

Placement Empowerment Program

Cloud Computing and DevOps Centre

Set Up a Private Network in the Cloud

Create a Virtual Private Cloud (VPC) with subnets for your instances. Configure routing for internal communication between subnets.

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INTRODUCTION

A Virtual Private Cloud (VPC) is a virtual networking environment that allows you to launch AWS resources in a virtual network that you define. Setting up a VPC with subnets and configuring routing for internal communication between subnets is a critical aspect of cloud computing.

OBJECTIVES

1. To understand the concept of a Virtual Private Cloud (VPC)
2. To learn how to create a VPC with subnets
3. To understand how to configure routing for internal communication between subnets
4. To learn how to verify connectivity between subnets

OVERVIEW

This provides a step-by-step approach to setting up a private network in the cloud.

1. Creating a Virtual Private Cloud (VPC)

2. Creating subnets for instances
3. Configuring routing for internal communication between subnets.

IMPORTANCE

Setting up a private network in the cloud is crucial for several reasons:

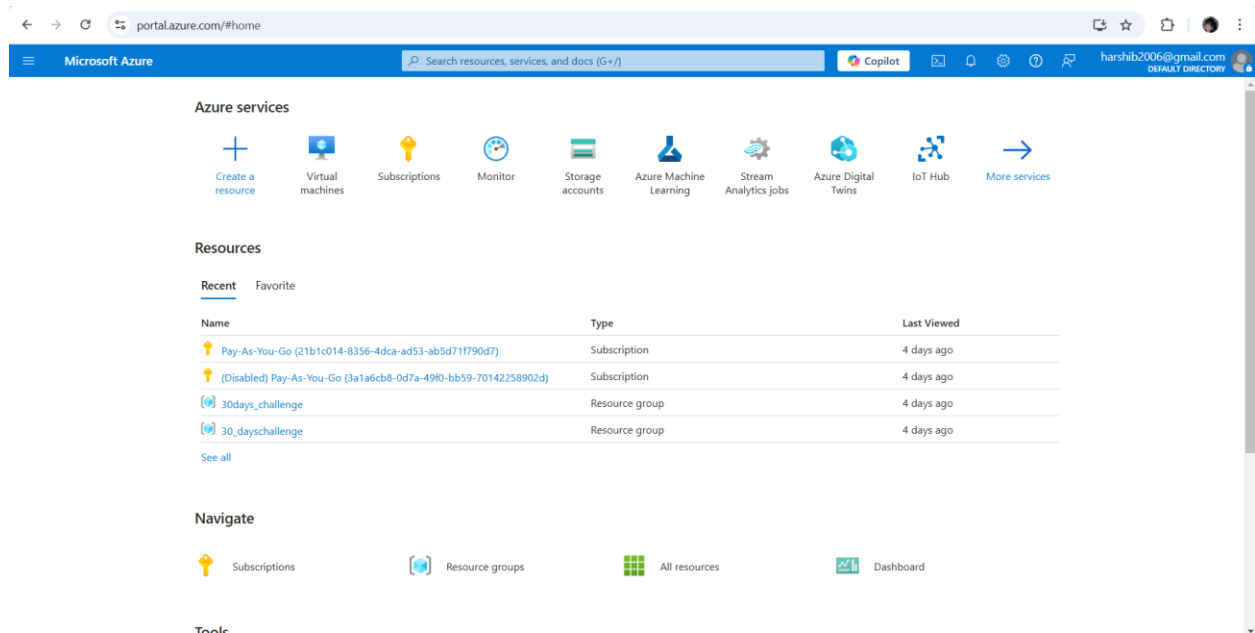
1. Security: A VPC provides a secure environment for your instances, isolated from the public internet.
2. Flexibility: A VPC allows you to define your own virtual networking environment, including subnets, routing tables, and network gateways.
3. Scalability: A VPC allows you to scale your infrastructure up or down as needed, without having to worry about the underlying network infrastructure.

