rules for your VM with the following:

1. Block SSH/RDP traffic from all IPs.
2. Allow only HTTP traffic (port 80).
3. Allow SSH/RDP access only from your public IP.

Expected Output:

- Website accessible on port 80.
- SSH/RDP blocked for all except your public IP.

ANS: STEP-1:

The screenshot shows the Microsoft Azure portal interface for a virtual machine named "RishalVM". The user is viewing the "Network settings" page. At the top, there is a search bar and a "Copilot" button. Below the header, the URL is "pandarishal568@gmail... DEFAULT DIRECTORY (PANDARIS...)". The main content area shows a network security group named "RishalVM-nsg" attached to a network interface "rishalvm244". A table lists "Inbound port rules (7)" with columns for Priority, Name, Port, Protocol, Source, Destination, and Action. The rules include allowing SSH (port 22), Grafana (port 3000), HTTP (port 80), and Azure Load Balancer (port Any). There are also deny rules for SSH from all and Azure Load Balancer.

Priority	Name	Port	Protocol	Source	Destination	Action
200	AllowSSHfromMyIP	22	TCP	103.161.223.14/32	Any	Allow
310	AllowGrafana	3000	TCP	Any	Any	Allow
1000	Allow-HTTP	80	TCP	Any	Any	Allow
1010	DenySSHfromAll	22	TCP	Any	Any	Deny
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerInBo...	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

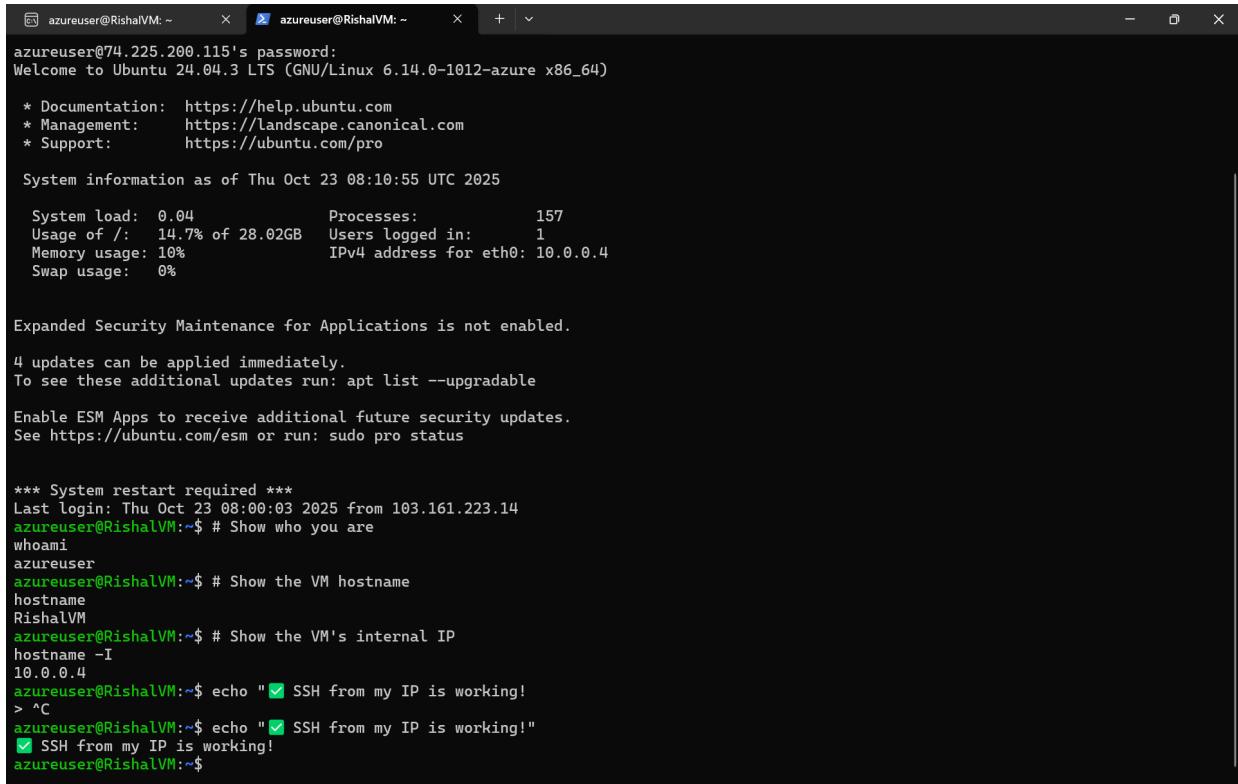
NSG Rules in Azure Portal: Showing all inbound ports.

