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# Setting up Virtual Machine on Google Cloud

The screenshot shows the Google Cloud Compute Engine interface. On the left, a sidebar navigation includes 'Compute Engine' (selected), 'Overview', 'Virtual machines' (selected), 'VM instances' (highlighted), 'Instance templates', 'Sole-tenant nodes', 'Machine images', 'TPUs', 'Committed use discounts', 'Reservations', and 'Migrate to Virtual Machines'. Under 'Storage', there are 'Disks', 'Storage Pools', 'Snapshots', 'Images', and 'Async Replication'. Under 'Instance groups', there are 'Marketplace' and 'Release Notes'. The main content area is titled 'VM instances' with tabs for 'Instances', 'Observability', and 'Instance schedules'. It features a search bar and columns for 'Status', 'Name', 'Zone', 'Recommendations', 'In use by', 'Internal IP', 'External IP', and 'Connect'. A large green dashed box highlights a specific instance named 'STT AI - Docker'. Below the table, a section titled 'VM Instances' explains the service's purpose: 'Compute Engine lets you use virtual machines that run on Google's infrastructure. Create micro-VMs or larger instances running Debian, Windows, or other standard images. Create your first VM instance, import it using a migration service, or try the quickstart to build a sample app.' It includes 'Create instance' and 'Take the quickstart' buttons.

The screenshot shows the 'Create an instance' dialog. On the left, a sidebar lists configuration sections: 'Machine configuration' (selected), 'OS and storage', 'Data protection', 'Networking', 'Observability', 'Security', and 'Advanced'. The 'Machine configuration' section shows a 'Preset' (e2-custom-4) selected. The 'Custom' tab is active, showing options for 'Creating a custom machine incurs additional costs'. It includes sliders for 'Cores' (set to 1), 'Memory' (set to 2 GB), and 'vCPUs to core ratio' (set to 1 vCPU per core). To the right, a 'Monthly estimate' table shows costs for 4 vCPUs + 2 GB memory (\$81.63), 10 GB balanced persistent disk (\$1.20), Logging, Monitoring, Snapshot schedule, and a total of \$82.83. A note states: '\* The number of vCPUs available might be less than the machine size.' Below the table are links for 'Compute Engine pricing' and 'Cloud Operations pricing'. At the bottom, there are 'Create' and 'Cancel' buttons.

The screenshot shows the Google Cloud Compute Engine interface for creating a new VM instance. The instance is named 'STT AI - Docker'. The configuration includes:

- Machine configuration:** e2-custom-4-2048, asia-south1-a, 1 vCPU per core
- OS and storage:** Ubuntu 20.04 LTS
- Data protection:** Snapshot schedules
- Networking:** 1 network interface
- Observability:** Install Ops Agent
- Security:**
- Advanced:**

**Operating system and storage:**

Name	instance-20250325-182837
Type	New balanced persistent disk
Size	10 GB
Snapshot schedule	default-schedule-1
License type	Free
Image	Ubuntu 20.04 LTS

**Additional disks:** Buttons for '+ Add new disk', '+ Attach existing disk', and '+ Add local SSD'.

**Container:** Deploy a container image to this VM instance. Buttons for '+ Deploy container'.

**Monthly estimate:** \$82.83. Pay for what you use: no upfront costs and per second billing.

Item	Monthly estimate
4 vCPU + 2 GB memory*	\$81.63
10 GB balanced persistent disk	\$1.20
Logging	Cost varies
Monitoring	Cost varies
Snapshot schedule	Cost varies
Total	\$82.83

\* The number of vCPUs available might be less than the machine size.

[Compute Engine pricing](#) [Cloud Operations pricing](#) [Less](#)