STEP-BY-STEP OVERVIEW

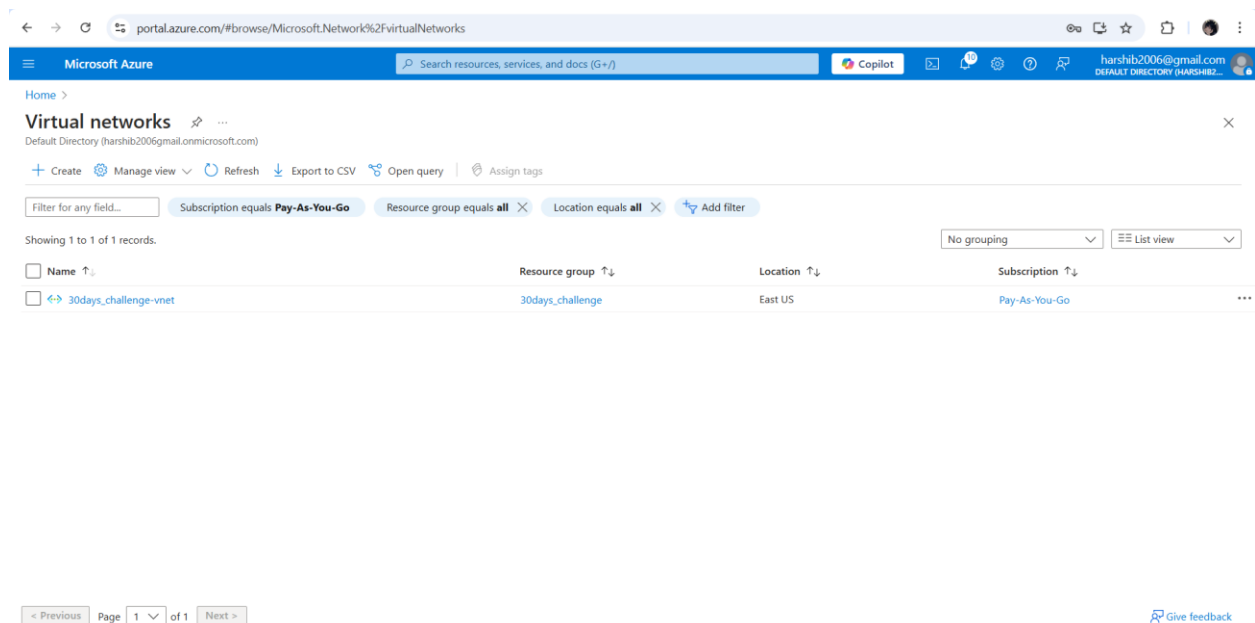
Here's a step-by-step guide to setting up a private network in Azure:

Create a Virtual Private Cloud (VPC)

1. Log in to the Azure portal



2. Click on "Create a resource" and search for "Virtual Network".



3. Select "Virtual Network" and click on "Create".

4. Enter a name for your VPC and select the resource group and location.

5. Configure the address space for your VPC (e.g., 10.0.0.0/16).

6. Click on "Create" to create the VPC.

The screenshot shows the 'Create virtual network' page in the Microsoft Azure portal. The 'IP addresses' tab is selected. The page displays a configuration for a virtual network with the address space 10.0.0.0/16. A warning message indicates that this address prefix overlaps with virtual network 'vm1-vnet'. Below the warning, there is a table with columns: Subnets, IP address range, Size, and NAT gateway. The table shows a single subnet named 'default' with an IP address range of 10.0.0.0 - 10.0.0.255 and a size of 256 (256 addresses). At the bottom of the page, there are buttons for 'Previous', 'Next', and 'Review + create'.

Microsoft Azure

portal.azure.com/#create/Microsoft.VirtualNetwork-ARM

Home > Virtual networks >

Create virtual network

Basics Security IP addresses Tags Review + create

Configure your virtual network address space with the IPv4 and IPv6 addresses and subnets you need. [Learn more](#)

Define the address space of your virtual network with one or more IPv4 or IPv6 address ranges. 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. [Learn more](#)

+ Add a subnet

10.0.0.0/16 [Delete address space](#)

This address prefix overlaps with virtual network 'vm1-vnet'. If you intend to peer these virtual networks, change the address space. [Learn more](#)

10.0.0.0 /16
10.0.0.0 - 10.0.255.255 65,536 addresses

Subnets	IP address range	Size	NAT gateway
default	10.0.0.0 - 10.0.0.255	256 (256 addresses)	-