STEP-2:

The screenshot shows a web browser window with the URL "74.225.200.115". A modal dialog box is displayed with the title "âœ... NSG Rules Working!". Inside the dialog, it says "HTTP (Port 80) is accessible" and "Student: Rishal Panda". Below that, there is task information: "Task 6: Secure VM via Network Security Group", "This page is accessible on port 80 from anywhere", and "SSH (port 22) is restricted to authorized IP only".

Website Accessible on Port 80

STEP-3:



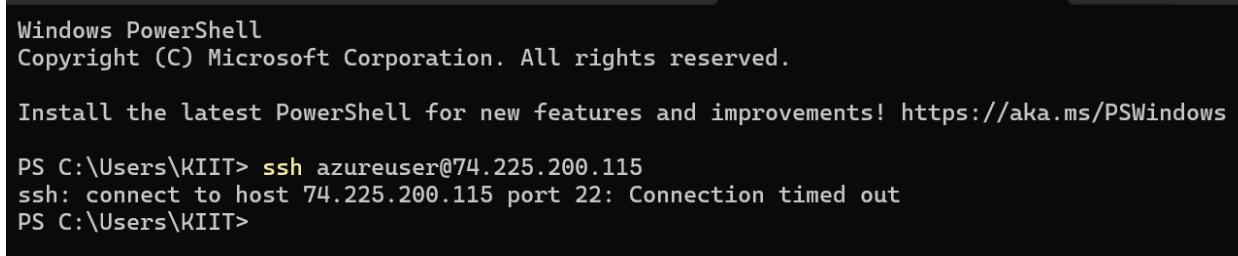
A screenshot of a Linux terminal window titled "azurouser@RishalVM: ~". The terminal displays the following output:

```
azurouser@74.225.200.115's password:  
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-1012-azure x86_64)  
  
* Documentation: https://help.ubuntu.com  
* Management: https://landscape.canonical.com  
* Support: https://ubuntu.com/pro  
  
System information as of Thu Oct 23 08:10:55 UTC 2025  
  
System load: 0.04 Processes: 157  
Usage of /: 14.7% of 28.02GB Users logged in: 1  
Memory usage: 10% IPv4 address for eth0: 10.0.0.4  
Swap usage: 0%  
  
Expanded Security Maintenance for Applications is not enabled.  
4 updates can be applied immediately.  
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  
  
*** System restart required ***  
Last login: Thu Oct 23 08:00:03 2025 from 103.161.223.14  
azurouser@RishalVM:~$ # Show who you are  
whoami  
azurouser  
azurouser@RishalVM:~$ # Show the VM hostname  
hostname  
RishalVM  
azurouser@RishalVM:~$ # Show the VM's internal IP  
hostname -I  
10.0.0.4  
azurouser@RishalVM:~$ echo "SSH from my IP is working!"  
> "  
azurouser@RishalVM:~$ echo "SSH from my IP is working!"  
SSH from my IP is working!  
azurouser@RishalVM:~$
```

Successful SSH from My IP

- Terminal showing successful SSH connection
- Should show your VM prompt

STEP-4:



A screenshot of a Windows PowerShell window titled "Windows PowerShell". The terminal displays the following output:

```
Windows PowerShell  
Copyright (C) Microsoft Corporation. All rights reserved.  
  
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows  
  
PS C:\Users\KIIT> ssh azurouser@74.225.200.115  
ssh: connect to host 74.225.200.115 port 22: Connection timed out  
PS C:\Users\KIIT>
```

SSH Blocked from Other IPs: Screenshot showing connection timeout that is refused from a different network.

