Azure File Server with Folder-Level Access Control using SFTP (OpenSSH)

1. Objective

The objective of this Proof of Concept (POC) is to design and implement a centralized file server in Microsoft Azure with **secure folder-level access control**. Each user should be able to access **only their assigned folder** using secure file transfer tools such as **WinSCP / FileZilla**.

2. Business Requirement

Organizations require a secure and centralized location to store department-wise data such as Billing and HR documents. Access must be restricted so that:

- Users can only access their own department folders
- Data transfer must be encrypted

3. Scope of POC

- Create a Windows-based file server in Azure
- Configure NTFS folder-level permissions
- Enable SFTP using OpenSSH
- Allow access from local machines using WinSCP

4. Architecture Overview

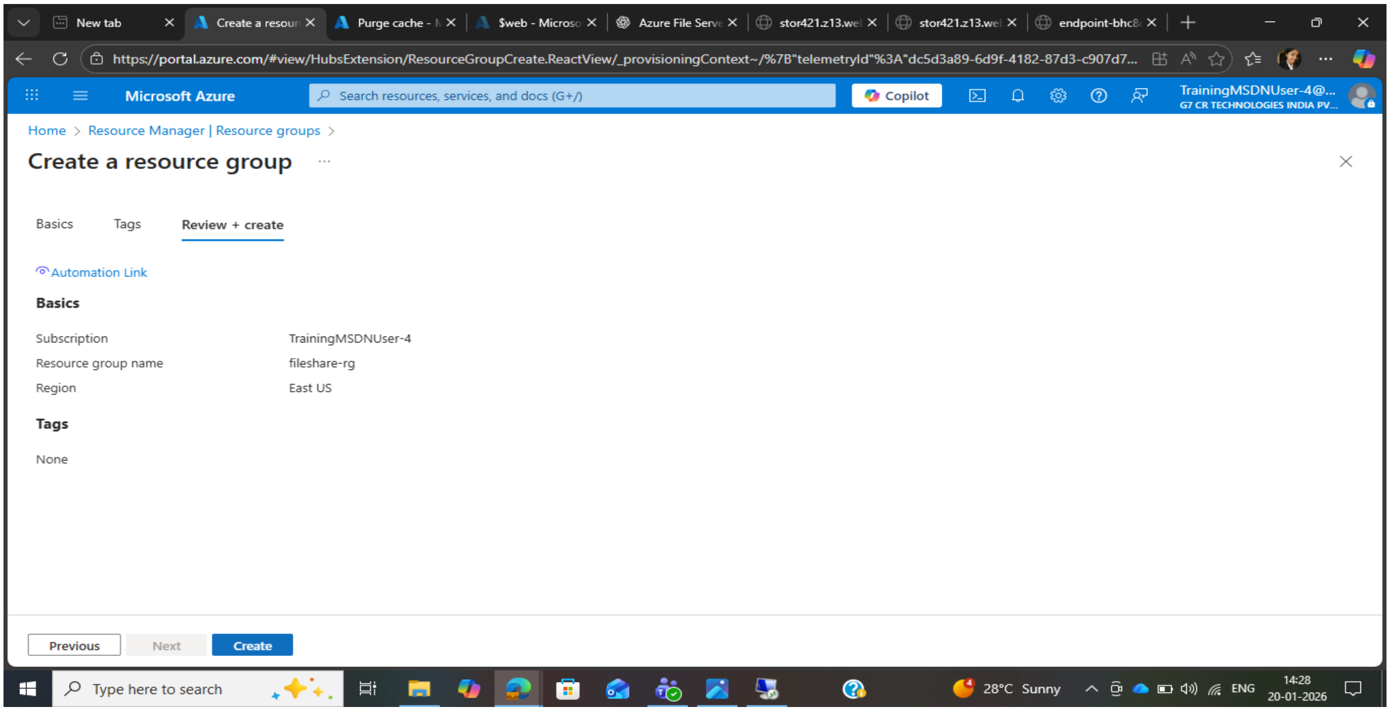
- Azure Virtual Machine (Windows Server)
- Local users on Windows Server
- NTFS permissions for folder-level isolation
- OpenSSH Server for SFTP access

5. Azure Resources Used

- Azure Virtual Machine (Windows Server 2022)
- Azure Network Security Group (NSG)
- Public IP Address

6. Implementation Steps

Step 1: Create Resource Group



https://portal.azure.com/#view/HubsExtension/ResourceGroupCreate.ReactView/_provisioningContext~/%7B"telemetryId"%3A"dc5d3a89-6d9f-4182-87d3-c907d7...

Home > Resource Manager | Resource groups >

Create a resource group

Basics Tags **Review + create**

Automation Link

Basics

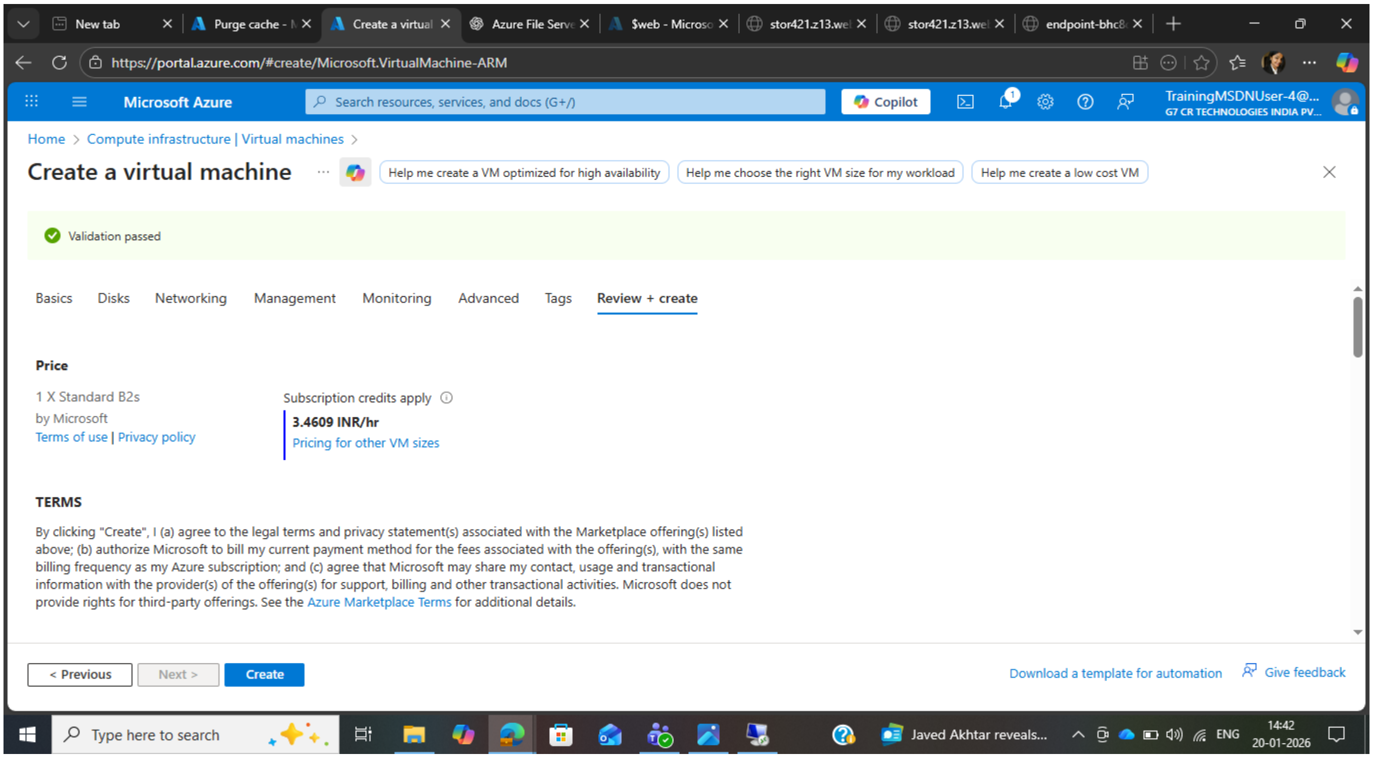
Subscription	TrainingMSDNUser-4
Resource group name	fileshare-rg
Region	East US

Tags

None

Previous Next Create

Step 2: Create Azure Windows Virtual Machine



https://portal.azure.com/#create/Microsoft.VirtualMachine-ARM

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Create a virtual machine

Help me create a VM optimized for high availability | Help me choose the right VM size for my workload | Help me create a low cost VM

Validation passed

Basics Disks Networking Management Monitoring Advanced Tags **Review + create**

Price

1 X Standard B2s
by Microsoft
Terms of use | Privacy policy

Subscription credits apply
3.4609 INR/hr
Pricing for other VM sizes

TERMS

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

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A Windows Server VM was created in Azure to act as the centralized file server. RDP access was enabled for administration.