## Building Docker Images

```
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker network create app
network
>>
Error response from daemon: network with name app-network already exists
```

```

PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker build -t unknown777
77/fastapi:1 frontend/
[+] Building 4.3s (11/11) FINISHED                                            docker:desktop-linux
=> [internal] load build definition from Dockerfile                         0.1s
=> => transferring dockerfile: 316B                                         0.0s
=> [internal] load metadata for docker.io/library/python:3.9-slim          3.2s
=> [auth] library/python:pull token for registry-1.docker.io                0.0s
=> [internal] load .dockerignore                                           0.0s
=> => transferring context: 2B                                              0.0s
=> [1/5] FROM docker.io/library/python:3.9-slim@sha256:e52ca5f579cc58fed41efccb55a0ed5dccf6c7a156cba76 0.1s
=> => resolve docker.io/library/python:3.9-slim@sha256:e52ca5f579cc58fed41efccb55a0ed5dccf6c7a156cba76 0.1s
=> [internal] load build context                                           0.0s
=> => transferring context: 94B                                             0.0s
=> CACHED [2/5] WORKDIR /app                                              0.0s
=> CACHED [3/5] COPY requirements.txt .                                     0.0s
=> CACHED [4/5] RUN pip install --no-cache-dir -r requirements.txt       0.0s
=> CACHED [5/5] COPY . .                                                 0.0s
=> exporting to image                                                       0.7s
=> => exporting layers                                                     0.0s
=> => exporting manifest sha256:a550c75bb7ce087d7312722a62008e83c2cf2bf86f0aed9ff1bb8ac4e72a6634 0.0s
=> => exporting config sha256:f473a0598c72404299726e82813da684884e53663d9b501e275520a99116d76 0.0s
=> => exporting attestation manifest sha256:d74655300db0098fa6d9da618d3c4fa8b5a6f11cd696fb39b99ac40dc4 0.1s
=> => exporting manifest list sha256:79d0ae94e424df5db0f8bee7326f74934c8550227014e57d454cb4ce93ed1011 0.0s

PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker build -t unknown777
77/fastapi:2 backend/
[+] Building 3.5s (11/11) FINISHED                                            docker:desktop-linux
=> [internal] load build definition from Dockerfile                         0.0s
=> => transferring dockerfile: 314B                                         0.0s
=> [internal] load metadata for docker.io/library/python:3.9-slim          2.5s
=> [auth] library/python:pull token for registry-1.docker.io                0.0s
=> [internal] load .dockerignore                                           0.0s
=> => transferring context: 2B                                              0.0s
=> [1/5] FROM docker.io/library/python:3.9-slim@sha256:e52ca5f579cc58fed41efccb55a0ed5dccf6c7a156cba76 0.1s
=> => resolve docker.io/library/python:3.9-slim@sha256:e52ca5f579cc58fed41efccb55a0ed5dccf6c7a156cba76 0.1s
=> [internal] load build context                                           0.0s
=> => transferring context: 94B                                             0.0s
=> CACHED [2/5] WORKDIR /app                                              0.0s
=> CACHED [3/5] COPY requirements.txt .                                     0.0s

PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker build -t unknown777
77/elasticsearch elasticsearch/
[+] Building 3.6s (9/9) FINISHED                                            docker:desktop-linux
=> [internal] load build definition from Dockerfile                         0.1s
=> => transferring dockerfile: 182B                                         0.0s
=> [internal] load metadata for docker.io/library/elasticsearch:7.17.0      2.9s
=> [auth] library/elasticsearch:pull token for registry-1.docker.io        0.0s
=> [internal] load .dockerignore                                           0.0s
=> => transferring context: 2B                                              0.0s
=> [internal] load build context                                           0.0s
=> => transferring context: 47B                                             0.0s
=> [1/3] FROM docker.io/library/elasticsearch:7.17.0@sha256:332c6d416808f6e9a2cbcbe0170d9a9bb14bfe7721 0.0s
=> => resolve docker.io/library/elasticsearch:7.17.0@sha256:332c6d416808f6e9a2cbcbe0170d9a9bb14bfe7721 0.0s
=> CACHED [2/3] COPY docker-entrypoint-init.sh /                           0.0s
=> CACHED [3/3] RUN chmod +x /docker-entrypoint-init.sh                   0.0s
=> exporting to image                                                       0.3s
=> => exporting layers                                                     0.0s
=> => exporting manifest sha256:9c58557a50c8bf2c52daed91f59a2a1f4b5fe19af34aacda60b76c86acb8600a 0.0s
=> => exporting config sha256:e491dbf18dd8171672fe604f3eb9664d47d1e8a322e665d19cf3e990b41fc4b 0.0s
=> => exporting attestation manifest sha256:4c52359d18a7b6253e91ac0f4e4c7b6c08c0dabee420f76cafe4743800 0.1s
=> => exporting manifest list sha256:4d0f4b622fd23ae2aa4aeab5de2fe29054a2630011b092d08hf93h0323794def 0.0s

```

## Pushing Docker Images

```
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker login
Authenticating with existing credentials...
Login Succeeded
```