Previous Next Review + create

[Give feedback](#)

The screenshot shows the 'Create virtual network' page in the Microsoft Azure portal, specifically the 'Review + create' tab. The page displays a summary of the configuration for the virtual network. The 'Basics' section shows the subscription as 'Pay-As-You-Go', the resource group as '30_dayschallenge', the name as 'vnet1', and the region as 'East US'. The 'Security' section shows 'Azure Bastion', 'Azure Firewall', and 'Azure DDoS Network Protection' all as 'Disabled'. The 'IP addresses' section shows the address space as '10.0.0.0/16 (65,536 addresses)' and the subnet as 'default (10.0.0.0/24) (256 addresses)'. At the bottom of the page, there are buttons for 'Previous', 'Next', and 'Create'.

Microsoft Azure

portal.azure.com/#create/Microsoft.VirtualNetwork-ARM

Home > Virtual networks >

Create virtual network

Basics Security IP addresses Tags Review + create

[View automation template](#)

Basics

Subscription Pay-As-You-Go

Resource Group 30_dayschallenge

Name vnet1

Region East US

Security

Azure Bastion Disabled

Azure Firewall Disabled

Azure DDoS Network Protection Disabled

IP addresses

Address space 10.0.0.0/16 (65,536 addresses)

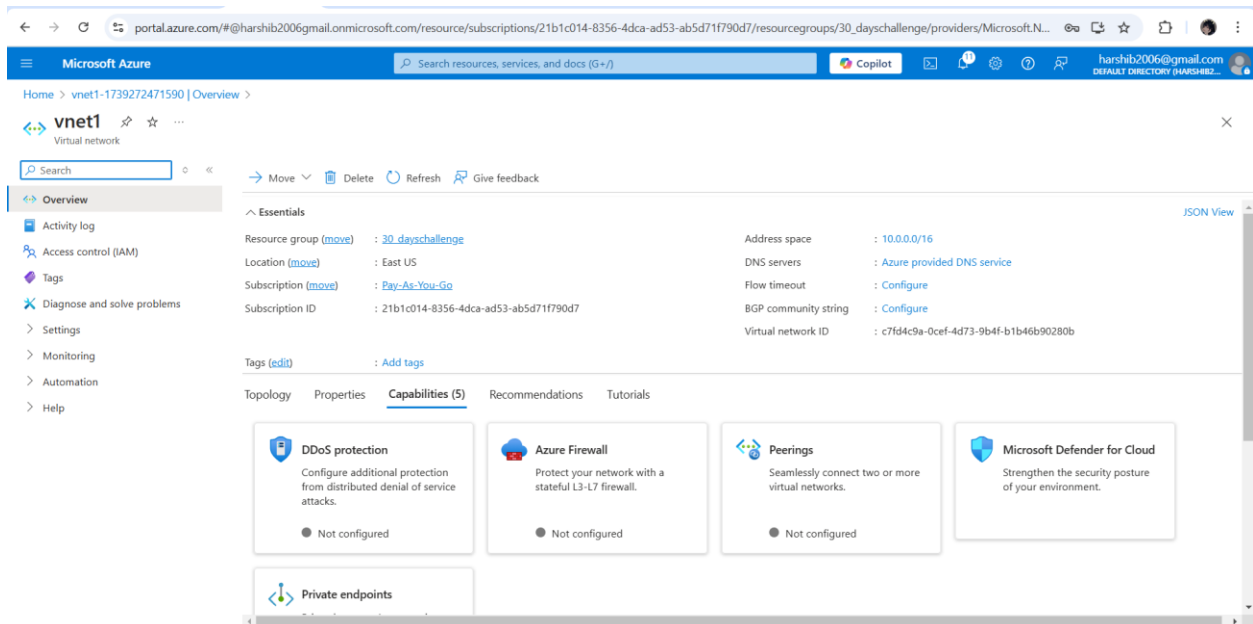
Subnet default (10.0.0.0/24) (256 addresses)