STEP-5:

```
*** System restart required ***
Last login: Thu Oct 23 08:10:55 2025 from 103.161.223.14
azureuser@RishalVM:~$ sudo systemctl status nginx
[sudo] password for azureuser:
● nginx.service - A high performance web server and a reverse proxy server
  Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: enabled)
  Active: active (running) since Thu 2025-10-23 08:01:35 UTC; 26min ago
    Docs: man:nginx(8)
 Process: 320233 ExecStartPre=/usr/sbin/nginx -t -q -g daemon on; master_process on; (code=exited, status=0/SUCCESS)
 Process: 320235 ExecStart=/usr/sbin/nginx -g daemon on; master_process on; (code=exited, status=0/SUCCESS)
 Main PID: 320236 (nginx)
   Tasks: 3 (limit: 9504)
  Memory: 2.4M (peak: 3.0M)
    CPU: 21ms
   CGroup: /system.slice/nginx.service
           ├─320236 "nginx: master process /usr/sbin/nginx -g daemon on; master_process on;"
           ├─320237 "nginx: worker process"
           └─320238 "nginx: worker process"

Oct 23 08:01:35 RishalVM systemd[1]: Starting nginx.service - A high performance web server and a reverse proxy server...
Oct 23 08:01:35 RishalVM systemd[1]: Started nginx.service - A high performance web server and a reverse proxy server.
azureuser@RishalVM:~$
```

Nginx Status showing it's running

Task 7: IAM – Simple Role Separation

Create two Azure AD users with simplified roles:

1. VM Operator User

- Can create/manage VMs.
 - Cannot create/manage Storage Accounts.

Expected Outcome: Can build VM, but storage creation fails if attempted.

2. Storage Operator User

- Can create/manage Storage Accounts (Blob/File Share).
 - Cannot create/manage VMs.

Expected Outcome: Can manage storage but VM creation fails if attempted.

Students should log in as each user and verify that permissions work as expected.

ANS:- 1) AZURE AD SETUP

STEP-1:

The screenshot shows the Microsoft Azure portal interface for creating a new user. The title bar reads "Microsoft Azure portal (PWA) - Create new user - Microsoft Azure". The top navigation bar includes "Microsoft Azure", a search bar, and various icons. The main navigation path is "Home > Default Directory | Overview > Users > Create new user". The page title is "Create new user" with a subtitle "Create a new internal user in your organization". Below this, there are tabs: "Basics" (which is selected), "Properties", "Assignments", and "Review + create". A note says "Create a new user in your organization. This user will have a user name like alice@contoso.com. [Learn more](#)". The "Identity" section contains fields for "User principal name" (VmOperator), "Domain" (@pandarisha568@gmail.on...), and "Mail nickname" (VmOperator). There is a checked checkbox "Derive from user principal name". The "Display name" field is also set to VmOperator. The "Password" field contains "Joka073041" with an eye icon and a "Copy" button. A checked checkbox "Auto-generate password" is present. The "Account enabled" field has a checked radio button. At the bottom, there are buttons for "Review + create", "Previous", "Next: Properties", and "Give feedback".

Create VM operator user with a visible password.

STEP-2:

The screenshot shows the Microsoft Azure portal interface for creating a new user. The title bar reads "Microsoft Azure portal (PWA) - Create new user - Microsoft Azure". The navigation bar includes "Microsoft Azure", "Search resources, services, and docs (G+)", "Copilot", and a user profile. The main content area is titled "Create new user" with the sub-instruction "Create a new internal user in your organization". Below this, there are tabs for "Basics", "Properties", "Assignments", and "Review + create". The "Basics" tab is selected. The form fields include:

- User principal name *: StorageOperator @ pandarishal568@gmail.on...
- Mail nickname *: StorageOperator
- Display name *: StorageOperator
- Password *: Wazu399558
- Account enabled:

Below the form, there are buttons for "Review + create" and "Next: Properties >". A "Give feedback" link is also present.

Create storage operator user with a visible password.