we by mistake gave a different name 1st so when we pushed again it was mounted from previous one

```
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker push unknown77777/cs203_frontend:1.0
The push refers to repository [docker.io/unknown77777/cs203_frontend]
367478946524: Pushed
147ecd7d38df: Pushed
f197d2be4f4c: Pushed
1307a4ceeb4e: Pushed
551614288614: Pushed
da1cbe0d584f: Pushed
5e909acdb790: Pushed
9a95d1744747: Pushed
cec49b84de9d: Pushed
1.0: digest: sha256:1130e50096ef52b259a0c0783019f818b39263ed6f161e92a299a69be8c514bb size: 856
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker>
```

```
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker push unknown77777/cs203_backend:1.0
The push refers to repository [docker.io/unknown77777/cs203_backend]
3c6afec9362e: Pushed
f197d2be4f4c: Mounted from unknown77777/cs203_frontend
9a95d1744747: Mounted from unknown77777/cs203_frontend
87a118fe317f: Pushed
cec49b84de9d: Mounted from unknown77777/cs203_frontend
53b0106b4afc: Pushed
da1cbe0d584f: Mounted from unknown77777/cs203_frontend
0402012c4cc1: Pushed
6e909acdb790: Mounted from unknown77777/cs203_frontend
1.0: digest: sha256:d9a9b151ab0291c6f03e3855e709ac45615bd2d99e3d515cd9c57e7e1d991825 size: 856
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker>
```

```
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker push unknown77777/fastapi:1
The push refers to repository [docker.io/unknown77777/fastapi]
52b554cd8a5c: Pushed
da1cbe0d584f: Mounted from unknown77777/cs203_frontend
f197d2be4f4c: Mounted from unknown77777/cs203_frontend
651614288614: Mounted from unknown77777/cs203_frontend
cec49b84de9d: Mounted from unknown77777/cs203_frontend
c5b736b6b620: Mounted from unknown77777/cs203_frontend
1307a4ceeb4e: Mounted from unknown77777/cs203_frontend
6e909acdb790: Mounted from unknown77777/cs203_frontend
9a95d1744747: Mounted from unknown77777/cs203_frontend
1: digest: sha256:79d0ae94e424df5db0f8bee7326f74934c8550227014e57d454cb4ce93ed1011 size: 856
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker push unknown77777/cs203_backend:1
The push refers to repository [docker.io/unknown77777/cs203_backend]
da1cbe0d584f: Layer already exists
0402012c4cc1: Mounted from unknown77777/cs203_backend
6e909acdb790: Layer already exists
d867ee1284b1: Mounted from unknown77777/cs203_backend
f197d2be4f4c: Layer already exists
9a95d1744747: Layer already exists
87a118fe317f: Mounted from unknown77777/cs203_backend
cec49b84de9d: Layer already exists
c3ae13b6bdd5: Pushed
2: digest: sha256:76ecf2b0a12dd00c340ae84d4f6f1b7318358b511c08b6a96693ad56447f4042 size: 856
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker>
```

```
PS C:\Users\Parth\OneDrive - iitgn.ac.in\CS203_Lab_01-main\New folder\cs203_docker> docker push unknown77777/cs203_elasticsearch:1.0
The push refers to repository [docker.io/unknown77777/cs203_elasticsearch]
4afff618a9264: Pushed
49618e7bd315: Pushed
ef2c6f195245: Pushed
807892be4984: Pushed
4f4fb700ef54: Mounted from library/elasticsearch
85e392fc2cc0: Pushed
ab1c10cef766: Pushed
1cf47933dd34: Pushed
c32ac7edc3c3: Pushing 12.58MB/313.1MB
9950b700fd47: Pushed
795bd33f4eb3: Pushed
ea362f368469: Pushing 13.63MB/28.57MB
```

## Installing Docker on VM

```
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1078-gcp x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/pro

System information as of Wed Mar 26 13:58:32 UTC 2025

  System load: 0.52      Processes:           113
  Usage of /: 28.8% of 9.51GB   Users logged in:      0
  Memory usage: 15%          IPv4 address for ens4: 10.160.0.3
  Swap usage: 0B

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

8 updates can be applied immediately.
7 of these updates are standard security updates.
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

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

g23110049@instance-20250325-182837:~$ for pkg in docker.io docker-doc docker-c^C
g23110049@instance-20250325-182837:~$ # Add Docker's official GPG key:
g23110049@instance-20250325-182837:~$ sudo apt-get update
Hit:1 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal InRelease [128 kB]
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [128 kB]
Get:3 https://packages.cloud.google.com/apt google-cloud-ops-agent-focal-2 InRelease
Get:4 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease [128 kB]
Fetched 383 kB in 1s (331 kB/s)
```

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

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

g23110049@instance-20250325-182837:~$ for pkg in docker.io docker-doc docker-c^C
g23110049@instance-20250325-182837:~$ # Add Docker's official GPG key:
g23110049@instance-20250325-182837:~$ sudo apt-get update
Hit:1 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal InRelease [128 kB]
Get:2 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-security InRelease [128 kB]
Get:3 http://security.ubuntu.com/ubuntu focal-security InRelease [128 kB]
Get:4 https://packages.cloud.google.com/apt google-cloud-ops-agent-focal-2 InRelease
Get:5 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease [128 kB]
Fetched 383 kB in 1s (331 kB/s)
Reading package lists... Done
g23110049@instance-20250325-182837:~$ sudo apt-get install ca-certificates curl
Reading package lists... Done
Building dependency tree
Reading state information...
ca-certificates is already the newest version (20240203-20.04.1).
curl is already the newest version (7.68.0-lubuntu2.25).
curl set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
g23110049@instance-20250325-182837:~$ sudo install -m 0755 -d /etc/apt/keyrings
g23110049@instance-20250325-182837:~$ sudo curl -fsSL https://download.docker.com/linux/ubuntu/gpg > /etc/apt/keyrings/docker.asc
g23110049@instance-20250325-182837:~$ sudo chmod a+r /etc/apt/keyrings/docker.asc
g23110049@instance-20250325-182837:~$ # Add the repository to Apt sources:
g23110049@instance-20250325-182837:~$ echo \
> "deb [arch=$dpkg --print-architecture] signed-by=/etc/apt/keyrings/docker.asc] https://download.docker.com/linux/ubuntu \
> $ . /etc/os-release && echo \"${UBUNTU_CODENAME}:stable\" | \ 
> sudo tee /etc/apt/sources.list.d/docker.list >/dev/null
g23110049@instance-20250325-182837:~$ sudo apt-get update
Get:1 https://download.docker.com/linux/ubuntu focal InRelease [57.7 kB]
Hit:2 https://packages.cloud.google.com/apt google-cloud-ops-agent-focal-2 InRelease
Get:3 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages [58.4 kB]
Hit:4 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal InRelease
Hit:5 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:6 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:7 http://security.ubuntu.com/ubuntu focal-security InRelease
Fetched 116 kB in 1s (127 kB/s)
Reading package lists... Done
g23110049@instance-20250325-182837:~$
```

The screenshot shows a Brave browser window with two tabs open. The active tab is titled "ssh.cloud.google.com/v2/ssh/projects/stt-ai-docker/zones/asia-south1-a/instances/instance-20250325-182837" and displays a terminal session. The session starts with:

```
g23110049@instance-20250325-182837:~$ sudo chmod a+r /etc/apt/keyrings/docker.asc
```

It then adds the repository to Apt sources:

```
g23110049@instance-20250325-182837:~$ # Add the repository to Apt sources:
```

```
g23110049@instance-20250325-182837:~$ echo \
```

```
> "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc] https://
```

```
download.docker.com/linux/ubuntu \
```

```
> $(. /etc/os-release && echo "$(UBUNTU_CODENAME)-$VERSION_CODENAME)" stable" | \
```

```
> sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
```

```
g23110049@instance-20250325-182837:~$ sudo apt-get update
```

It lists packages from various sources:

```
Get:1 https://download.docker.com/linux/ubuntu focal InRelease [57.7 kB]
```

```
Hit:2 https://packages.cloud.google.com/appengine-cloud-ops-agent-focal-2 InRelease
```

```
Get:3 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages [58.4 kB]
```

```
Hit:4 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal InRelease
```

```
Hit:5 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates InRelease
```

```
Hit:6 http://security.ubuntu.com/ubuntu focal-security InRelease
```

```
Fetched 116 kB in 1s (127 kB/s)
```

Reading package lists... Done

```
g23110049@instance-20250325-182837:~$
```

```
g23110049@instance-20250325-182837:~$ sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin
```

Reading package lists... Done

Building dependency tree

Reading state information... Done

The following additional packages will be installed:

```
  docker-ce-rootless-extras pigz slirp4netns
```

Suggested packages:

```
  cgroupfs-mount | cgroup-lite
```

The following NEW packages will be installed:

```
  containerd.io docker-buildx-plugin docker-ce docker-ce-cli docker-ce-rootless-extras
  docker-compose-plugin pigz slirp4netns
```

0 upgraded, 8 newly installed, 0 to remove and 8 not upgraded.

Need to get 121 MB of archives.

After this operation, 441 MB of additional disk space will be used.

Do you want to continue? [Y/n] Y

Get:1 https://download.docker.com/linux/ubuntu focal/stable amd64 containerd.io amd64 1.7.26-1 [30.3 MB]

Get:2 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal/universe amd64 pigz amd64 2.4-1 [57.4 kB]

Get:3 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal/universe amd64 slirp4netns amd64 0.4.3-1 [74.3 kB]

Get:4 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-buildx-plugin amd64 0.22.0-1~ubuntu.20.04-focal [35.3 MB]

Get:5 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-cli amd64 5:28.0.4-1~ubuntu.20.04-focal [15.8 MB]

Get:6 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce amd64 5:28.0.4-1~ubuntu.20.04-focal [19.2 MB]

Get:7 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-rootless-extras amd64 5:28.0.4-1~ubuntu.20.04-focal [6099 kB]

Get:8 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-compose-plugin amd64 2.34.0-1~ubuntu.20.04-focal [14.1 MB]

Fetched 121 MB in 2s (70.5 kB/s)

Selecting previously unselected package pigz.

[Reading database ... 60%

```
Brave File Edit View History Bookmarks Profiles Tab Window Help
ssh.cloud.google.com/v2/ssh/projects/stt-ai-docker/zones/asia-south1-a/instances/instance-2025032...
ssh.cloud.google.com/v2/ssh/projects/stt-ai-docker/zones/asia-south1-a/instances/inst...
SSH-in-browser UPLOAD FILE DOWNLOAD FILE
Get:4 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-buildx-plugin amd64
Get:5 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-cli amd64 5:28.0.4-1~ubuntu.20.04-focal [15.8 MB]
Get:6 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce amd64 5:28.0.4-1~ubuntu.20.04-focal [19.2 MB]
Get:7 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-rootless-extras amd64 5:28.0.4-1~ubuntu.20.04-focal [6099 kB]
Get:8 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-compose-plugin amd64 2.34.0-1~ubuntu.20.04-focal [14.1 MB]
Fetched 39.6 MB in 2s (10.0 MB/s)
Selecting previously unselected package pigz.
(Reading database ... 62486 files and directories currently installed.)
Preparing to unpack .../0-pigz_2.4-1_amd64.deb ...
Unpacking pigz (2.4-1) ...
Selecting previously unselected package containerd.io.
Preparing to unpack .../1-containerd.io_1.7.26-1_amd64.deb ...
Unpacking containerd.io (1.7.26-1) ...
Selecting previously unselected package docker-buildx-plugin.
Preparing to unpack .../2-docker-buildx-plugin_0.22.0-1~ubuntu.20.04-focal_amd64.deb ...
Unpacking docker-buildx-plugin (0.22.0-1~ubuntu.20.04-focal) ...
Selecting previously unselected package docker-ce-cl1.
Preparing to unpack .../3-docker-ce-cl1_53a28.0.4-1~ubuntu.20.04-focal_amd64.deb ...
Unpacking docker-ce-cl1 (5:28.0.4-1~ubuntu.20.04-focal) ...
Selecting previously unselected package docker-ce.
Preparing to unpack .../4-docker-ce_53a28.0.4-1~ubuntu.20.04-focal_amd64.deb ...
Unpacking docker-ce (5:28.0.4-1~ubuntu.20.04-focal) ...
Selecting previously unselected package docker-ce-rootless-extras.
Preparing to unpack .../5-docker-ce-rootless-extras_53a28.0.4-1~ubuntu.20.04-focal_amd64.de...
Unpacking docker-ce-rootless-extras (5:28.0.4-1~ubuntu.20.04-focal) ...
Selecting previously unselected package docker-compose-plugin.
Preparing to unpack .../6-docker-compose-plugin_2.34.0-1~ubuntu.20.04-focal_amd64.deb ...
Unpacking docker-compose-plugin (2.34.0-1~ubuntu.20.04-focal) ...
Selecting previously unselected package slirp4netns.
Preparing to unpack .../7-slirp4netns_0.4.3-1_amd64.deb ...
Unpacking slirp4netns (0.4.3-1) ...
Setting up slirp4netns (0.4.3-1) ...
Setting up docker-buildx-plugin (0.22.0-1~ubuntu.20.04-focal) ...
Setting up containerd.io (1.7.26-1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/containerd.service → /lib/systemd/system/containerd.service.
Setting up docker-compose-plugin (2.34.0-1~ubuntu.20.04-focal) ...
Setting up docker-ce-cl1 (5:28.0.4-1~ubuntu.20.04-focal) ...
Setting up pigz (2.4-1) ...
Setting up docker-ce-rootless-extras (5:28.0.4-1~ubuntu.20.04-focal) ...
Setting up docker-ce (5:28.0.4-1~ubuntu.20.04-focal) ...
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /lib/systemd/system/docker.socket.
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for systemd (245.4-4ubuntu3.24) ...
g23110049@instance-20250325-182837:~$
```