Previous Next Create

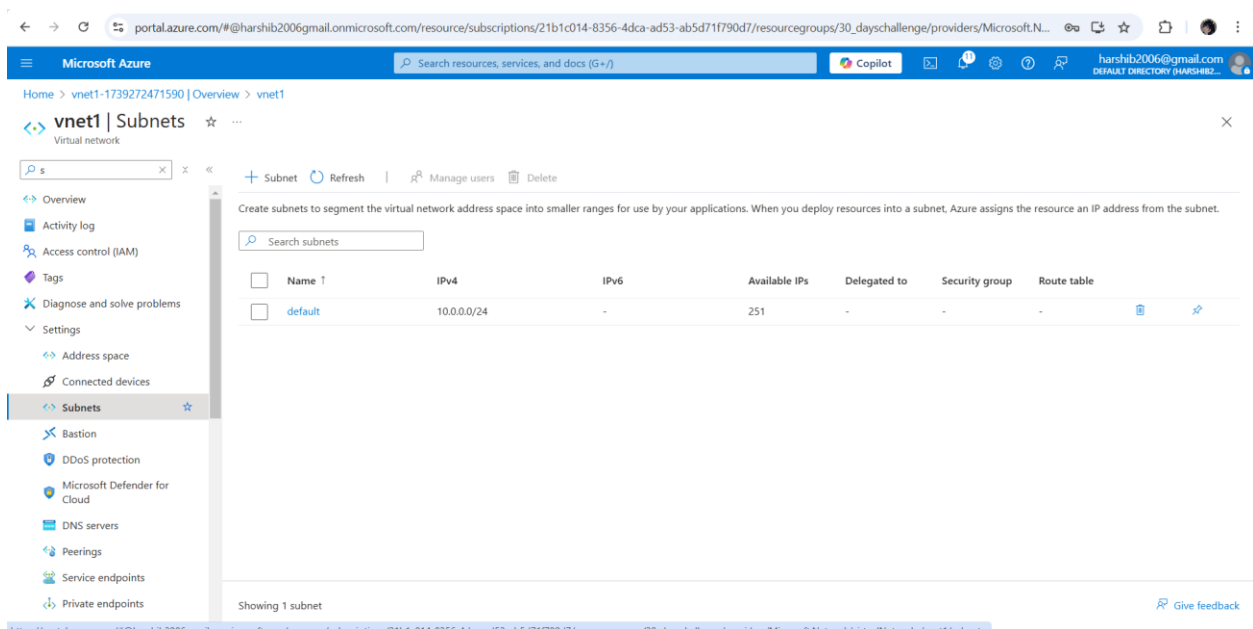
[Give feedback](#)

Create Subnets

1. Navigate to the VPC you created.



2. Click on "Subnets" and then click on "New subnet".



3. Enter a name for the subnet and configure the address range (e.g., 10.0.1.0/24).

4. Click on "Create" to create the subnet.

Microsoft Azure portal interface showing the 'Add a subnet' dialog box. The dialog is for adding a new subnet to a virtual network named 'vnet1'. The 'Subnet purpose' is set to 'Default'. The 'Name' is 'default2'. The 'IPv4' section is checked, and the 'IPv4 address space' is '10.0.0.0/16'. The 'Starting address' is '10.0.1.0', the 'Size' is '/24 (256 addresses)', and the 'Subnet address range' is '10.0.1.0 - 10.0.1.255'. The 'IPv6' section is unchecked. The 'Private subnet' section is also unchecked. The 'Add' button is highlighted.

5. Repeat steps 2-4 to create additional subnets as needed.

Microsoft Azure portal interface showing the 'vnet1 | Subnets' page. The page displays a table of subnets. The table has columns for Name, IPv4, IPv6, Available IPs, Delegated to, Security group, and Route table. Two subnets are listed: 'default' and 'default2'. The 'default' subnet has an IPv4 address space of '10.0.0.0/24' and 251 available IPs. The 'default2' subnet has an IPv4 address space of '10.0.1.0/24' and 251 available IPs. A success message is displayed at the top right: 'Successfully added subnet'.

Name	IPv4	IPv6	Available IPs	Delegated to	Security group	Route table
default	10.0.0.0/24	-	251	-	-	-
default2	10.0.1.0/24	-	251	-	-	-

Configure Routing

1. Navigate to the VPC you created.

2. Click on "Route tables" and then click on "New route table".

portal.azure.com/#create/Microsoft.RouteTable-ARM

Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

harshib2006@gmail.com

Home > Route tables >

Create Route table

Basics Tags **Review + create**

[View automation template](#)

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.

