

Lab 3: Deployment of Ubuntu OS in Azure Virtual Machine and install Apache2 for static website deployment

Objectives

- a. Deploy an Ubuntu-based Virtual Machine (VM) in Microsoft Azure.
- b. Configure secure access to the VM using SSH.
- c. Install and configure Apache2 web server on the Ubuntu VM.
- d. Deploy a basic static website and verify access via the VM's Public IP.
- e. Understand the workflow of cloud VM provisioning and web server hosting.

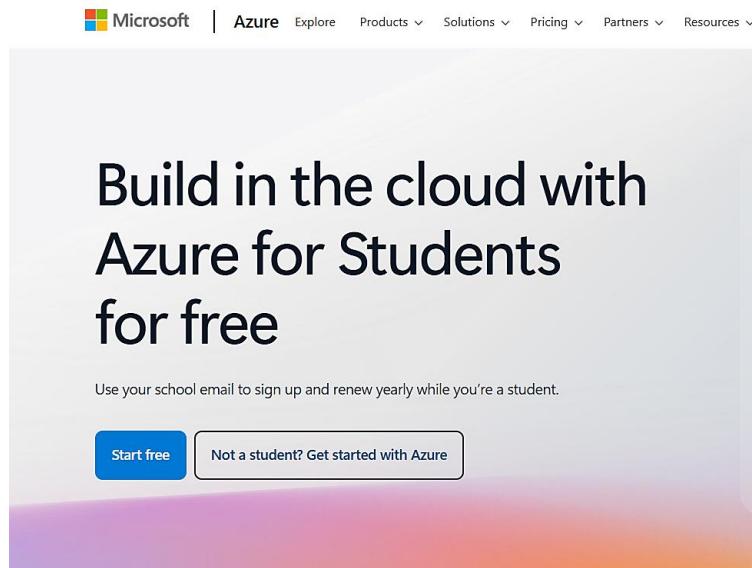
Tools and Technologies Used

- a. Microsoft Azure Portal
- b. Azure Virtual Machine (Ubuntu)
- c. SSH Key Pair (generated during VM creation)
- d. Git Bash / Windows Terminal (for SSH access)
- e. Apache2 Web Server

Procedure

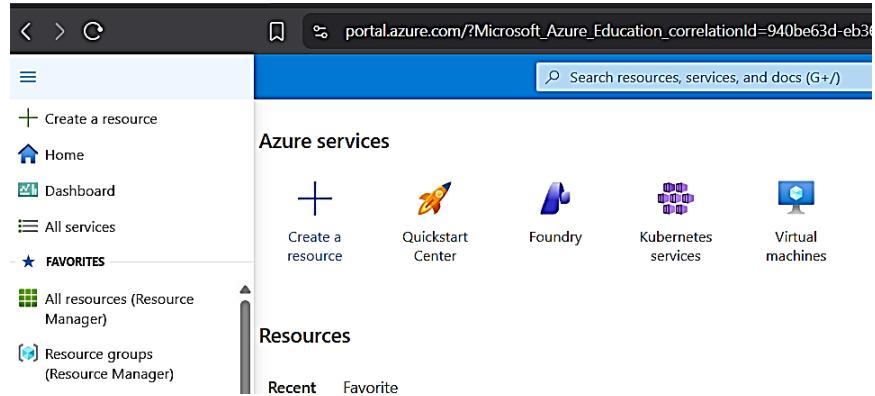
Step 1: Create Azure Free Account

- a. Log in to the Azure portal.
- b. Activate the Free Trial to access free-tier resources.
- c. Navigate to the Azure Home Dashboard.



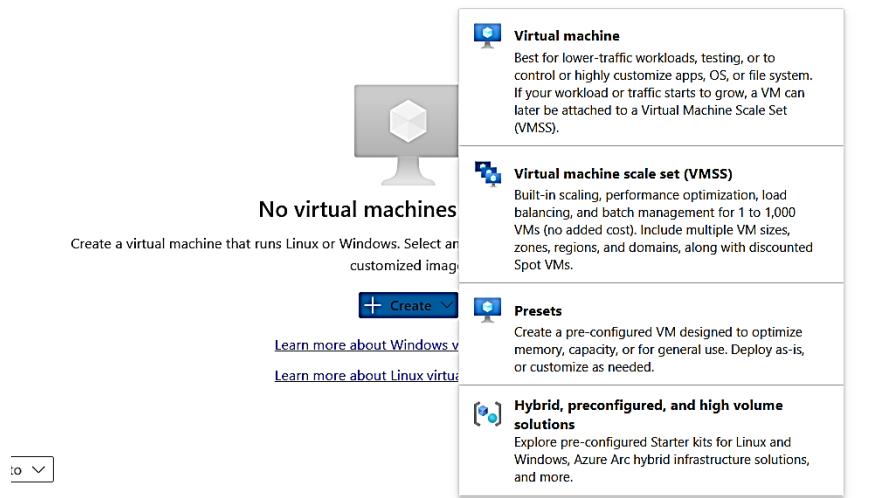
Step 2: Create an Ubuntu Virtual Machine