Purpose:

- Provides full control over OS and file system
- Acts as IaaS-based file server

Step 3: Create Folder Structure

A central directory was created:

C:\CompanyData

├── Billing

├── HR

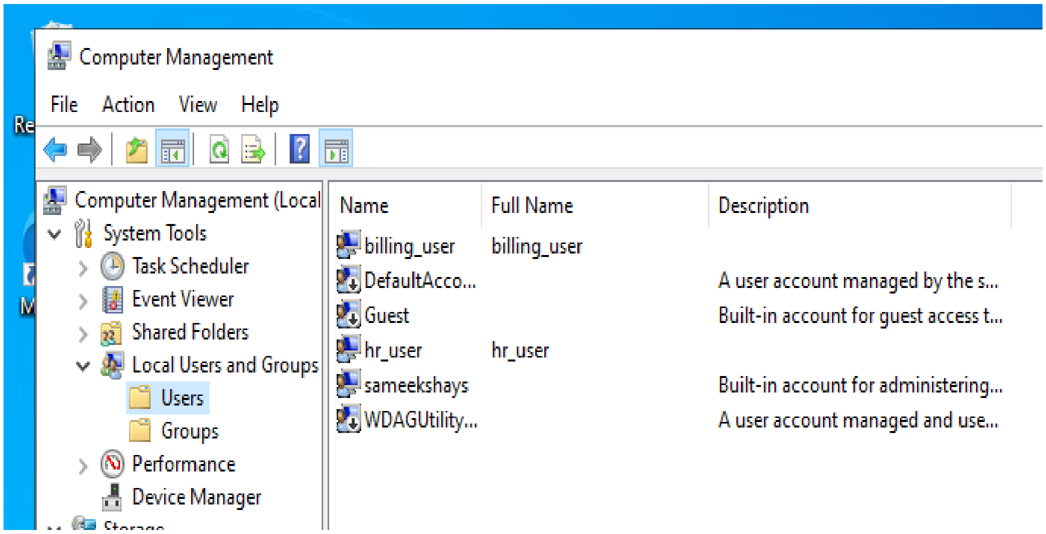
Purpose:

- Logical separation of department data
- Centralized storage

Step 4: Create Local Users

Local users were created on the Windows Server:

- billing_user
- hr_user



Name	Full Name	Description
billing_user	billing_user	
DefaultAcco...		A user account managed by the s...
Guest		Built-in account for guest access t...
hr_user	hr_user	
sameekshays		Built-in account for administering...
WDAGUtility...		A user account managed and use...

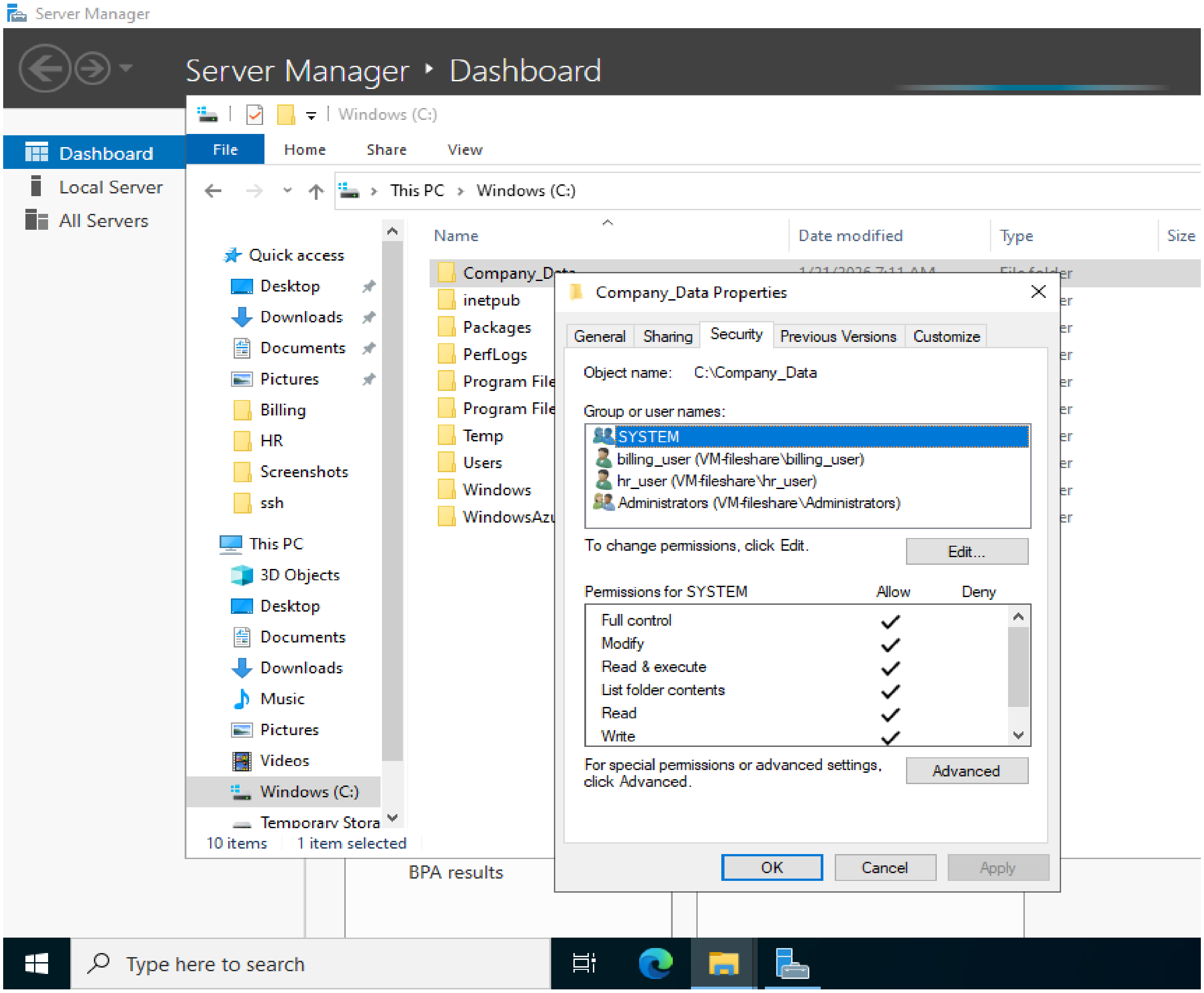
Purpose:

Simple user-level access control

Step 5: Configure NTFS Folder-Level Permissions

Permissions were configured so that:

- billing_user can access only Billing folder
- hr_user can access only HR folder
- Administrators and SYSTEM retain full control



Company_Data Properties

General | Sharing | Security | Previous Versions | Customize

Object name: C:\Company_Data

Group or user names:

- SYSTEM
- billing_user (VM-fileshare\billing_user)
- hr_user (VM-fileshare\hr_user)
- Administrators (VM-fileshare\Administrators)

To change permissions, click Edit. [Edit...]