Basics

Subscription	Pay-As-You-Go
Resource group	30_dayschallenge
Region	East US
Name	route1
Propagate gateway routes	Yes

[Previous](#) [Next](#) [Create](#)

[Give feedback](#)

portal.azure.com/#/harshib2006gmail.onmicrosoft.com/resource/subscriptions/21b1c014-8356-4dca-ad53-ab5d71f790d7/resourceGroups/30_dayschallenge/providers/Microsoft.Network...

Microsoft Azure

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Home > Microsoft.RouteTable-20250211165458 | Overview >

route1

Route table

[Move](#) [Delete](#) [Refresh](#) [Give feedback](#)

Overview

- Activity log
- Access control (IAM)
- Diagnose and solve problems
- Settings
 - Configuration
 - Routes
 - Subnets
 - Properties
- Monitoring
 - Alerts
- Automation
 - Export template
- Help
 - Effective routes
 - Support + Troubleshooting

Essentials

Resource group (move) : [30_dayschallenge](#)

Location : East US

Subscription (move) : [Pay-As-You-Go](#)

Subscription ID : 21b1c014-8356-4dca-ad53-ab5d71f790d7

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

Associations : 0 subnet associations

Routes

[Search routes](#)

Name	Address prefix	Next hop type	Next hop IP address
No results.			

Subnets

[Search subnets](#)

Name	Address range	Virtual network	Security group
No results.			

3. Enter a name for the route table and select the VPC.

4. Click on "Create" to create the route table.

5. Configure routes for internal communication between subnets:

- Click on "Routes" and then click on "New route".
- Enter a name for the route and select the route table.
- Configure the address prefix (e.g., 10.0.2.0/24) and next hop type (e.g., "Virtual network gateway").
- Click on "Create" to create the route.

The screenshot displays the Microsoft Azure portal interface. On the left, the navigation pane shows the 'Routes' section under 'Configuration'. The main area is titled 'route1 | Routes' and shows a table with columns 'Name', 'Address prefix', and 'Next hop'. Below the table, it states 'No results.'.

On the right, the 'Add route' configuration panel is open. It includes a description: 'A user defined route (UDR) is a static route that overrides Azure's default system routes, or adds a route to a subnet's route table. [Learn more](#)'. The configuration fields are as follows:

- Route name ***: m1 (with a green checkmark)
- Destination type ***: IP Addresses (dropdown menu)
- Destination IP addresses/CIDR ranges ***: 10.0.2.0/24 (with a green checkmark)
- Next hop type ***: Virtual network gateway (dropdown menu)
- Next hop address**: (empty text field)

At the bottom of the panel, there is a blue 'Add' button and a 'Give feedback' link.

portal.azure.com/#@harshib2006gmail.onmicrosoft.com/resource/subscriptions/21b1c014-8356-4dca-ad53-ab5d71f790d7/resourceGroups/30_dayschallenge/providers/Microsoft.Network...

Microsoft Azure Search resources, services, and docs (G+)

Home > Microsoft.RouteTable-20250211165458 | Overview > route1

route1 | Routes ☆ ...

Route table

+ Add Refresh Give feedback

Search routes

Name ↑↓	Address prefix ↑↓	Next hop type ↑↓	Next hop IP address ↑↓
rm1	10.0.2.0/24	VirtualNetworkGateway	...

Overview

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Help

Effective routes

Support + Troubleshooting

6. Associate the route table with the subnets:

- Navigate to the subnet.

portal.azure.com/#@harshib2006gmail.onmicrosoft.com/resource/subscriptions/21b1c014-8356-4dca-ad53-ab5d71f790d7/resourceGroups/30_dayschallenge/providers/Microsoft.Network...

Microsoft Azure Search resources, services, and docs (G+)

Home > Microsoft.RouteTable-20250211165458 | Overview > route1

route1 | Subnets ☆ ...

Route table

+ Associate

Search subnets

Name ↑↓	Address range ↑↓	Virtual ne
No results.		