Go to Home > Azure Services



The screenshot shows the Azure portal's main dashboard. On the left, there's a sidebar with options like 'Create a resource', 'Home', 'Dashboard', 'All services', and 'FAVORITES'. The main area is titled 'Azure services' and contains icons for 'Create a resource' (a plus sign), 'Quickstart Center' (a rocket), 'Foundry' (a blue square), 'Kubernetes services' (a cluster of squares), and 'Virtual machines' (a monitor). Below this, there's a section titled 'Resources' with 'Recent' and 'Favorite' tabs.

Create a resource > Virtual Machine.



The screenshot shows the 'Create a virtual machine' wizard. It starts with a heading 'No virtual machines' and a sub-instruction 'Create a virtual machine that runs Linux or Windows. Select an image and a customization profile.' Below this is a 'Create' button with a dropdown arrow. To the right, there are four options listed in boxes:

- Virtual machine**: Best for lower-traffic workloads, testing, or to control or highly customize apps, OS, or file system. If your workload or traffic starts to grow, a VM can later be attached to a Virtual Machine Scale Set (VMSS).
- Virtual machine scale set (VMSS)**: Built-in scaling, performance optimization, load balancing, and batch management for 1 to 1,000 VMs (no added cost). Include multiple VM sizes, zones, regions, and domains, along with discounted Spot VMs.
- Presets**: Create a pre-configured VM designed to optimize memory, capacity, or for general use. Deploy as-is, or customize as needed.
- Hybrid, preconfigured, and high volume solutions**: Explore pre-configured Starter kits for Linux and Windows, Azure Arc hybrid infrastructure solutions, and more.

Choose the following basic settings:

- Virtual Machine Name: UBUNTU-VM
- Region: (Asia Pacific) Central India
- Availability Zone: Zone1

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Create a virtual machine

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 +1

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

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * Resource group * Create new

Instance details

Virtual machine name *

Region * Deploy to an Azure Extended Zone

Availability options

Zone options Self-selected zone
Choose up to 3 availability zones, one VM per zone
 Azure-selected zone (Preview)
Let Azure assign the best zone for your needs
Using an Azure-selected zone is not supported in region 'Central India'.

Availability zone *
You can now select multiple zones. Selecting multiple zones will create one VM per zone. [Learn more](#)

- d. Security type: Trusted launch virtual machines
- e. Image: Ubuntu Server 24.04 LTS – x64 Gen2
- f. VM architecture: x64
- g. Size: Standard_B2as_v2 – 2vcpus, 8 Gib Memory (\$35.92/month)
- h. Authentication type: SSH public key

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Create a virtual machine

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 +1

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

Security type Configure security features

Image * See all images | Configure VM generation

VM architecture Arm64 x64

Run with Azure Spot discount

Size * See all sizes

Enable Hibernation
Hibernate does not currently support Trusted launch and Confidential virtual machines for Linux images. [Learn more](#)

Administrator account

Authentication type SSH public key Password

- i. Username: azureuser
- j. SSH public key source: public key pair
- k. SSH Key Type: RSA SSH Format
- l. Key pair name: UBUNTU-VM_key
- m. Select inbound ports: HTTP (80), SSH (22)

The screenshot shows the 'Create a virtual machine' wizard in Microsoft Azure. The 'Virtual machine type' is selected. Configuration details include:

- Username:** azureuser
- SSH public key source:** Generate new key pair
- SSH Key Type:** RSA SSH Format (selected)
- Key pair name:** UBUNTU-VM_key
- Inbound port rules:**
 - Public inbound ports:** Allow selected ports (selected)
 - Selected inbound ports:** HTTP (80), SSH (22) (selected)

Step 3: Connect to the VM through SSH

After deployment, go to Home > Virtual Machines > Connect > SSH.

The screenshot shows the 'UBUNTU-VM | Connect' page in Microsoft Azure. The 'Native SSH' tab is active. Connection settings are as follows:

- Source machine:** Windows, Local IP: 103.180.241.10
- Destination VM:** Public IP: 135.235.194.199, Port: 22
- Connection prerequisites:** Check inbound NSG rules (selected)
- SSH command:** ssh -i <private-key-file-path> azureuser@135.235.194.199

A note at the bottom states: "⚠ Private key file path missing Edit settings".

Copy the SSH command given in the portal > Open Git Bash on your PC > Navigate to .pem file.