Permissions for SYSTEM	Allow	Deny
Full control	✓	
Modify	✓	
Read & execute	✓	
List folder contents	✓	
Read	✓	
Write	✓	

For special permissions or advanced settings, click Advanced. [Advanced]

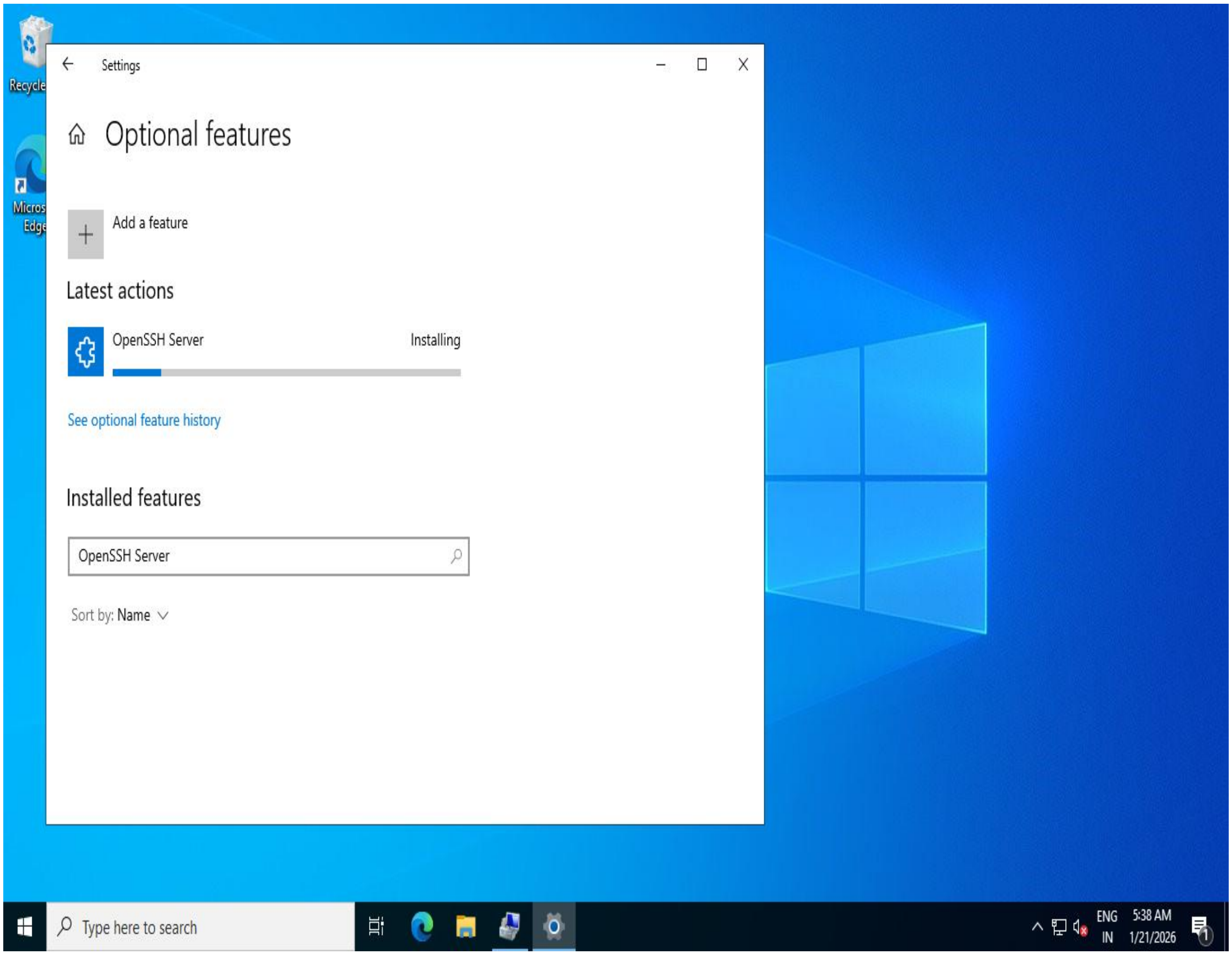
[OK] [Cancel] [Apply]

Purpose:

- Enforces strict access isolation
- Prevents unauthorized access

Step 5: Install OpenSSH Server (SFTP)

OpenSSH Server was installed using Windows Optional Features and configured to start automatically.



Purpose:

- Enables secure file transfer using SFTP
- Uses encrypted SSH channel

Step 6: Configure Firewall and Network Security Group

Port 22 (SSH) was allowed in:

- Windows Firewall
- Azure NSG

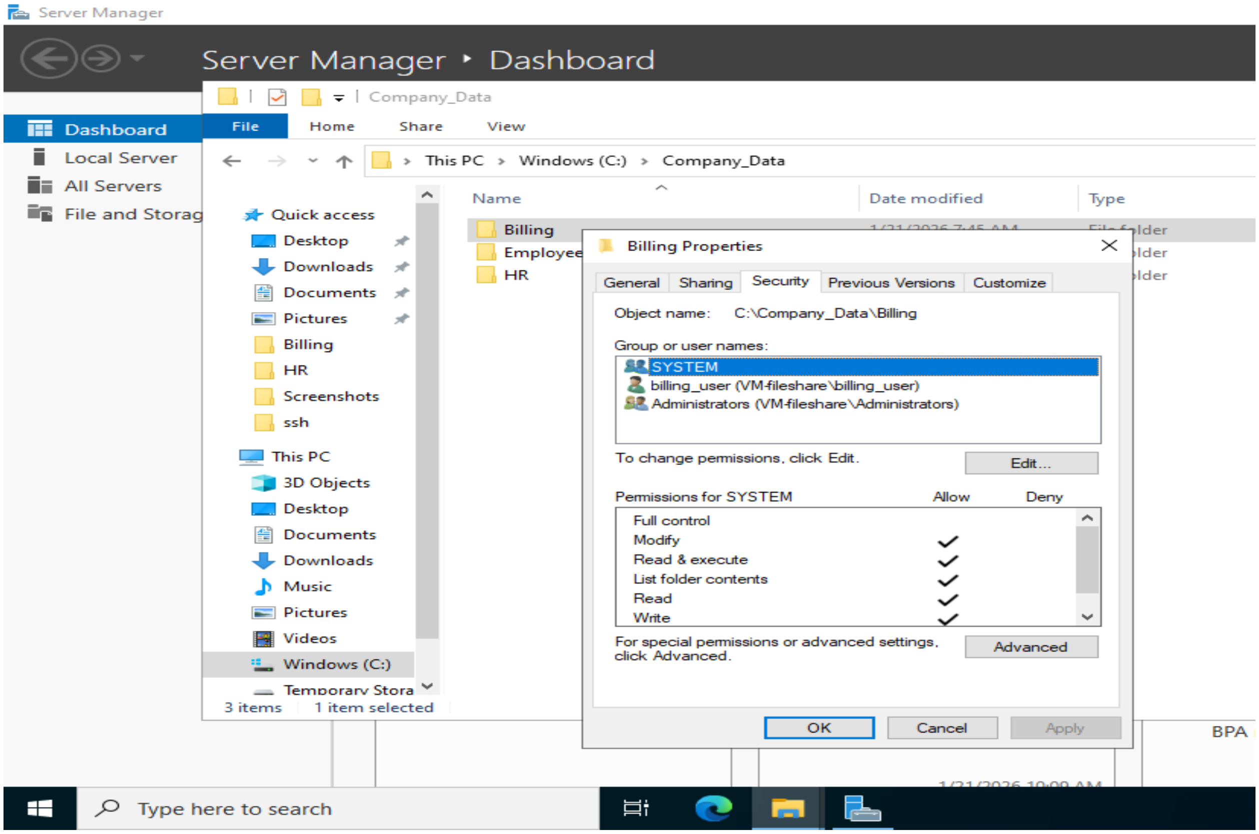
Purpose:

- Allows SFTP access from external machines

Step 7: Configure User Directory Mapping (Chroot)

Each user was restricted to their respective directory using SSH configuration:

- billing_user → C:\CompanyData\Billing



Billing Properties

Object name: C:\Company_Data\Billing

Group or user names:

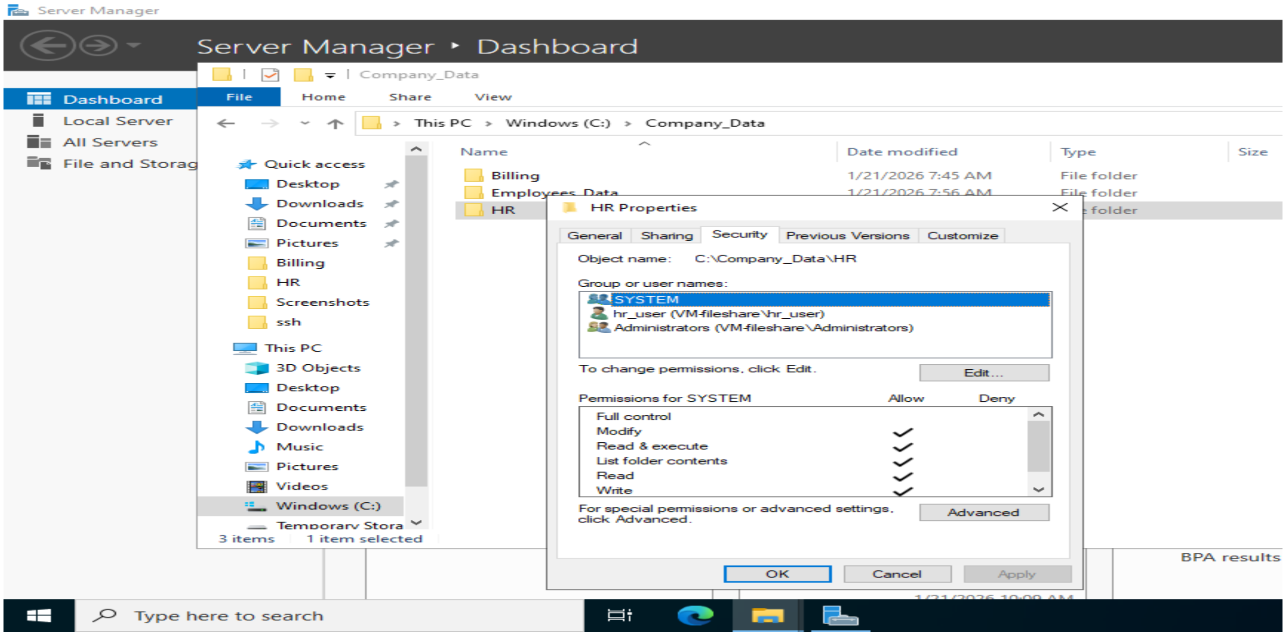
- SYSTEM
- billing_user (VM-fileshare\billing_user)
- Administrators (VM-fileshare\Administrators)

To change permissions, click Edit.

Permissions for SYSTEM	Allow	Deny
Full control		
Modify	✓	
Read & execute	✓	
List folder contents	✓	
Read	✓	
Write	✓	

For special permissions or advanced settings, click Advanced.

- hr_user → C:\CompanyData\HR



Name	Date modified	Type	Size
Billing	1/21/2026 7:45 AM	File folder	
Employees Data	1/21/2026 7:56 AM	File folder	
HR		File folder	

HR Properties

Object name: C:\Company_Data\HR

Group or user names:

- SYSTEM
- hr_user (VM-fileshare\hr_user)
- Administrators (VM-fileshare\Administrators)

To change permissions, click Edit.

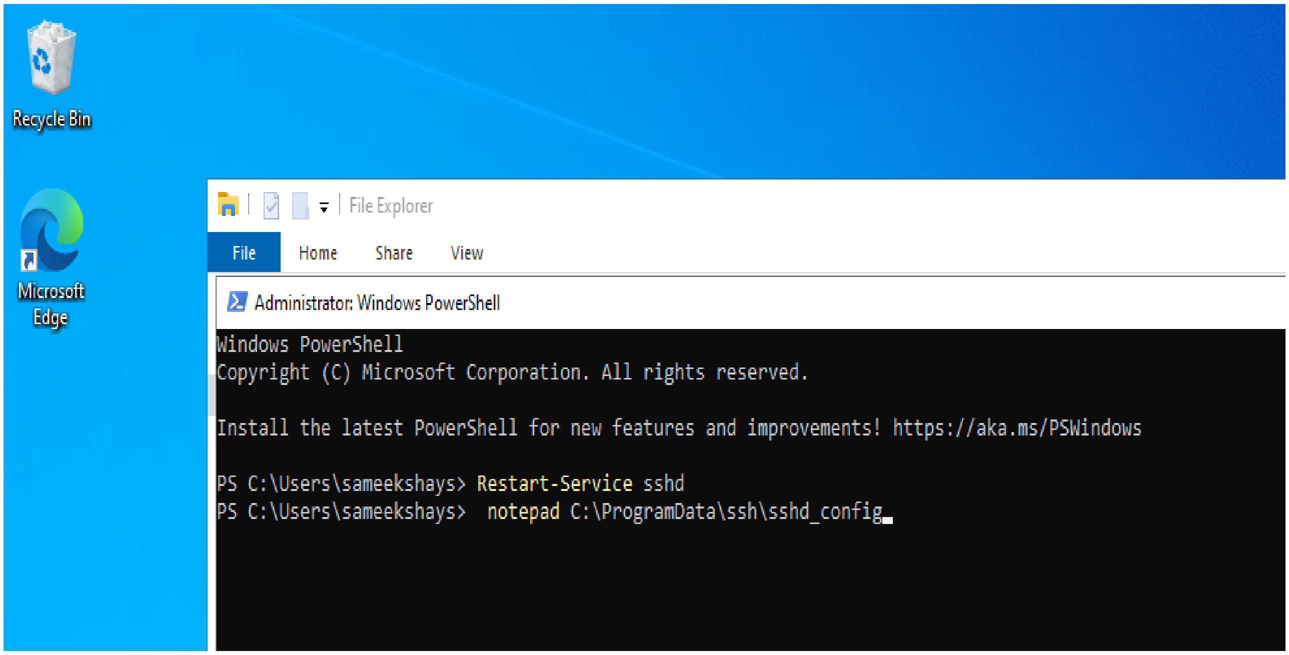
Permissions for SYSTEM	Allow	Deny
Full control		
Modify	✓	
Read & execute	✓	
List folder contents	✓	
Read	✓	
Write	✓	

For special permissions or advanced settings, click Advanced.

Purpose:

- User lands directly in assigned folder
- Prevents browsing parent directories

Step 8: Edit the ssh config file



```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\sameekshays> Restart-Service sshd
PS C:\Users\sameekshays>  notepad C:\ProgramData\ssh\sshd_config
```
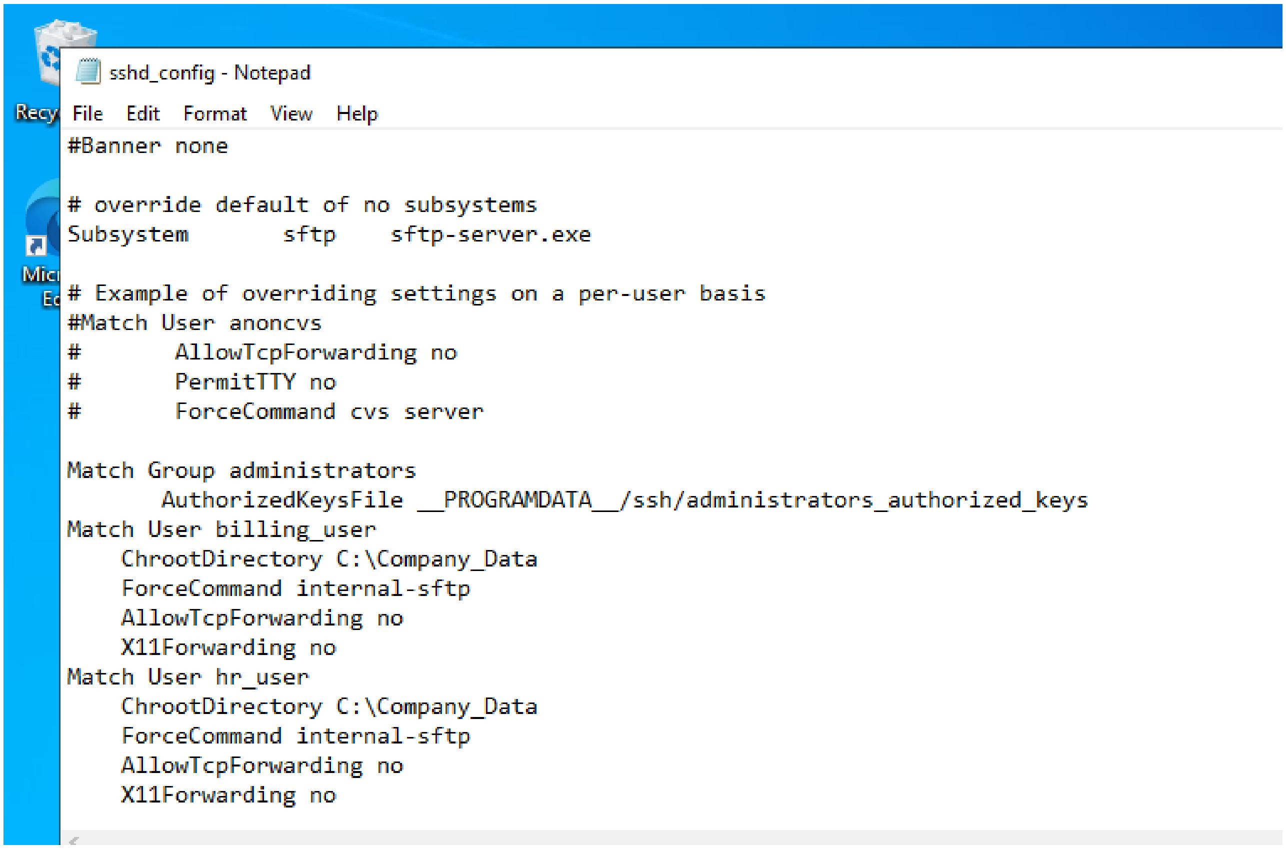
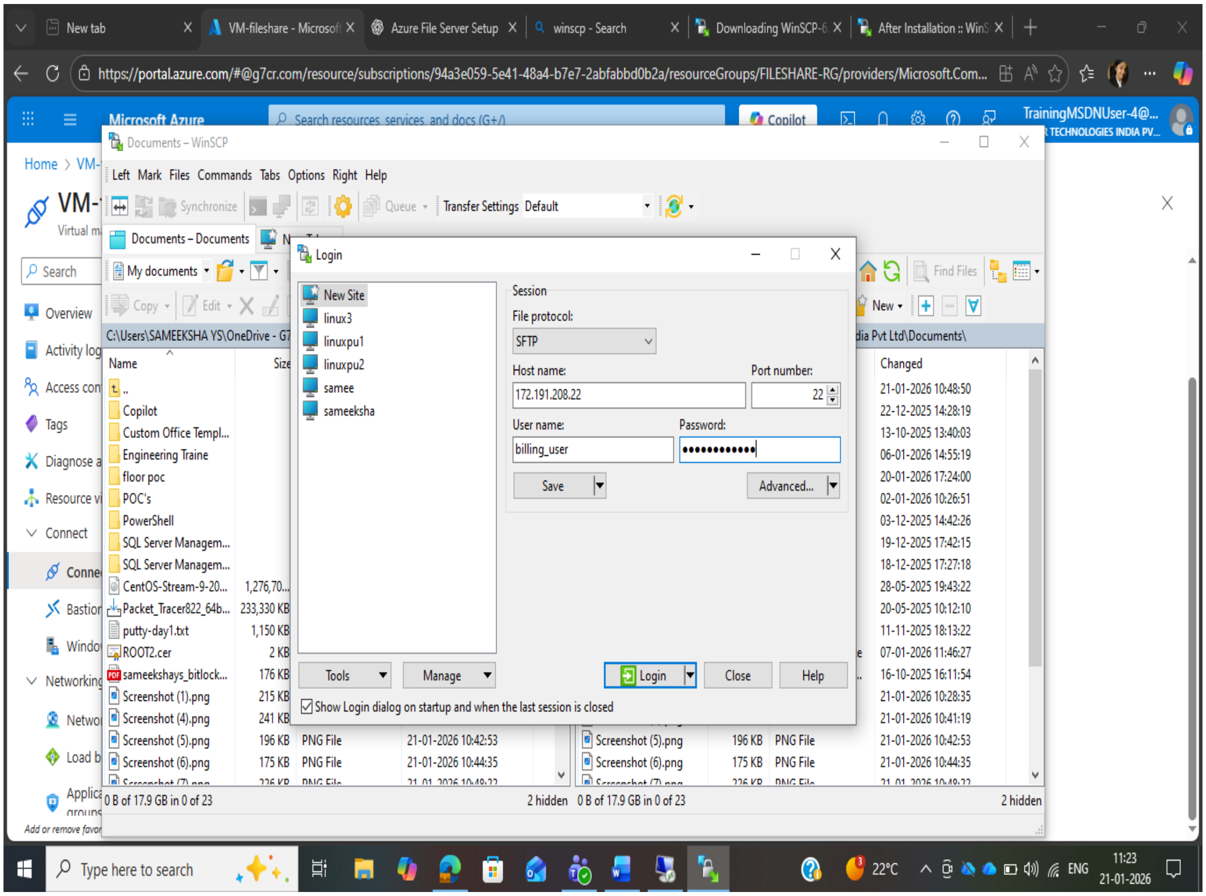



```
#Banner none

# override default of no subsystems
Subsystem       sftp    sftp-server.exe

# Example of overriding settings on a per-user basis
#Match User anoncvs
#       AllowTcpForwarding no
#       PermitTTY no
#       ForceCommand cvs server

Match Group administrators
       AuthorizedKeysFile __PROGRAMDATA__/ssh/administrators_authorized_keys
Match User billing_user
    ChrootDirectory C:\Company_Data
    ForceCommand internal-sftp
    AllowTcpForwarding no
    X11Forwarding no
Match User hr_user
    ChrootDirectory C:\Company_Data
    ForceCommand internal-sftp
    AllowTcpForwarding no
    X11Forwarding no
```

Step 9: Access from Local Machine

Users accessed the file server using WinSCP with the following settings:

Setting	Value
Protocol	SFTP
Host	VM Public IP
Port	22
Username	billing_user



Session

File protocol: SFTP

Host name: 172.191.208.22

Port number: 22

User name: billing_user

Password: ••••••••••••

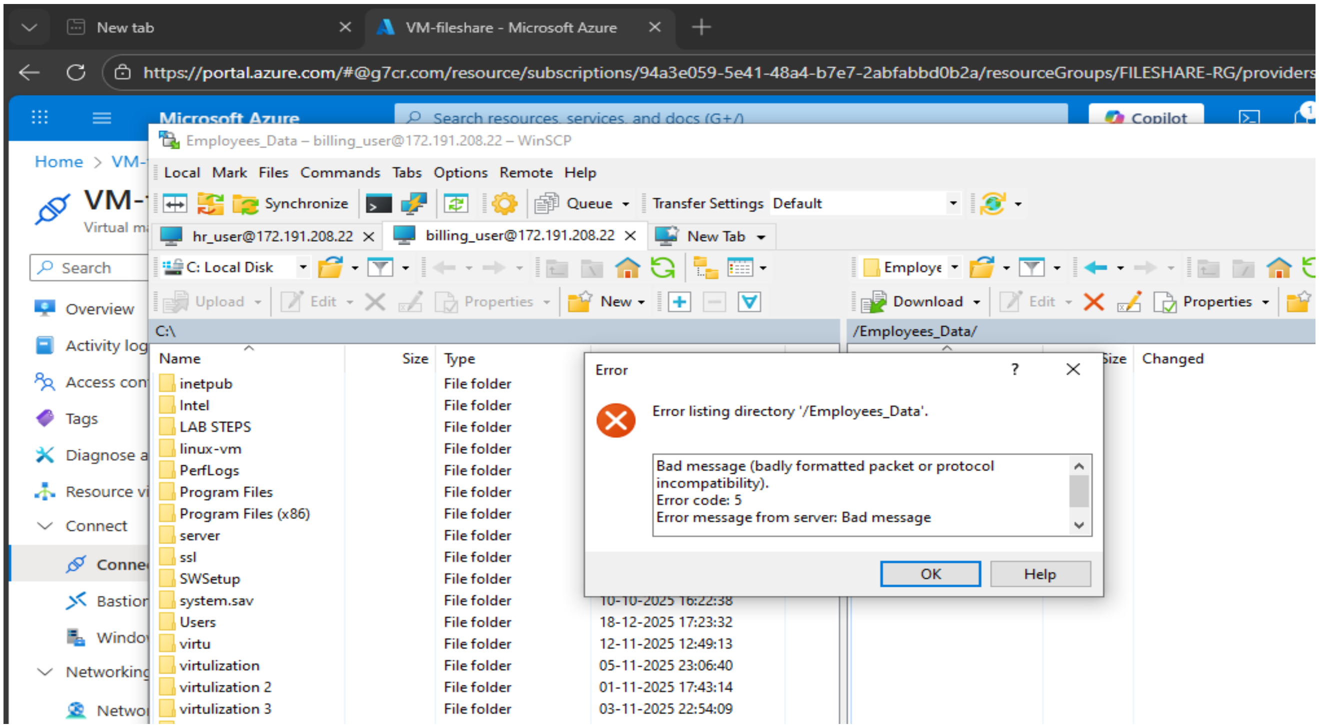
☑ Show Login dialog on startup and when the last session is closed

Purpose:

- Enables secure remote file access

7. Testing and Validation

User	Billing Folder	HR Folder
billing_user	Accessible	Access Denied
hr_user	Access Denied	Accessible



https://portal.azure.com/#@g7cr.com/resource/subscriptions/94a3e059-5e41-48a4-b7e7-2abfabbd0b2a/resourceGroups/FILESHARE-RG/providers