```
Brave File Edit View History Bookmarks Profiles Tab Window Help
ssh.cloud.google.com/v2/ssh/projects/stt-ai-docker/zones/asia-south1-a/instances/instance-2025032...
ssh.cloud.google.com/v2/ssh/projects/stt-ai-docker/zones/asia-south1-a/instances/inst...
SSH-in-browser UPLOAD FILE DOWNLOAD FILE
Preparing to unpack .../5-docker-ce-rootless-extras_53a28.0.4-1~ubuntu.20.04-focal_amd64.de...
Unpacking docker-ce-rootless-extras (5:28.0.4-1~ubuntu.20.04-focal) ...
Selecting previously unselected package docker-compose-plugin.
Preparing to unpack .../6-docker-compose-plugin_2.34.0-1~ubuntu.20.04-focal_amd64.deb ...
Unpacking docker-compose-plugin (2.34.0-1~ubuntu.20.04-focal) ...
Selecting previously unselected package slirp4netns.
Preparing to unpack .../7-slirp4netns_0.4.3-1_amd64.deb ...
Unpacking slirp4netns (0.4.3-1) ...
Setting up slirp4netns (0.4.3-1) ...
Setting up docker-buildx-plugin (0.22.0-1~ubuntu.20.04-focal) ...
Setting up containerd.io (1.7.26-1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/containerd.service → /lib/systemd/system/containerd.service.
Setting up docker-compose-plugin (2.34.0-1~ubuntu.20.04-focal) ...
Setting up docker-ce-cl1 (5:28.0.4-1~ubuntu.20.04-focal) ...
Setting up pigz (2.4-1) ...
Setting up docker-ce-rootless-extras (5:28.0.4-1~ubuntu.20.04-focal) ...
Setting up docker-ce (5:28.0.4-1~ubuntu.20.04-focal) ...
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /lib/systemd/system/docker.socket.
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for systemd (245.4-4ubuntu3.24) ...
g23110049@instance-20250325-182837:~$ sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
Last login: Fri Mar 24 10:49:45 UTC 2023 by g23110049@192.168.1.11
Digest: sha256:7e1aef2d11e2ac7a8c3f768d416c62defeb09d2a750b010412b6ea13delef19
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
3. The Docker daemon created a new container from that image which runs the
   executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
   to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
g23110049@instance-20250325-182837:~$
```

```
Brave File Edit View History Bookmarks Profiles Tab Window Help

ssh.cloud.google.com/v2/ssh/projects/stt-ai-docker/zones/asia-south1-a/instances/instance-20250325-182837

ssh.cloud.google.com/v2/ssh/projects/stt-ai-docker/zones/asia-south1-a/instances/instance-20250325-182837

SSH-in-browser UPLOAD FILE DOWNLOAD FILE

Setting up slirp4netns (0.4.3-1) ...
Setting up docker-buildx-plugin (0.22.0-1~ubuntu.20.04-focal) ...
Setting up containerd.io (1.7.26-1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/containerd.service → /lib/systemd/system/containerd.service.
Setting up docker-bridge-plugin (2.34.0-1~ubuntu.20.04-focal) ...
Setting up docker-ce-clnt (5:28.0.4-1~ubuntu.20.04-focal) ...
Setting up pixz (2.4.1-1) ...
Setting up docker-ce-rootless-extras (5:28.0.4-1~ubuntu.20.04-focal) ...
Setting up docker-ce (5:28.0.4-1~ubuntu.20.04-focal) ...
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /lib/systemd/system/docker.socket.
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for systemd (245.4+ubuntu3.24) ...
g23110049instance-20250325-182837:~$ sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
e6590344ba15: Pull complete
Digest: sha256:7e1a4e2d1e2ac7a8c3f768d4166c2defeb09d2a750b010412b6eal3delefbi9
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
     (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
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    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
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For more examples and ideas, visit:
https://docs.docker.com/get-started/

