

Lab 2: Deploy a Virtual Machine Instance (IaaS), Configure a Web Server (PaaS), and Use a Software Application (SaaS) using GCP Free Tier

Objective

To demonstrate the use of Google Cloud Platform (GCP) Free Tier for deploying:

- A Virtual Machine (IaaS)
- A Web Server (PaaS)
- A Cloud-hosted Software Application (SaaS)

Software/Tools Required

- Google Cloud Platform (GCP) Free Tier Account
- Compute Engine (VM instance)
- Apache Web Server
- Web Browser (Chrome or Firefox)

Theory

IaaS – Infrastructure as a Service

- In IaaS, users get access to virtualized hardware resources such as VMs, networks, and storage.
- In this lab, we will launch a virtual machine instance using GCP Compute Engine.

PaaS – Platform as a Service

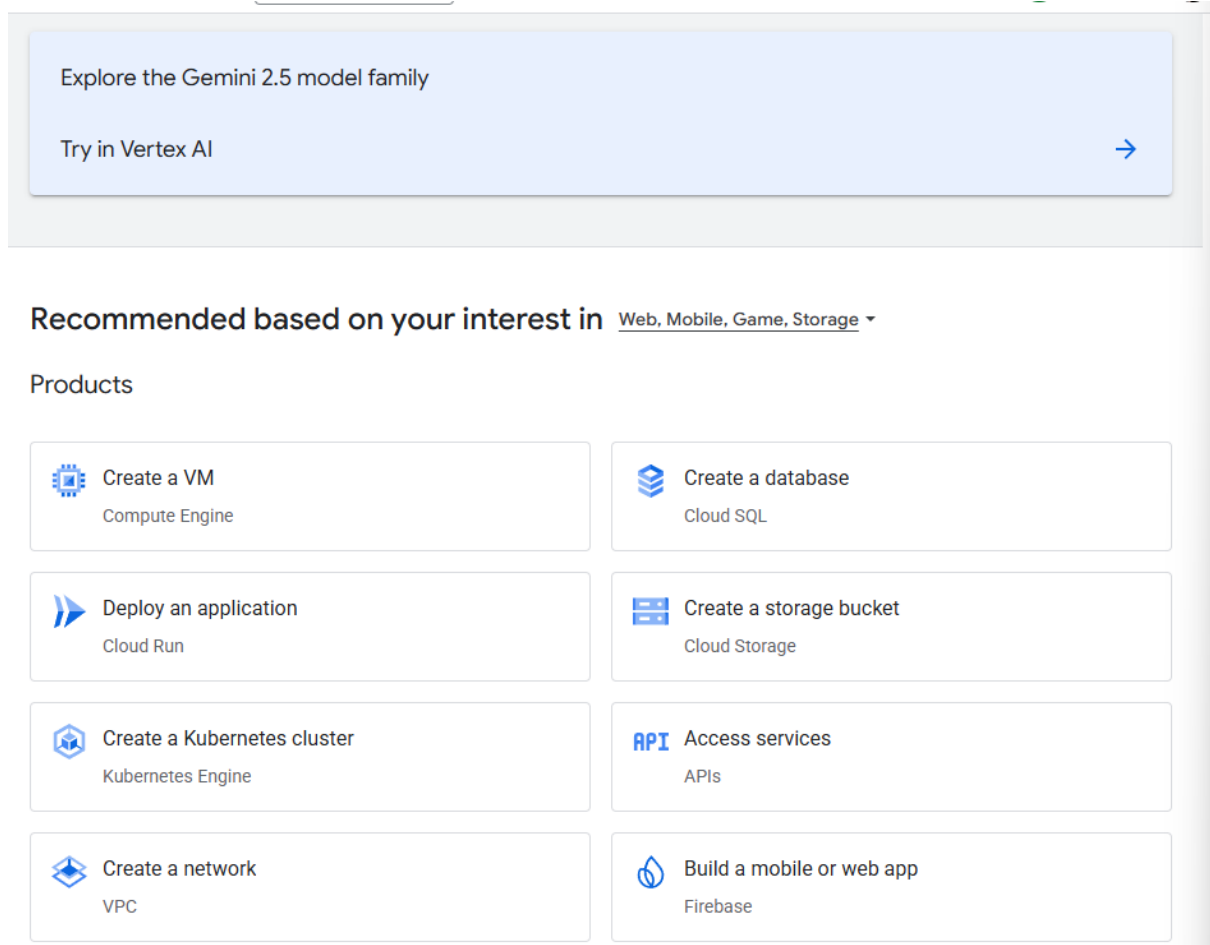
- In PaaS, cloud providers offer an environment for hosting applications without managing underlying OS.
- We will configure a web server (Apache) on the VM to host a basic web page.

SaaS – Software as a Service

- SaaS provides ready-to-use software applications hosted in the cloud.
- For this lab, we will use a SaaS tool like Google Docs or Gmail directly from the browser, showing how cloud apps work without installation.