Employees_Data – billing_user@172.191.208.22 – WinSCP

C:\

/Employees_Data/

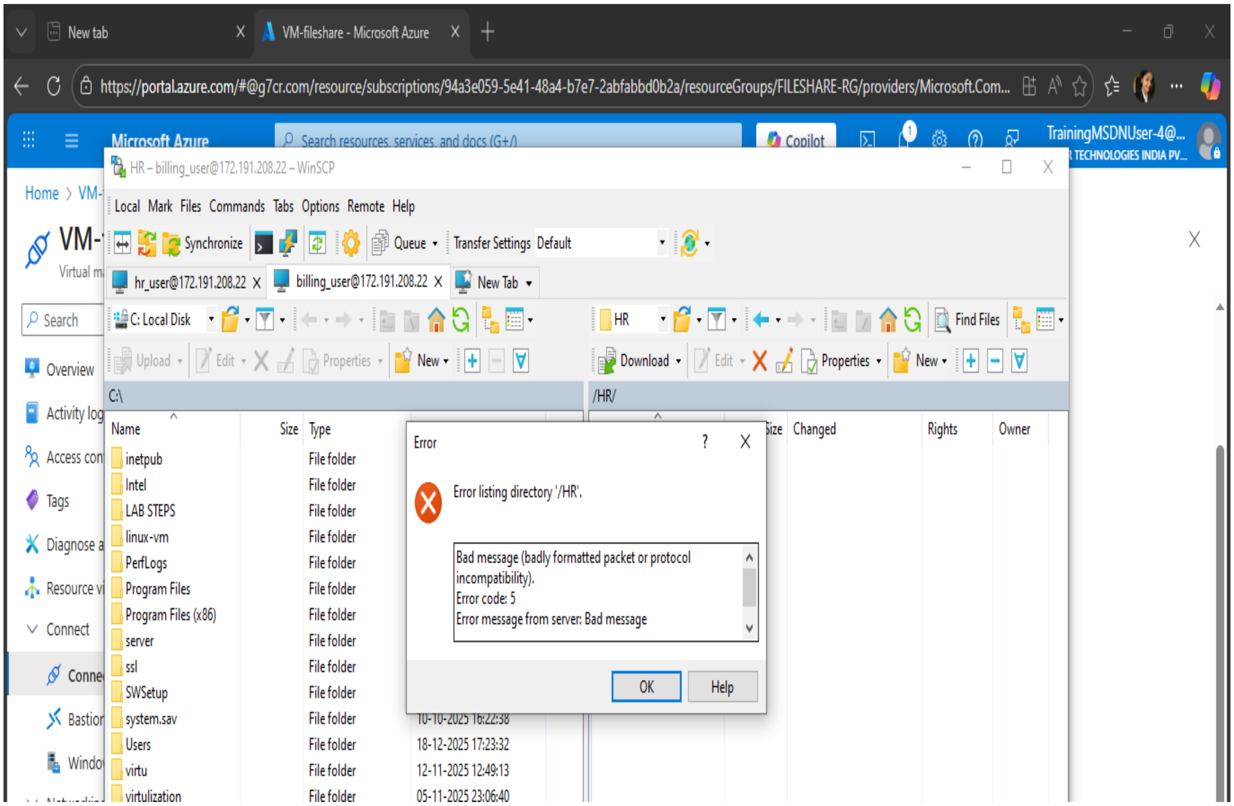
Error

Error listing directory '/Employees_Data'.

```
Bad message (badly formatted packet or protocol
incompatibility).
Error code: 5
Error message from server: Bad message
```

Name	Size	Type	Changed
inetpub		File folder	
Intel		File folder	
LAB STEPS		File folder	
linux-vm		File folder	
PerfLogs		File folder	
Program Files		File folder	
Program Files (x86)		File folder	
server		File folder	
ssl		File folder	
SWSetup		File folder	
system.sav		File folder	10-10-2025 16:22:38
Users		File folder	18-12-2025 17:23:32
virtu		File folder	12-11-2025 12:49:13
virtulization		File folder	05-11-2025 23:06:40
virtulization 2		File folder	01-11-2025 17:43:14
virtulization 3		File folder	03-11-2025 22:54:09

Size	Changed



https://portal.azure.com/#@g7cr.com/resource/subscriptions/94a3e059-5e41-48a4-b7e7-2abfabbd0b2a/resourceGroups/FILESHARE-RG/providers/Microsoft.Com...

HR – billing_user@172.191.208.22 – WinSCP

C:\

/HR/

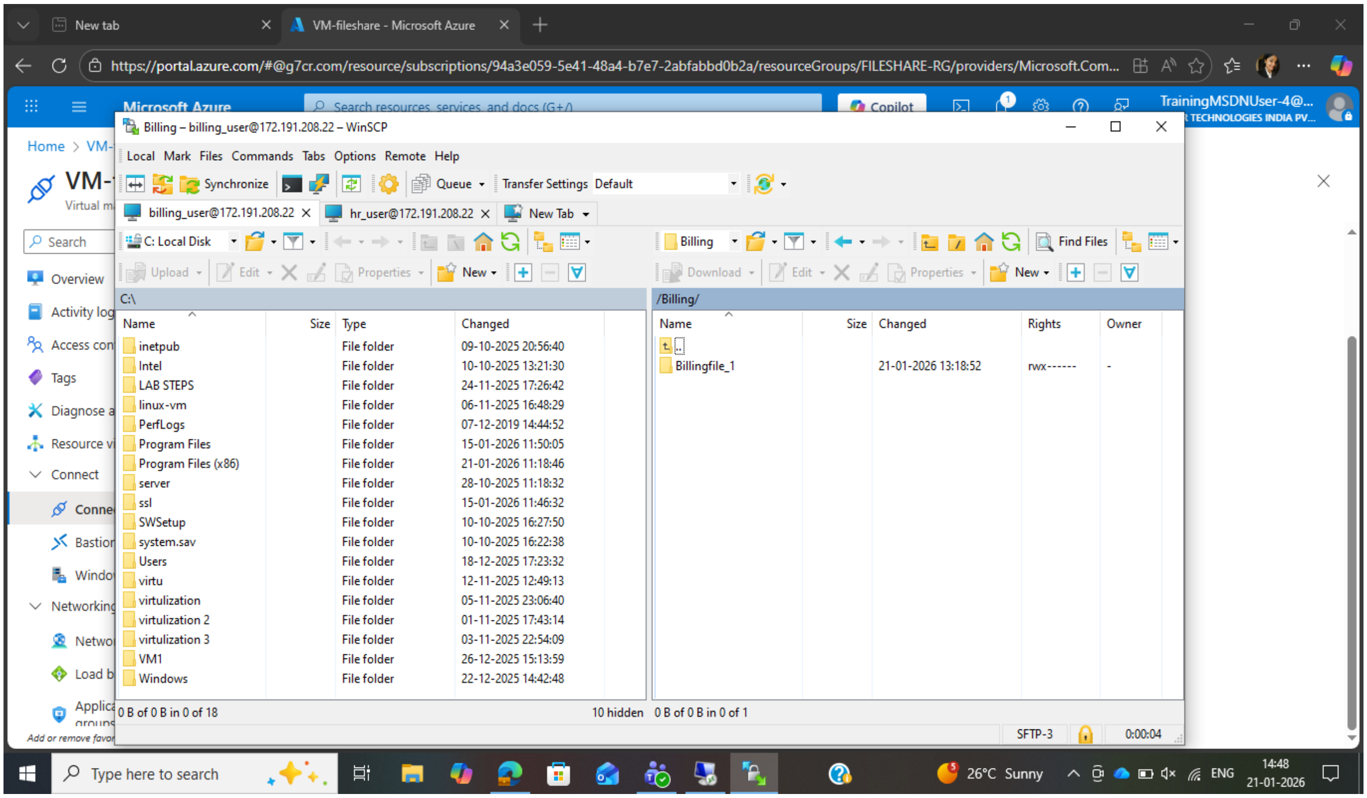
Error

Error listing directory '/HR'.

```
Bad message (badly formatted packet or protocol
incompatibility).
Error code: 5
Error message from server: Bad message
```

Name	Size	Type	Changed
inetpub		File folder	
Intel		File folder	
LAB STEPS		File folder	
linux-vm		File folder	
PerfLogs		File folder	
Program Files		File folder	
Program Files (x86)		File folder	
server		File folder	
ssl		File folder	
SWSetup		File folder	
system.sav		File folder	10-10-2025 16:22:38
Users		File folder	18-12-2025 17:23:32
virtu		File folder	12-11-2025 12:49:13
virtulization		File folder	05-11-2025 23:06:40

Size	Changed	Rights	Owner



https://portal.azure.com/#@g7cr.com/resource/subscriptions/94a3e059-5e41-48a4-b7e7-2abfabbd0b2a/resourceGroups/FILESHARE-RG/providers/Microsoft.Com...