Run the SSH command:

- a. chmod 400 UBUBTU-VM_key.pem
- b. ssh -i UBUNTU-VM_key.pem azureuser@135.235.194.199

```
Sandesh Khatiwada@Sandesh MINGW64 ~/downloads
$ chmod 400 UBUNTU-VM_key.pem

Sandesh Khatiwada@Sandesh MINGW64 ~/downloads
$ ssh -i UBUNTU-VM_key.pem azureuser@135.235.194.199
The authenticity of host '135.235.194.199 (135.235.194.199)' can't be established.
ED25519 key fingerprint is SHA256:vBIUQezYk1e7tDdSRIY4iW6nqKRKQJBRAjI0YAHP88s.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '135.235.194.199' (ED25519) to the list of known hosts.
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 Mon Nov 24 01:35:51 UTC 2025

System load:  0.16           Processes:          118
Usage of /:   5.6% of 28.02GB  Users logged in:    0
Memory usage: 3%            IPv4 address for eth0: 172.16.0.4
Swap usage:   0%
```

Step 4: Update Packages and Install Apache2

- a. Inside the VM terminal:
- b. Update package lists:
- c. sudo apt update
- d. Install Apache2:

```
azuser@UBUNTU-VM:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1t64 libaprutil1-dbd-sqlite3 libaprutil1-ldap libaprutil1t64 liblua5.4-0 ssl-cert
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1t64 libaprutil1-dbd-sqlite3 libaprutil1-ldap libaprutil1t64 liblua5.4-0
0 upgraded, 10 newly installed, 0 to remove and 37 not upgraded.
Need to get 2086 kB of archives.
After this operation, 8090 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 libapr1t64 amd64 1.7.2-3.1ubuntu0.1 [108 kB]
Get:2 http://azure.archive.ubuntu.com/ubuntu noble/main amd64 libaprutil1t64 amd64 1.6.3-1.1ubuntu7 [91.9 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu noble/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.3-1.1ubuntu7 [11.2 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu noble/main amd64 libaprutil1-ldap amd64 1.6.3-1.1ubuntu7 [9116 B]
Get:5 http://azure.archive.ubuntu.com/ubuntu noble/main amd64 liblua5.4-0 amd64 5.4.6-3build2 [166 kB]
Get:6 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 apache2-bin amd64 2.4.58-1ubuntu8.8 [1331 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 apache2-data all 2.4.58-1ubuntu8.8 [163 kB]
Get:8 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 apache2-utils amd64 2.4.58-1ubuntu8.8 [97.7 kB]
Get:9 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 apache2 amd64 2.4.58-1ubuntu8.8 [90.2 kB]
Get:10 http://azure.archive.ubuntu.com/ubuntu noble/main amd64 ssl-cert all 1.1.2ubuntu1 [17.8 kB]
Fetched 2086 kB in 0s (28.6 MB/s)
Preconfiguring packages ...
Selecting previously unselected package libapr1t64:amd64.
(Reading database ... 68419 files and directories currently installed.)
Preparing to unpack .../0-libapr1t64_1.7.2-3.1ubuntu0.1_amd64.deb ...
Unpacking libapr1t64:amd64 (1.7.2-3.1ubuntu0.1) ...
```

e. systemctl status apache2

```
azureuser@UBUNTU-VM:~$ systemctl status apache2
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
    Active: active (running) since Mon 2025-11-24 01:44:57 UTC; 3min 17s ago
      Docs: https://httpd.apache.org/docs/2.4/
           Main PID: 2743 (apache2)
             Tasks: 55 (limit: 9444)
            Memory: 5.2M (peak: 5.4M)
              CPU: 43ms
            CGroup: /system.slice/apache2.service
                      ├─2743 /usr/sbin/apache2 -k start
                      ├─2745 /usr/sbin/apache2 -k start
                      └─2747 /usr/sbin/apache2 -k start

Nov 24 01:44:57 UBUNTU-VM systemd[1]: Starting apache2.service - The Apache HTTP Server...
Nov 24 01:44:57 UBUNTU-VM systemd[1]: Started apache2.service - The Apache HTTP Server.
azureuser@UBUNTU-VM:~$
```

f. sudo systemctl stop apache2

```
azureuser@UBUNTU-VM:~$ sudo systemctl stop apache2
azureuser@UBUNTU-VM:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
    Active: inactive (dead) since Mon 2025-11-24 01:49:13 UTC; 8s ago
      Duration: 4min 15.902s
        Docs: https://httpd.apache.org/docs/2.4/
     Process: 3119 ExecStop=/usr/sbin/apachectl graceful-stop (code=exited, status=0/SUCCESS)
   Main PID: 2743 (code=exited, status=0/SUCCESS)
     CPU: 66ms

Nov 24 01:44:57 UBUNTU-VM systemd[1]: Starting apache2.service - The Apache HTTP Server...
Nov 24 01:44:57 UBUNTU-VM systemd[1]: Started apache2.service - The Apache HTTP Server.
Nov 24 01:49:13 UBUNTU-VM systemd[1]: Stopping apache2.service - The Apache HTTP Server...
Nov 24 01:49:13 UBUNTU-VM systemd[1]: apache2.service: Deactivated successfully.
Nov 24 01:49:13 UBUNTU-VM systemd[1]: Stopped apache2.service - The Apache HTTP Server.
azureuser@UBUNTU-VM:~$
```