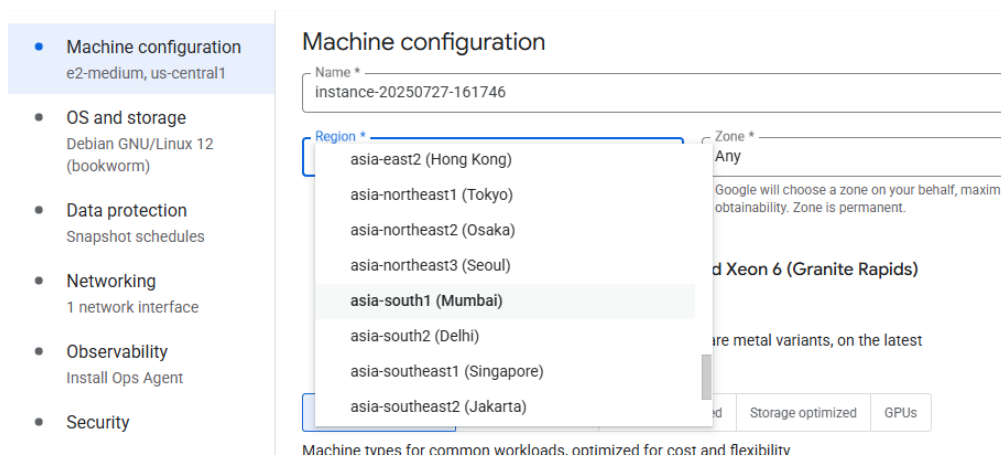
Deploy a Virtual Machine Instance (IaaS)

Step 1: Open Google Cloud Console and click on Create a VM



Step 2: Configure the VM

Select the Region to asia-northeast2 (Mumbai)



Step 3: Choose the machine series to E2

- Machine configuration
e2-medium, asia-south1
- OS and storage
Debian GNU/Linux 12 (bookworm)
- Data protection
Snapshot schedules
- Networking
1 network interface
- Observability
Install Ops Agent
- Security
- Advanced

New C4 machine types with Titanium SSD and Xeon 6 (Granite Rapids) now in Preview

✓ Try new C4 machine types, including local SSD and bare metal variants, on the latest [Try now](#)

✓ General purpose

Compute optimized

Memory optimized

Storage optimized

GPUs

Machine types for common workloads, optimized for cost and flexibility

	Series	Description	vCPUs	Memory	CPU Platform
<input type="radio"/>	C4	Consistently high performance	2 - 288	4 - 2,232 GB	Intel Emerald
<input type="radio"/>	C4A	Arm-based consistently high performance	1 - 72	2 - 576 GB	Google Axion
<input type="radio"/>	C4D	Consistently high performance	2 - 384	3 - 3,072 GB	AMD Turin
<input type="radio"/>	N4	Flexible & cost-optimized	2 - 80	4 - 640 GB	Intel Emerald
<input type="radio"/>	C3	Consistently high performance	4 - 192	8 - 1,536 GB	Intel Sapphire
<input type="radio"/>	C3D	Consistently high performance	4 - 360	8 - 2,880 GB	AMD Genoa
<input checked="" type="radio"/>	E2	Low cost, day-to-day computing	0.25 - 32	1 - 128 GB	Intel Broadwe
<input type="radio"/>	N2	Balanced price & performance	2 - 128	2 - 864 GB	Intel Cascade
<input type="radio"/>	N2D	Balanced price & performance	2 - 224	2 - 896 GB	AMD Milan
<input type="radio"/>	T2A	Scale-out workloads	1 - 48	4 - 192 GB	Ampere Altra
<input type="radio"/>	T2D	Scale-out workloads	1 - 60	4 - 240 GB	AMD Milan
<input type="radio"/>	N1	Balanced price & performance	0.25 - 96	0.6 - 624 GB	Intel Haswell

Step 4: Choose the machine type to e2-micro

Machine type

Choose a machine type with preset amounts of vCPUs and memory that suit most workloads. Or, you can create a custom machine for your workload's particular needs. [Learn more](#)

Preset

Custom

e2-micro (2 vCPU, 1 core, 1 GB memory)

vCPU

0.25-2 vCPU (1 shared core)

Memory

1 GB

Step 5: Go to Networking option and allow both http and https traffic

- Machine configuration
e2-micro, asia-south1
- OS and storage
Debian GNU/Linux 12 (bookworm)
- Data protection
Snapshot schedules
- Networking
2 firewall rules, 1 network interface
- Observability
Install Ops Agent
- Security
- Advanced

Networking

Firewall ⓘ

Select firewall rules to allow specific network traffic from the Internet. Firewall rules will only be applied when an instance is created.