g23110049instance-20250325-182837:~$ mkdir assignment
g23110049instance-20250325-182837:~$ ls
assignment
g23110049instance-20250325-182837:~$ cd mkdir
g23110049instance-20250325-182837:~/mkdir$ ls
No such file or directory
g23110049instance-20250325-182837:~/mkdir$ cd
g23110049instance-20250325-182837:~$ cd assignment/
g23110049instance-20250325-182837:~/assignment$ touch docker-compose.yml
g23110049instance-20250325-182837:~/assignment$ vim docker-compose.yml
g23110049instance-20250325-182837:~/assignment$
```

```
to read about a specific subcommand or concept.
See 'git help git' for an overview of the system.
g23110049@instance-20250325-182837:~$ git clone https://github.com/Aryan-IIT/cs203_docker.git
Cloning into 'cs203_docker'...
remote: Enumerating objects: 50, done.
remote: Counting objects: 100% (50/50), done.
remote: Compressing objects: 100% (36/36), done.
remote: Total 50 (delta 10), reused 46 (delta 9), pack-reused 0 (from 0)
Unpacking objects: 100% (50/50), 8.51 KiB | 726.00 KiB/s, done.
g23110049@instance-20250325-182837:~$ cd
g23110049@instance-20250325-182837:~$ cd cs203_docker/
g23110049@instance-20250325-182837:~/cs203_docker$ ls
README.md backend docker-compose.yml elasticsearch frontend
g23110049@instance-20250325-182837:~/cs203_docker$ cp -r frontend/ ..assignment/
g23110049@instance-20250325-182837:~/cs203_docker$ cd ..
g23110049@instance-20250325-182837:~$ cd assignment/
g23110049@instance-20250325-182837:~/assignment$ ls
docker-compose.yml frontend
g23110049@instance-20250325-182837:~/assignment$ cat docker-compose.yml
version: '3.8'

services:
  frontend:
    image: unknown77777/cs203_frontend:1.0
    ports:
      - "9567:9567"
    depends_on:
      - backend
g23110049@instance-20250325-182837:~/assignment$ █
```

```

g23110049@instance-20250325-182837:~/assignment$ docker compose up --build
unknown shorthand flag: 'b' in --build
Usage: docker [OPTIONS] COMMAND [ARG...]
Run 'docker --help' for more information
g23110049@instance-20250325-182837:~/assignment$ docker compose up --build
unknown flag: --build
Usage: docker [OPTIONS] COMMAND [ARG...]
Run 'docker --help' for more information
g23110049@instance-20250325-182837:~/assignment$ docker compose up --build
WARN[0000] /home/g23110049/assignment/docker-compose.yml: the attribute 'version' is obsolete
e, it will be ignored, please remove it to avoid potential confusion
unable to get image `unknown77777/cs203.frontend:1.0': permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%Fvar%2Frun%2Fdocker.sock": dial unix /var/run/docker.sock: permission denied
g23110049@instance-20250325-182837:~/assignment$ sudo
usage: sudo -h [-K | -k | -V]
usage: sudo -v [-AknS] [-g group] [-h host] [-p prompt] [-u user]
usage: sudo -l [-AknS] [-g group] [-h host] [-p prompt] [-U user] [-u user] [command]
usage: sudo -A[-EknPS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p prompt] [-T
    timeout] [-u user] [VAR=value] [-i|-s] <command>
usage: sudo -e [-AknS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p prompt] [-T
    timeout] [-u user] [-e file]
g23110049@instance-20250325-182837:~/assignment$ sudo docker compose up --build
WARN[0000] /home/g23110049/assignment/docker-compose.yml: the attribute 'version' is obsolete
e, it will be ignored, please remove it to avoid potential confusion
[+] Running 9/9
 ✓ frontend Pulled
 ✓ 6e909acdb790 Pull complete
 ✓ cec49b84d9ed9 Pull complete
 ✓ dalcibell Pull complete
 ✓ 9200f4447474 Pull complete
 ✓ f197d2psaf4c Pull complete
 ✓ 1307a4ceeb4 Pull complete
 ✓ 651614288614 Pull complete
 ✓ c5b7366b6620 Pull complete
[+] Running 2/2
 ✓ Network assignment_default Created
  Container assignment-frontend-1 Created
Attaching to frontend-1
frontend-1 | INFO: Started server process [1]
frontend-1 | INFO: Waiting for application startup.
frontend-1 | INFO: Application startup complete.
frontend-1 | INFO: Uvicorn running on http://0.0.0.0:9567 (Press CTRL+C to quit)

```

VM1 is VM with frontend (fastapi:1)

VM2 is VM with backend (fastapi:2) & elasticseach

## Docker-compose.yml in VM1

```

g23110049@instance-20250325-182837:~/assignment$ cat docker-compose.yml
version: '3.8'

services:
  frontend:
    image: unknown77777/fastapi:1
    ports:
      - "9567:9567"
    environment:
      - BACKEND_URL=http://35.200.184.56:9567
    restart: unless-stopped
g23110049@instance-20250325-182837:~/assignment$ 

```

## Docker-compose.yml in VM2