Associate subnet

route1

Virtual network ⓘ

vm1-vnet (30_dayschallenge)

Subnet * ⓘ

default

OK

Give feedback

Microsoft Azure portal showing the 'route1 | Subnets' page. The page displays a table with one subnet named 'default' with address range '10.0.0/24' and virtual network 'vm1-vnet'. A notification at the top right says 'Saved route table for subnet'.

Name	Address range	Virtual network	Security group
default	10.0.0/24	vm1-vnet	-

- Click on "Route table" and select the route table.

Verify Connectivity

1. Create a virtual machine (VM) in each subnet.

Microsoft Azure portal showing the 'Create a virtual machine' page. The 'Networking' tab is selected, showing network interface settings. The 'Virtual network' is 'vm1-vnet', 'Subnet' is 'default (10.0.0/24)', and 'Public IP' is '(new) vm1ip593'. The 'NIC network security group' is set to 'Basic'. The 'Estimated monthly costs' sidebar on the right shows a total cost of ₹2,040.06.

Category	Cost (₹)
Basics	₹631.61
Disks	₹439.23
Networking	₹969.22
Public IP	₹303.66
VM outbound data transfer	₹665.56
Estimated monthly cost	₹2,040.06

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

Microsoft Azure

Home > Virtual machines >

Create a virtual machine

Validation passed

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

Basics	
Subscription	Pay-As-You-Go
Resource group	30_dayschallenge
Virtual machine name	vm1
Region	East US
Availability options	Availability zone
Zone options	Self-selected zone
Availability zone	1
Security type	Trusted launch virtual machines
Enable secure boot	Yes
Enable vTPM	Yes
Integrity monitoring	No
Image	Ubuntu Server 24.04 LTS - Gen2
VM architecture	x64
Size	Standard B1s (1 vcpu, 1 GiB memory)
Enable Hibernation	No
Authentication type	SSH public key

Estimated monthly costs

Costs indicated here are estimates only. Pricing may vary depending on your Microsoft agreement, date of purchase, subscription type, usage costs, licensing and currency exchange rates. Total costs may include other resource costs, licensing and subscription implications. This feature may have limited or restricted functionality, but is made available on a preview basis for evaluation and feedback.

Give feedback about your estimate experience

Category	Cost
Basics	₹631.61
Disks	₹439.23
Networking	₹969.22
Management	₹0.00
Estimated monthly cost	₹2,040.06

< Previous Next > Create

Download a template for automation Give feedback

2. Connect to each VM using Remote Desktop or SSH.

portal.azure.com/#@harshib2006gmail.onmicrosoft.com/resource/subscriptions/21b1c014-8356-4dca-ad53-ab5d71f790d7/resourcegroups/30_dayschallenge/providers/Micros...

Microsoft Azure

Home > CreateVm-canonical.ubuntu-24.04-lts-server-20250211170916 | Overview > vm1

vm1 | Connect

net

Refresh Troubleshoot More Options Feedback

Connect

Connecting using Public IP address | 172.208.70.70

Admin username : azureuser

Port (change) : 22 Check access

Just-in-time policy : Unsupported by plan

Recommended Most common

Export template

SSH using Azure CLI

Connect from the Azure portal

Connect from your local machine

- Configure prerequisites for SSH using Azure CLI

Azure needs to configure some features in order to connect to the VM.

 - Prerequisites configured
 - System assigned managed identity

Azure will configure a system-assigned managed identity in order to enable the Microsoft Entra ID login extension. [Learn more](#)
 - Microsoft Entra ID SSH Login Extension

The Microsoft Entra ID based SSH Login extension will securely connect to the VM using Microsoft Entra ID instead of SSH or a username and