☒ Allow HTTP traffic

☒ Allow HTTPS traffic

☐ Allow Load Balancer Health Checks

Network tags

Network tags

https-server × http-server × ⓘ

Hostname

Hostname ⓘ

Set a custom hostname for this instance or leave it default. Choice is permanent

IP forwarding ⓘ

Step 6: Click on create

Add a network interface

Create

Cancel

↔ Equivalent code

Step 7: Click on SSH to connect linux VM

VM instances						
Filter Enter property name or value ⓘ ⓘ						
<input type="checkbox"/> Status	Name ↑	Zone	Recommendations	In use	Connect	
<input type="checkbox"/> ✓	instance-20250727-161746	asia-south1-c			SSH	⌵ ⋮

Step 8: Go to superuser mode

Command: sudo su

ssh.cloud.google.com/v2/ssh/projects/affable-album-464616-u3/zones/asi



SSH-in-browser

```
saikatparamanik1136@instance-20250727-161746:~$ sudo su
root@instance-20250727-161746:/home/saikatparamanik1136#
```

Step 9: Install Apache web server (PaaS)

Command : sudo apt update

sudo apt install apache2 -y



SSH-in-browser

UPLOAD FILE

```
saikatparamanik1136@instance-20250727-161746:~$ sudo su
root@instance-20250727-161746:/home/saikatparamanik1136# sudo apt update
sudo apt install apache2 -y
```

Step 10: Make sure that apache is running

Command: sudo systemctl status apache2

```
root@instance-20250727-161746:/var/www/html# sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; preset: enabled)
   Active: active (running) since Sun 2025-07-27 16:48:56 UTC; 1min 51s ago
     Docs: https://httpd.apache.org/docs/2.4/
    Main PID: 4970 (apache2)
      Tasks: 55 (limit: 1136)
     Memory: 9.2M
        CPU: 62ms
    CGroup: /system.slice/apache2.service
            └─4970 /usr/sbin/apache2 -k start
              └─4971 /usr/sbin/apache2 -k start
                └─4972 /usr/sbin/apache2 -k start

Jul 27 16:48:56 instance-20250727-161746 systemd[1]: Starting apache2.service - The Apache HTTP Server...
Jul 27 16:48:56 instance-20250727-161746 systemd[1]: Started apache2.service - The Apache HTTP Server.
root@instance-20250727-161746:/var/www/html#
```

Step 11: Copy external IP of the VM

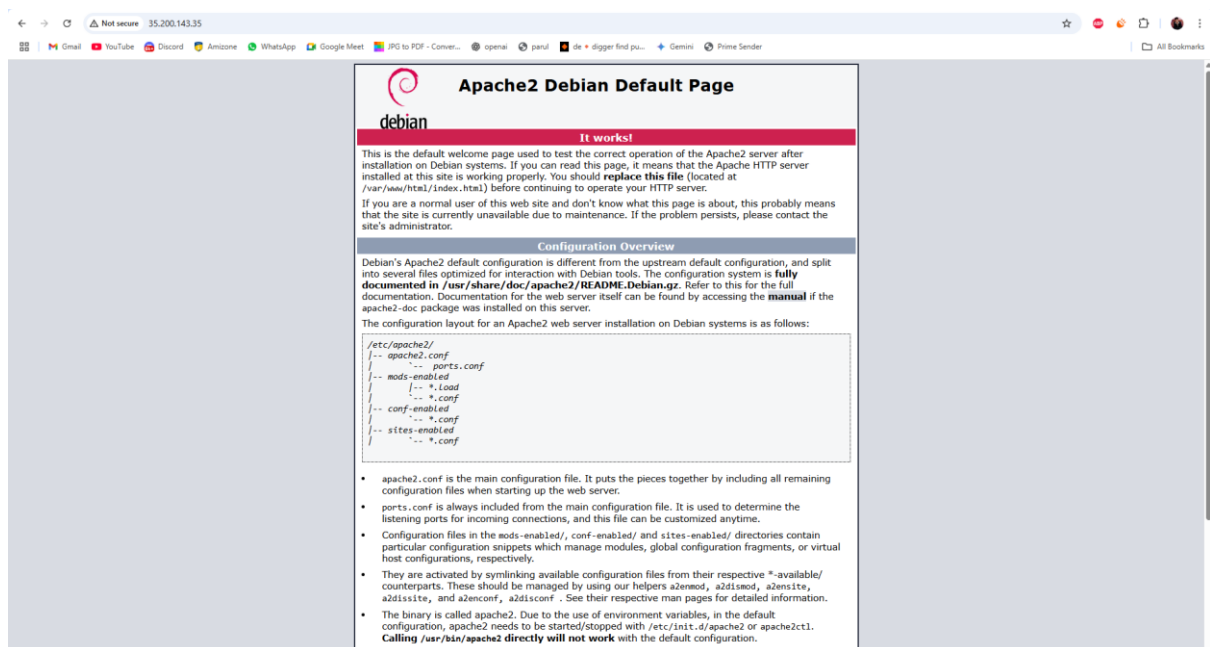
VM instances

Filter Enter property name or value						
<input type="checkbox"/> Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP
<input type="checkbox"/>	instance-20250727-161746	asia-south1-c			10.160.0.3 (nic0)	35.200.143.35 (nic0)

Related actions

Step 12: Paste external IP on web - browser

Result:



Step 13: Use a Software Application (SaaS)

Open a SaaS Application

Example: Google Docs

Visit: <https://docs.google.com>

click **Blank Document** to create a new document.

You can also open:

- **Gmail** → <https://mail.google.com>
- **Google Drive** → <https://drive.google.com>
- **Google Meet** → <https://meet.google.com>