```
g23110049@instance-20250325-183413:~/assignment$ cat docker-compose.yml
version: '3.8'

services:
  backend:
    image: unknown77777/fastapi:2
    ports:
      - "9567:9567"
    depends_on:
      - elasticsearch
    restart: unless-stopped

  elasticsearch:
    image: unknown77777/elasticsearch
    environment:
      - discovery.type=single-node
    volumes:
      - esdata:/usr/share/elasticsearch/data
    restart: unless-stopped

volumes:
  esdata:
```

**Firewall for VM1**

 Network Security 

 Secure Web Proxy

 Cloud Armor 

-  DDoS Dashboard
-  Cloud Armor policies
-  Adaptive Protection
-  Cloud Armor Service Tier

 Cloud IDS 

-  IDS Dashboard
-  IDS Endpoints
-  IDS Threats

 Cloud NGFW 

-  Dashboard
-  Firewall policies 
-  Threats
-  Firewall endpoints

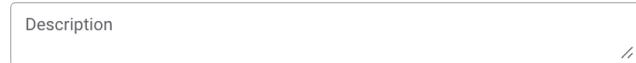
 Common components 

-  Address groups
-  Security profiles
-  TLS inspection policies
-  SSL policies
-  Authentication Configuration

 Create a firewall rule 

whatinaname-frontend 

Lowercase letters, numbers, hyphens allowed

Description 

**Logs**

Turning on firewall logs can generate a large number of logs which can increase costs in Logging. [Learn more](#) 

On 

Off 

Network \*  default 

Priority \*  1000  

Priority can be 0 - 65535

Direction of traffic 

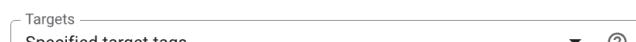
Ingress 

Egress 

Action on match 

Allow 

Deny 

Targets  Specified target tags 

Target tags \* 

Source filter  IPv4 ranges 

Source IPv4 ranges \*  14.139.98.80  35.200.184.56  for example, 0.0.0.0/0, 1 

# FireWall for VM2

The screenshot shows the Google Cloud Firewall policies interface. On the left, there's a sidebar with various security services like Network Security, Secure Web Proxy, Cloud Armor, Cloud IDS, Cloud NGFW, and Common components. The 'Firewall policies' section is selected. The main area displays a table of firewall rules:

Name	Type	Targets	Filters	Protocols / ports	Action	Priority	Network	Logs
default-allow-health-check	Ingress	lb-health-	IP ranges:	tcp	Allow	1000	default	Off
default-allow-health-check-ipv6	Ingress	lb-health-	IP ranges:	tcp	Allow	1000	default	Off
default-allow-http	Ingress	http-server	IP ranges: 0.0.0.0/0	tcp:80	Allow	1000	default	Off
default-allow-https	Ingress	https-server	IP ranges: 0.0.0.0/0	tcp:443	Allow	1000	default	Off
whatinnaname-frontend	Ingress	Apply to all	IP ranges:	tcp:9567	Allow	1000	default	Off
default-allow-icmp	Ingress	Apply to all	IP ranges: 0.0.0.0/0	icmp	Allow	65534	default	Off
default-allow-internal	Ingress	Apply to all	IP ranges:	tcp:0-65535 udp:0-65535 icmp	Allow	65534	default	Off
default-allow-ntp	Ingress	Apply to all	IP ranges: 0.0.0.0/0	tcp:3389	Allow	65534	default	Off
default-allow-ssl	Ingress	Apply to all	IP ranges: 0.0.0.0/0	tcp:22	Allow	65534	default	Off

Below the table, there's a section titled 'Network firewall policies' with a note about IAM roles and a 'Learn more' link.

On the right side, there are several recommended links:

- Cloud Next Generation Firewall overview
- Types of firewall policies
- Create a global network firewall policy
- Configure intrusion prevention service
- Set up TLS inspection

At the bottom right, there's a link to 'All Cloud NGFW documentation'.

## Get query testing

```
g23110237@instance-20250325-182837:~/vm1$ curl "http://0.0.0.0:9567/get"
{
  "took": 2,
  "timed_out": false,
  "_shards": {
    "total": 1,
    "successful": 1,
    "skipped": 0,
    "failed": 0
  },
  "hits": {
    "total": {
      "value": 1
    },
    "relation": "eq",
    "max_score": 1.0,
    "hits": [
      {
        "_index": "my_index",
        "_type": "_doc",
        "_id": "Jva72JUB0kdJ2bJniQE",
        "_score": 1.0,
        "_ignored": [
          "doc.content.keyword"
        ],
        "_source": {
          "index": "4",
          "doc": {
            "title": "Modern India",
            "content": "India has been a federal republic since 1950, governed through a democratic parliamentary system. It is a pluralistic, multilingual and multi-ethnic society. India's population grew from 361 million in 1951 to over 1.4 billion in 2023. During this time, its nominal per capita income increased from US$64 annually to US$2,601, and its literacy rate from 16.6% to 74%. A comparatively destitute country in 1951, India has become a fast-growing major economy and hub for information technology services; it has an expanding middle class. Indian movies and music increasingly influence global culture. India has reduced its poverty rate, though at the cost of increasing economic inequality. It is a nuclear-weapon state that ranks high in military expenditure. It has disputes over Kashmir with its neighbours, Pakistan and China, unresolved since the mid-20th century. Among the socio-economic challenges India faces are gender inequality, child malnutrition, and rising levels of air pollution. India's land is megadiverse with four biodiversity hotspots. India's wildlife, which has traditionally been viewed with tolerance in its culture, is supported in protected habitats."
          }
        }
      }
    ]
  }
}
g23110237@instance-20250325-182837:~/vm1$
```

## Insert query testing