STEP-3:

The screenshot shows the Microsoft Azure portal "Users" list page. The title bar reads "Microsoft Azure portal (PWA) - Users - Microsoft Azure". The navigation bar includes "Microsoft Azure", "Search resources, services, and docs (G+)", "Copilot", and a user profile. The main content area is titled "Users" with the sub-instruction "Default Directory". The page includes a sidebar with links like "All users", "Audit logs", "Sign-in logs", "Diagnose and solve problems", "Deleted users", "Password reset", "User settings", "Bulk operation results", and "Bulk operation results (Preview)". The main table displays user information:

Display name ↑	User principal name ↑	User type	On-premises sync	Identities
Rishal	pandarishal568_g...	Member	No	MicrosoftAccount
StorageOperator	StorageOperator...	Member	No	pandarishal568@gmail.on...
VmOperator	VmOperator@pan...	Member	No	pandarishal568@gmail.on...

Users list showing both new users

2) ROLE ASSIGNMENTS

STEP-4:

The screenshot shows the Microsoft Azure portal interface for adding a role assignment. The top navigation bar includes the Microsoft Azure logo, a search bar, and various icons. The main title is "Add role assignment". Below it, there are tabs: "Role", "Members" (which is selected), "Conditions", and "Review + assign".
Selected role: Virtual Machine Contributor
Assign access to: User, group, or service principal Managed identity
Members: + Select members
A table lists a member:
Name: VmOperator, Object ID: 6a2f9ea1-82cb-4f10-9762-3befbcc8ba..., Type: User
Description: Optional
At the bottom, there are buttons for "Review + assign", "Previous", "Next", and "Feedback".

- **The VM operator was assigned the virtual machine contributor role.**
- **The VM operator was selected as a member.**
- **Role assignment success for VM Operator.**

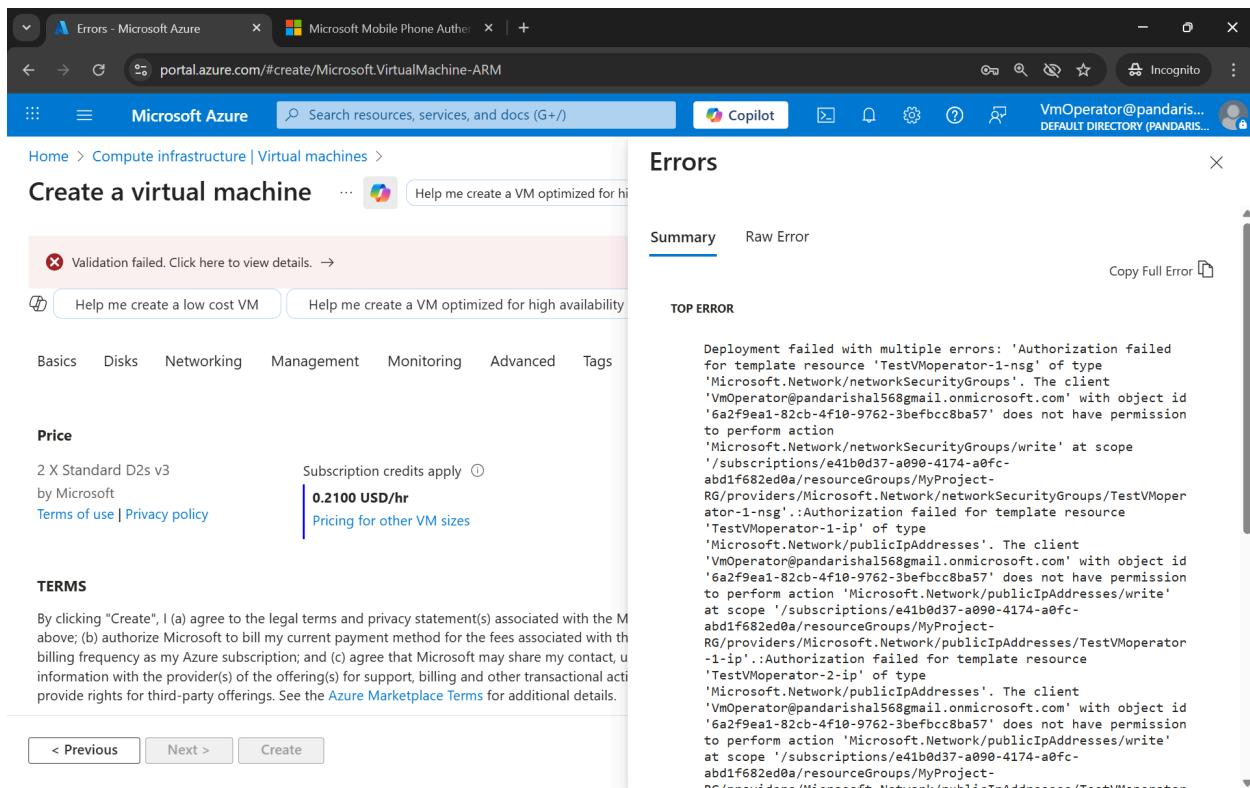
STEP-5:

The screenshot shows the Microsoft Azure portal interface for adding a role assignment. The top navigation bar includes the Microsoft Azure logo, a search bar, and various icons. The main title is "Add role assignment". Below it, there are tabs: "Role", "Members" (which is selected), "Conditions", and "Review + assign".
Selected role: Storage Account Contributor
Assign access to: User, group, or service principal Managed identity
Members: + Select members
A table lists a member:
Name: StorageOperator, Object ID: 71a20b21-0657-4d53-9e4e-35660c24..., Type: User
Description: Optional

- The storage operator was assigned the storage account contributor role.
 - Storage Operator selected as member.
 - Role assignment success for Storage Operator.

3) VM Operator Testing:

STEP-6:

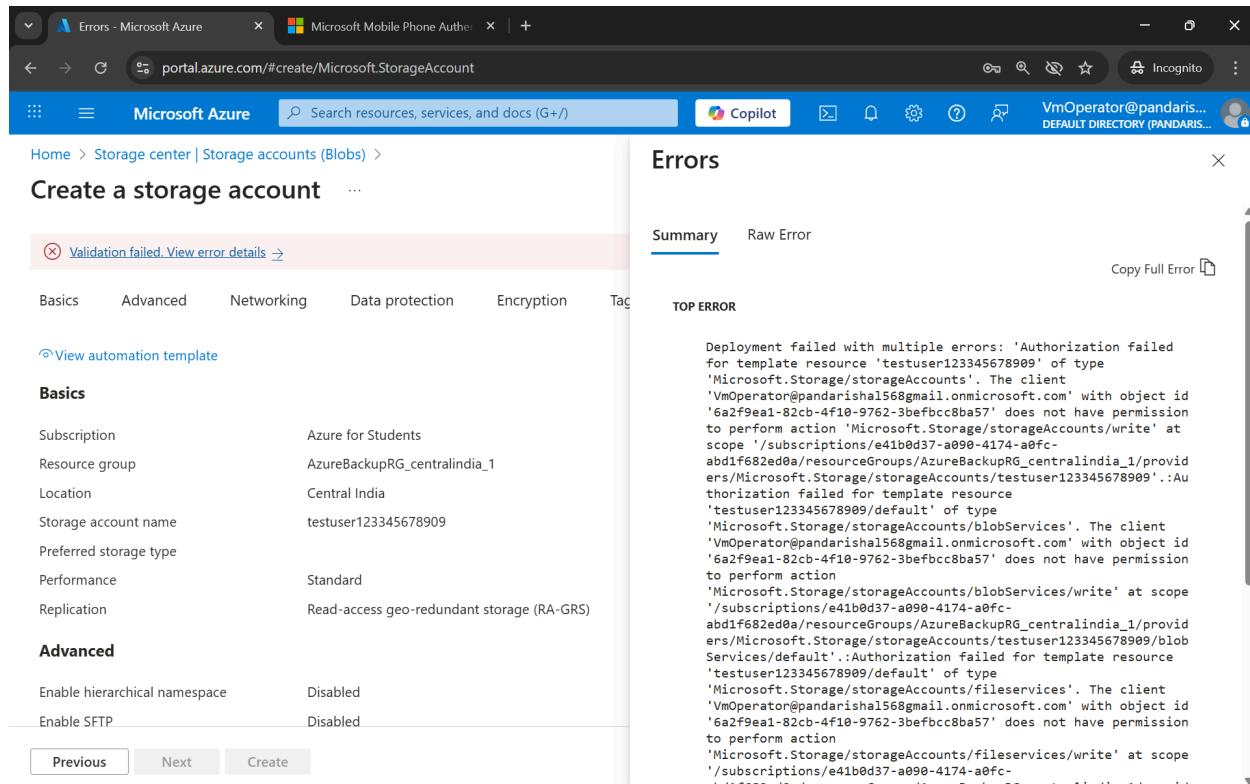


—The error shows that the VM operator cannot create the network resources (NSG, public IP, virtual network) that are needed for a VM. This is because:

- The virtual machine contributor role allows managing VMs.
 - But NOT the networking components (NSG, VNet, Public IP).

This is a partial success—it proves role separation is working!

STEP-7:



The screenshot shows the Microsoft Azure portal interface for creating a storage account. The URL in the address bar is `portal.azure.com/#create/Microsoft.StorageAccount`. The user is signed in as `VmOperator@pandaris...`. The main page title is "Create a storage account". A prominent red error message box at the top left says "Validation failed. View error details →". Below it, the "Basics" section is filled out with the following values:

Subscription	Azure for Students
Resource group	AzureBackupRG_centralindia_1
Location	Central India
Storage account name	testuser123345678909
Preferred storage type	Standard
Performance	Standard
Replication	Read-access geo-redundant storage (RA-GRS)

The "Advanced" section has two disabled options:

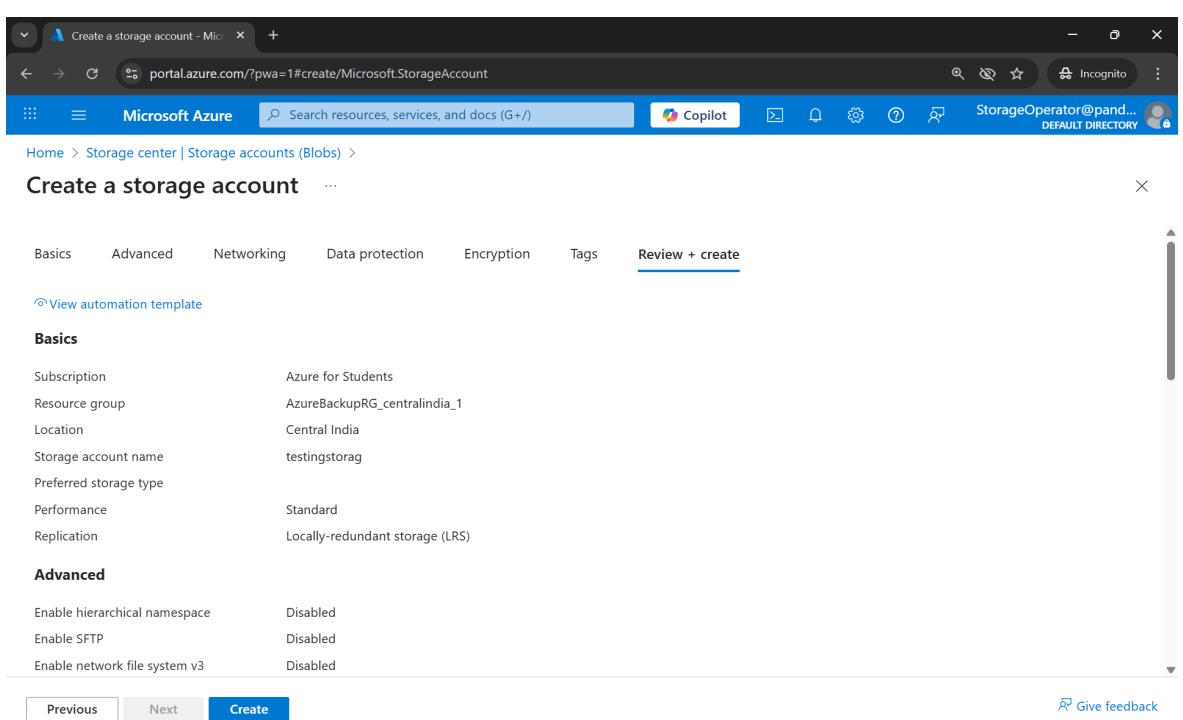
Enable hierarchical namespace	Disabled
Enable SFTP	Disabled

At the bottom, there are "Previous", "Next", and "Create" buttons. To the right, a sidebar titled "Errors" is open, showing the "Summary" tab. It displays a long error message detailing multiple deployment failures due to authorization issues for various Microsoft Storage API operations.