Billing – billing_user@172.191.208.22 – WinSCP

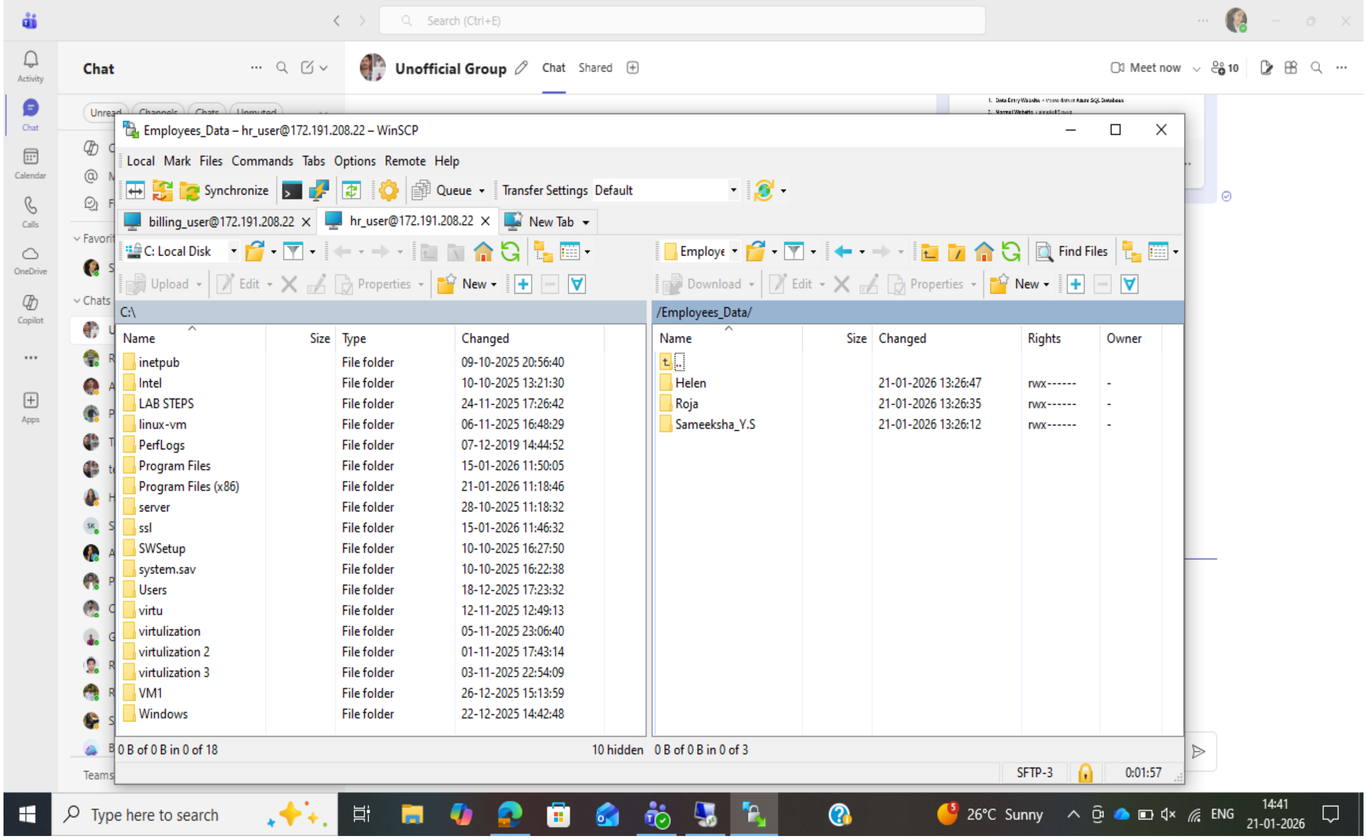
C:\

Name	Size	Type	Changed
inetpub		File folder	09-10-2025 20:56:40
Intel		File folder	10-10-2025 13:21:30
LAB STEPS		File folder	24-11-2025 17:26:42
linux-vm		File folder	06-11-2025 16:48:29
PerfLogs		File folder	07-12-2019 14:44:52
Program Files		File folder	15-01-2026 11:50:05
Program Files (x86)		File folder	21-01-2026 11:18:46
server		File folder	28-10-2025 11:18:32
ssl		File folder	15-01-2026 11:46:32
SWSetup		File folder	10-10-2025 16:27:50
system.sav		File folder	10-10-2025 16:22:38
Users		File folder	18-12-2025 17:23:32
virtu		File folder	12-11-2025 12:49:13
virtulization		File folder	05-11-2025 23:06:40
virtulization 2		File folder	01-11-2025 17:43:14
virtulization 3		File folder	03-11-2025 22:54:09
VM1		File folder	26-12-2025 15:13:59
Windows		File folder	22-12-2025 14:42:48

/Billing/

Name	Size	Changed	Rights	Owner
..				
Billingfile_1		21-01-2026 13:18:52	rwx------	-

0 B of 0 B in 0 of 18 — 10 hidden — 0 B of 0 B in 0 of 1 — SFTP-3 — 0:00:04



Employees_Data – hr_user@172.191.208.22 – WinSCP

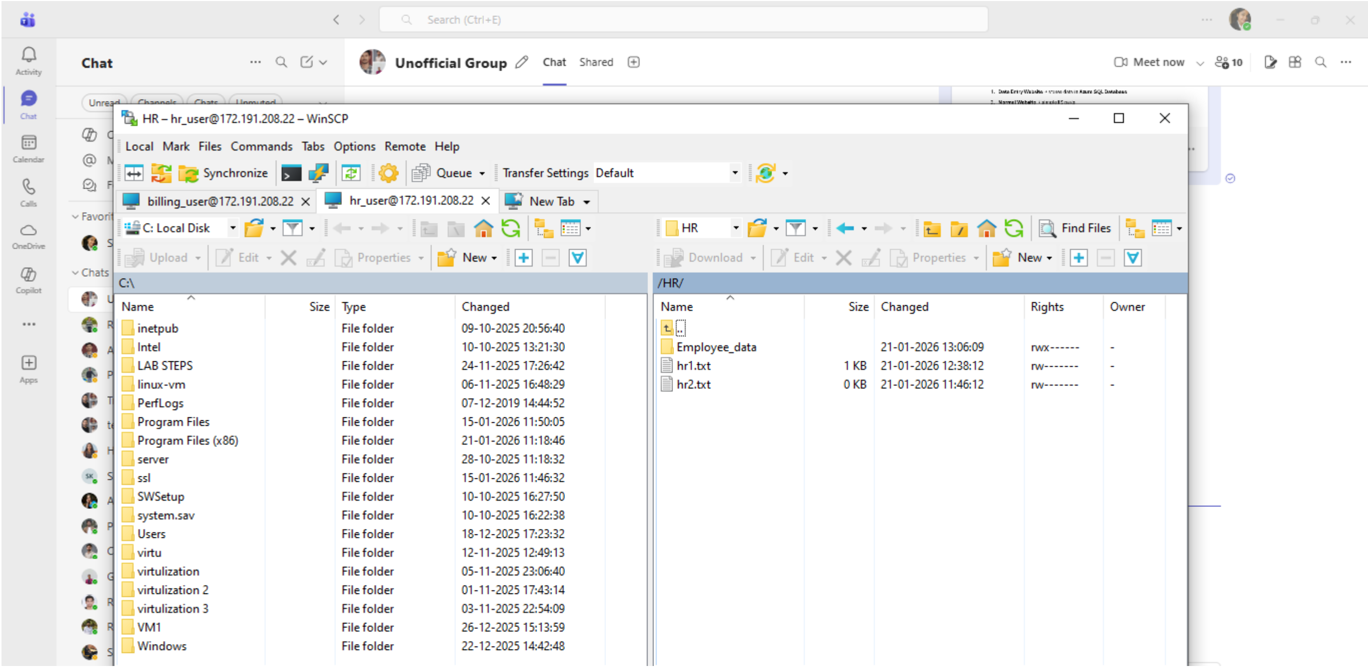
C:\

Name	Size	Type	Changed
inetpub		File folder	09-10-2025 20:56:40
Intel		File folder	10-10-2025 13:21:30
LAB STEPS		File folder	24-11-2025 17:26:42
linux-vm		File folder	06-11-2025 16:48:29
PerfLogs		File folder	07-12-2019 14:44:52
Program Files		File folder	15-01-2026 11:50:05
Program Files (x86)		File folder	21-01-2026 11:18:46
server		File folder	28-10-2025 11:18:32
ssl		File folder	15-01-2026 11:46:32
SWSetup		File folder	10-10-2025 16:27:50
system.sav		File folder	10-10-2025 16:22:38
Users		File folder	18-12-2025 17:23:32
virtu		File folder	12-11-2025 12:49:13
virtulization		File folder	05-11-2025 23:06:40
virtulization 2		File folder	01-11-2025 17:43:14
virtulization 3		File folder	03-11-2025 22:54:09
VM1		File folder	26-12-2025 15:13:59
Windows		File folder	22-12-2025 14:42:48