g. sudo systemctl start apache2

```
azureuser@UBUNTU-VM:~$ sudo systemctl start apache2
azureuser@UBUNTU-VM:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
    Active: active (running) since Mon 2025-11-24 01:50:22 UTC; 10s ago
      Docs: https://httpd.apache.org/docs/2.4/
     Process: 3136 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUCCESS)
   Main PID: 3139 (apache2)
     Tasks: 55 (limit: 9444)
    Memory: 5.1M (peak: 5.5M)
      CPU: 29ms
    CGroup: /system.slice/apache2.service
              ├─3139 /usr/sbin/apache2 -k start
              ├─3141 /usr/sbin/apache2 -k start
              └─3142 /usr/sbin/apache2 -k start

Nov 24 01:50:22 UBUNTU-VM systemd[1]: Starting apache2.service - The Apache HTTP Server...
Nov 24 01:50:22 UBUNTU-VM systemd[1]: Started apache2.service - The Apache HTTP Server.
azureuser@UBUNTU-VM:~$ |
```

Step 5: Deploy Static Website

- a. Navigate to the Apache web directory:
- b. cd /var/www/html

```
azureuser@UBUNTU-VM: /var/www/html
azureuser@UBUNTU-VM:/var/www/html$ cd /var/www/html
azureuser@UBUNTU-VM:/var/www/html$ ls
index.html
azureuser@UBUNTU-VM:/var/www/html$ cat index.html
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
 "http://www.w3.org/1999/xhtml">
<!--
 Modified from the Debian original for Ubuntu
 Last updated: 2022-03-22
 See: https://launchpad.net/bugs/1966004
-->
```

- c. Edit or replace the default index.html:
- d. sudo nano index.html



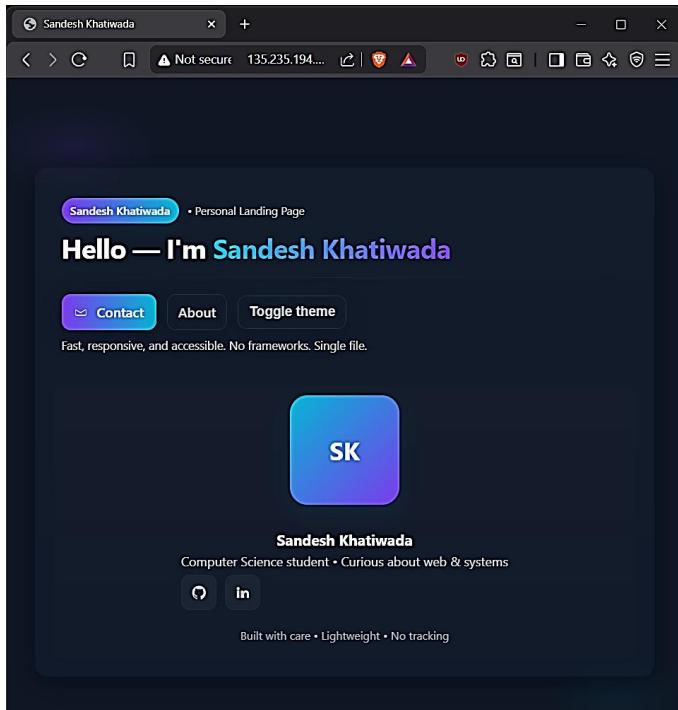
- e. Write any simple HTML content
- f. Save and exit (Ctrl X, Y, Enter).

Step 6: Access the Website

- a. Go back to the VM page in Azure.
- b. Check Networking > Public IP or find the Primary NIC Public IP.

Operating system : Linux (ubuntu 24.04)
Size : Standard_B2as_v2
Primary NIC public IP : 135.235.194.199
[1 associated public IPs](#)

- c. Open any browser and enter: <http://135.235.194.199>



Conclusion

In this lab, an Ubuntu Virtual Machine was successfully deployed in Microsoft Azure using the free-tier setup. The VM was accessed securely via SSH, and Apache2 was installed to host a basic static website. By replacing the default index.html, web content was served publicly through the VM's assigned public IP. This exercise demonstrates foundational cloud skills: VM provisioning, remote access, package installation, and basic web hosting.