```
g23110237@instance-20250325-182837:~/vm1$ curl -X POST "http://0.0.0.0:9567/insert" -H "Content-Type: application/json" -d @- << 'EOF'
{
  "index": "3",
  "doc": {
    "title": "Medieval History",
    "content": "In the early medieval era, Christianity, Islam, Judaism, and Zoroastrianism became established on India's southern and western coasts. Muslim armies from Central Asia intermittently overran India's northern plains. The resulting Delhi Sultanate drew northern India into the cosmopolitan networks of medieval Islam. In south India, the Vijayanagara Empire created a long-lasting composite Hindu culture. In the Punjab, Sikhism emerged, rejecting institutionalised religion. The Mughal Empire, in 1526, ushered in two centuries of relative peace, leaving a legacy of luminous architecture. Gradually expanding rule of the British East India Company turned India into a colonial economy but consolidated its sovereignty. British Crown rule began in 1858. The rights promised to Indians were granted slowly, but technological changes were introduced, and modern ideas of education and public life took root. A pioneering and influential nationalist movement, noted for nonviolent resistance, became the major factor in ending British rule. In 1947, the British Indian Empire was partitioned into two independent dominions, a Hindu-majority Dominion of India and a Muslim-majority dominion of Pakistan. A large-scale loss of life and an unprecedented migration accompanied the partition."
  }
}
EOF
```

# Testing Elastic Search

FastAPI Frontend



India, officially the Republic of India,[1][2] is a country in South Asia. It is the seventh-largest country by area; the most populous country from June 2023 onwards,[22][23] and since its independence in 1947, the world's most populous democracy.[24][25][26] Bounded by the Indian Ocean on the south, the Arabian Sea on the southwest, and the Bay of Bengal on the southeast, it shares land borders with Pakistan to the west;[k] China, Nepal, and Bhutan to the north; and Bangladesh and Myanmar to the east. In the Indian Ocean, India is near Sri Lanka and the Maldives; its Andaman and Nicobar Islands share a maritime border with Thailand, Myanmar, and Indonesia.

```
Login Succeeded
g23110237@instance-20250325-182837:~/vm1$ sudo docker push unknown77777/fastapi:1
The push refers to repository [docker.io/unknown77777/fastapi]
8ed1f3801a32: Pushed
7a9a1024a4a9: Pushed
ef03f6d3a227: Pushed
3ff57d3f8556: Pushed
9ae9750f0b5d: Mounted from library/python
b22bacb70618: Mounted from library/python
e803932e3be4: Mounted from library/python
1287fbecdfcc: Layer already exists
```

# Final elasticsearch Test Using [India](#)



## Elasticsearch Document Manager

subcontinent

Modern humans arrived on the Indian subcontinent from Africa no later than 55,000 years ago.[28][29][30] Their long occupation, predominantly in isolation as hunter-gatherers, has made the region highly diverse, second only to Africa in human genetic diversity.[31] Settled life emerged on the subcontinent in the western margins of the Indus river basin 9,000 years ago, evolving gradually into the Indus Valley Civilisation of the third millennium BCE.[32] By 1200 BCE, an archaic form of Sanskrit, an Indo-European language, had diffused into India from the northwest.[33][34] Its hymns recorded the dawning of Hinduism in India.[35] India's pre-existing Dravidian languages were supplanted in the northern regions.[36] By 400 BCE, caste had emerged within Hinduism,[37] and Buddhism and Jainism had arisen, proclaiming social orders unlinked to heredity.[38] Early political consolidations gave rise to the loose-knit Maurya and Gupta Empires.[39] Widespread creativity suffused this era,[40] but the status of women declined,[41] and untouchability became an organized belief.[41][42] In South India, the Middle kingdoms exported Dravidian language scripts and religious cultures to the kingdoms of Southeast Asia.[43] In the early mediaeval era, Christianity, Islam, Judaism, and Zoroastrianism became established on India's southern and western coasts.[44] Muslim armies from Central Asia intermittently overran India's northern plains.[45] The resulting Delhi Sultanate drew northern India into the cosmopolitan networks of mediaeval Islam.[46] In south India, the Vijayanagara Empire created a long-lasting composite Hindu culture.[47] In the Punjab, Sikhism emerged, rejecting institutionalised religion.[48] The Mughal Empire, in 1526, ushered in two centuries of relative peace,[49] leaving a legacy of luminous architecture [m][50] Gradually expanding rule of the British East India Company turned India into a colonial economy but consolidated its sovereignty.[51] British Crown rule began in 1858. The rights promised to Indians were granted slowly,[52][53] but technological changes were introduced, and modern ideas of education and public life took root.[54] A pioneering and