Close Troubleshooting Give feedback

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

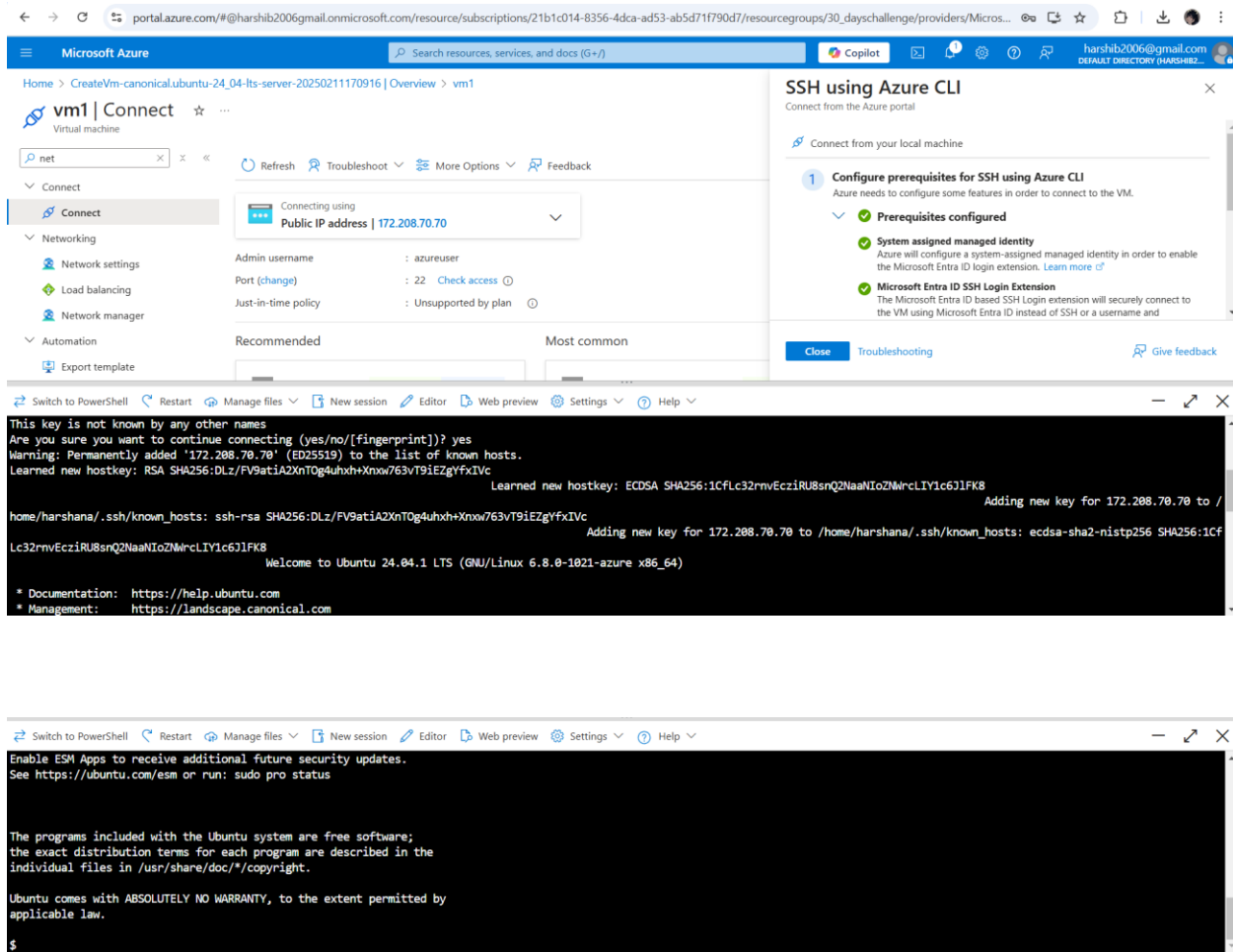
```

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.
harshana [ ~ ]$ az ssh vm --resource-group 30_dayschallenge --vm-name vm1 --subscription 21b1c014-8356-4dca-ad53-ab5d71f790d7
OpenSSH 8.9p1, OpenSSL 1.1.1k FIPS 25 Mar 2021
The authenticity of host '172.288.70.70 (172.288.70.70)' can't be established.
ED25519 key fingerprint is SHA256:WJWtsqyL48RWdDakgVGeog81F9G4VQinoaxRUKDE.
  
```



3. Verify that you can communicate between VMs in different subnets.

That's it! You have now set up a private network in Azure with subnets and routing configured for internal communication.

OUTCOME

After completing, you will be able to:

1. Create a Virtual Private Cloud (VPC) with subnets
2. Configure routing for internal communication between subnets
3. Verify connectivity between subnets
4. Understand the benefits and importance of setting up a private network in the cloud.