VM Operator—Storage creation validation failed.

4) Storage Operator Testing:

STEP-8:



The screenshot shows the Microsoft Azure portal interface for creating a storage account. The URL in the address bar is `portal.azure.com/?pwa=1#create/Microsoft.StorageAccount`. The user is signed in as `StorageOperator@pandaris...`. The main page title is "Create a storage account". The "Review + create" tab is selected. The "Basics" section is filled out with the following values:

Subscription	Azure for Students
Resource group	AzureBackupRG_centralindia_1
Location	Central India
Storage account name	testingstorag
Preferred storage type	Standard
Performance	Standard
Replication	Locally-redundant storage (LRS)

The "Advanced" section has three disabled options:

Enable hierarchical namespace	Disabled
Enable SFTP	Disabled
Enable network file system v3	Disabled

At the bottom, there are "Previous", "Next", and "Create" buttons. A "Give feedback" link is visible at the bottom right. The overall status is green, indicating successful creation.

Storage Operator—Storage creation validation passed.

STEP-9:

The screenshot shows the Microsoft Azure 'Create a virtual machine' wizard. On the left, under 'Price', it lists '2 X Standard D2s v3 by Microsoft'. Below that is a 'TERMS' section with a detailed legal notice. On the right, the 'Errors' blade is open, showing a summary of deployment failures related to network interface authorization.

Create a virtual machine

Validation failed. Click here to view details. →

Help me create a low cost VM Help me create a VM optimized for high availability

Basics Disks Networking Management Monitoring Advanced Tags

Price

2 X Standard D2s v3
by Microsoft

Subscription credits apply ⓘ
0.2100 USD/hr
[Pricing for other VM sizes](#)

TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the M above; (b) authorize Microsoft to bill my current payment method for the fees associated with th billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, u information with the provider(s) of the offering(s) for support, billing and other transactional act provide rights for third-party offerings. See the [Azure Marketplace Terms](#) for additional details.

< Previous Next > Create

Errors

Summary Raw Error

Copy Full Error

TOP ERROR

```
Deployment failed with multiple errors: 'Authorization failed for template resource 'teststorage-rg-1120_z2' of type 'Microsoft.Network/networkInterfaces'. The client 'StorageOperator@pandarishal568@gmail.onmicrosoft.com' with object id '71a20b21-0e57-4d53-9e4e-35660c240d25' does not have permission to perform action 'Microsoft.Network/networkInterfaces/write' at scope '/subscriptions/e41b0d37-a090-4174-a0fc-abd1f682ed0a/resourceGroups/MyProject-RG/providers/Microsoft.Network/networkInterfaces/teststorage-rg-1120_z2'. :Authorization failed for template resource 'teststorage-rg-1554_z3' of type 'Microsoft.Network/networkInterfaces'. The client 'StorageOperator@pandarishal568@gmail.onmicrosoft.com' with object id '71a20b21-0e57-4d53-9e4e-35660c240d25' does not have permission to perform action 'Microsoft.Network/networkInterfaces/write' at scope '/subscriptions/e41b0d37-a090-4174-a0fc-abd1f682ed0a/resourceGroups/MyProject-RG/providers/Microsoft.Network/networkInterfaces/teststorage-rg-1554_z3'. :Authorization failed for template resource 'TestStorage-Rg-1-nsg' of type 'Microsoft.Network/networkSecurityGroups'. The client 'StorageOperator@pandarishal568@gmail.onmicrosoft.com' with object id '71a20b21-0e57-4d53-9e4e-35660c240d25' does not have permission to perform action 'Microsoft.Network/networkSecurityGroups/write' at scope '/subscriptions/e41b0d37-a090-4174-a0fc-
```

Storage Operator—VM creation validation failed.

The Major Project Is Completed Successfully.