/Employees_Data/

Name	Size	Changed	Rights	Owner
..				
Helen		21-01-2026 13:26:47	rwx------	-
Roja		21-01-2026 13:26:35	rwx------	-
Sameeksha_Y.S		21-01-2026 13:26:12	rwx------	-

0 B of 0 B in 0 of 18 — 10 hidden — 0 B of 0 B in 0 of 3 — SFTP-3 — 0:01:57



HR – hr_user@172.191.208.22 – WinSCP

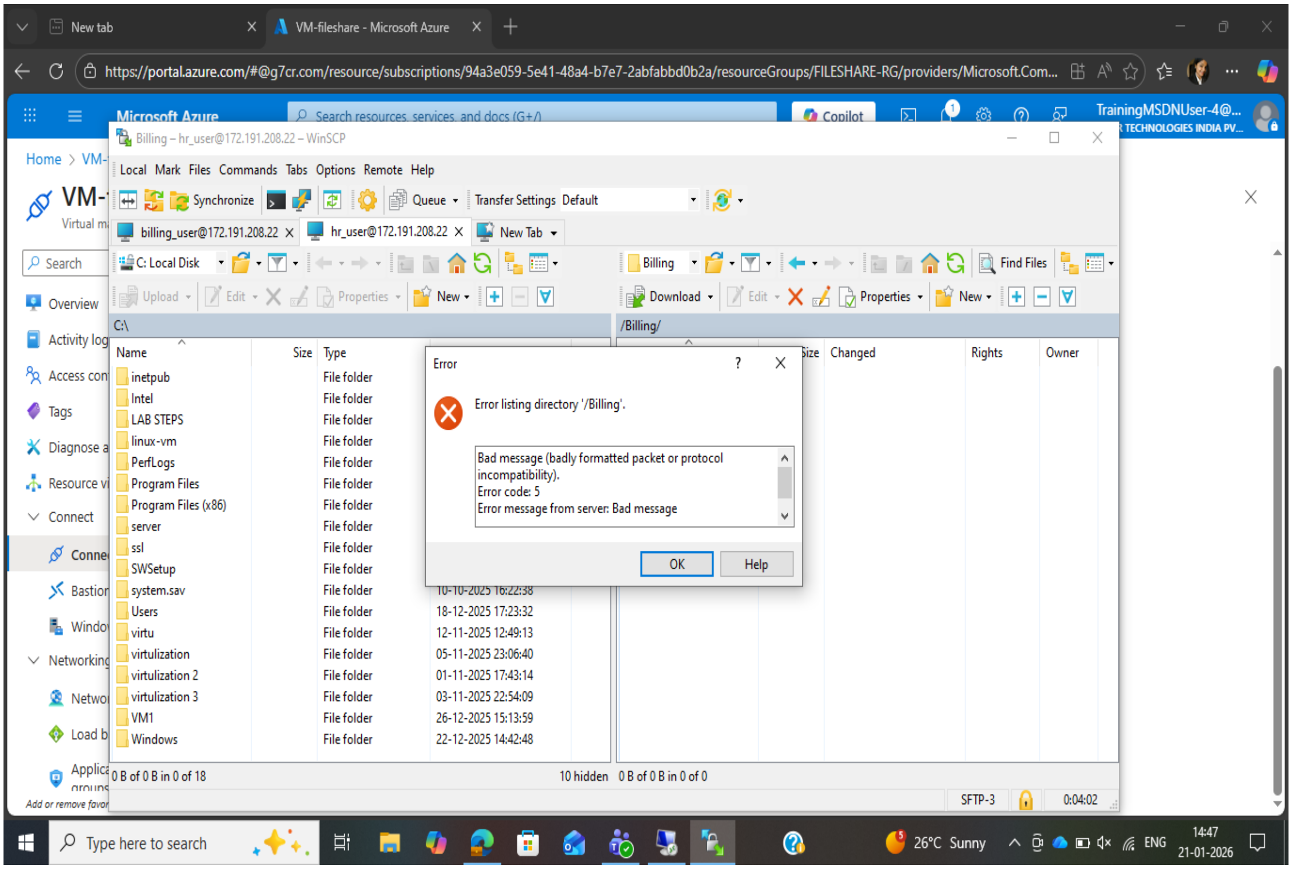
Transfer Settings Default

C:\

Name	Size	Type	Changed
inetpub		File folder	09-10-2025 20:56:40
Intel		File folder	10-10-2025 13:21:30
LAB STEPS		File folder	24-11-2025 17:26:42
linux-vm		File folder	06-11-2025 16:48:29
PerfLogs		File folder	07-12-2019 14:44:52
Program Files		File folder	15-01-2026 11:50:05
Program Files (x86)		File folder	21-01-2026 11:18:46
server		File folder	28-10-2025 11:18:32
ssl		File folder	15-01-2026 11:46:32
SWSetup		File folder	10-10-2025 16:27:50
system.sav		File folder	10-10-2025 16:22:38
Users		File folder	18-12-2025 17:23:32
virtu		File folder	12-11-2025 12:49:13
virtulization		File folder	05-11-2025 23:06:40
virtulization 2		File folder	01-11-2025 17:43:14
virtulization 3		File folder	03-11-2025 22:54:09
VM1		File folder	26-12-2025 15:13:59
Windows		File folder	22-12-2025 14:42:48

/HR/

Name	Size	Changed	Rights	Owner
..				
Employee_data		21-01-2026 13:06:09	rwx------	-
hr1.txt	1 KB	21-01-2026 12:38:12	rw-------	-
hr2.txt	0 KB	21-01-2026 11:46:12	rw-------	-



https://portal.azure.com/#@g7cr.com/resource/subscriptions/94a3e059-5e41-48a4-b7e7-2abfabbd0b2a/resourceGroups/FILESHARE-RG/providers/Microsoft.Com...

Billing – hr_user@172.191.208.22 – WinSCP

Transfer Settings Default

C:\

/Billing/

Error

Error listing directory '/Billing'.

Bad message (badly formatted packet or protocol incompatibility).
Error code: 5
Error message from server: Bad message

OK Help

Name	Size	Type	Changed
inetpub		File folder	
Intel		File folder	
LAB STEPS		File folder	
linux-vm		File folder	
PerfLogs		File folder	
Program Files		File folder	
Program Files (x86)		File folder	
server		File folder	
ssl		File folder	
SWSetup		File folder	
system.sav		File folder	10-10-2025 16:22:38
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virtulization 3		File folder	03-11-2025 22:54:09
VM1		File folder	26-12-2025 15:13:59
Windows		File folder	22-12-2025 14:42:48

0 B of 0 B in 0 of 18   10 hidden   0 B of 0 B in 0 of 0

SFTP-3   0:04:02

8. Final Outcome

- Centralized file server implemented
- Secure folder-level access achieved
- Encrypted SFTP access enabled
- Solution is scalable and enterprise-ready

9. Real-World Use Cases

- Finance and Billing document storage
- HR confidential files
- Internal company file sharing

10. Conclusion

This POC successfully demonstrates how Azure Virtual Machines can be used to implement a secure file server with strict folder-level access control using NTFS permissions and SFTP. The solution aligns with enterprise security standards and is suitable for real-world deployment with enhancements such as Active Directory integration.