

CS 203 Lab 08

Team 07

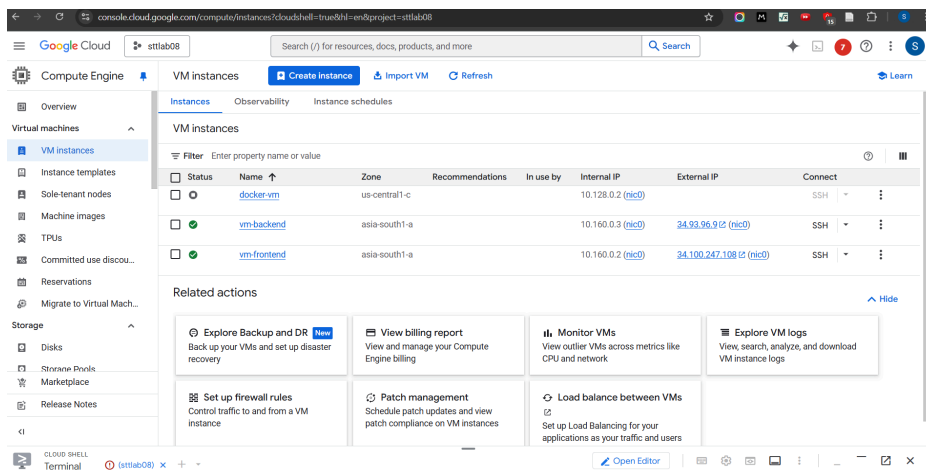
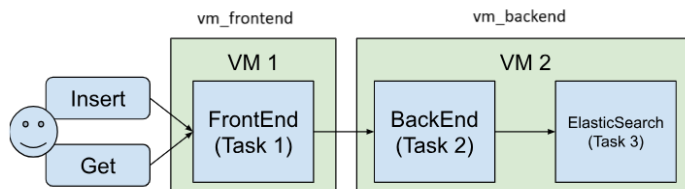
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Github code : https://github.com/Soham-Gaonkar/CS203_Lab_08

Implementation :

1. Creating two vm instances -



Network security
Firewall policies
Create firewall policy
Create firewall rule
Learn

- 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

VPC firewall rules

Firewall rules control incoming or outgoing traffic to an instance. By default, incoming traffic from outside your network is blocked.[Learn more](#)

Note: App Engine firewalls are managed in the [App Engine firewall rules section](#).

SMTP port 25 disallowed in this project.[Learn more](#)

[Refresh](#)
[Configure logs](#)
[Delete](#)

Name ↑	Type	Targets	Filters	Protocols/ports	Action	Priority	Network ↑	Logs
<input checked="" type="checkbox"/> allow-fastapi	Ingress	backend	IP ranges: 10.160.0.3/32	tcp:9567	Allow	1000	default	Off
<input type="checkbox"/> default-allow-http	Ingress	http-server	IP ranges:	tcp:80	Allow	1000	default	Off
<input type="checkbox"/> default-allow-https	Ingress	https-server	IP ranges:	tcp:443	Allow	1000	default	Off
<input checked="" type="checkbox"/> publictofrontend	Ingress	frontend	IP ranges: 0.0.0.0/0	tcp:9567	Allow	1000	default	On
<input type="checkbox"/> default-allow-icmp	Ingress	Apply to all	IP ranges:	icmp	Allow	65534	default	Off
<input type="checkbox"/> default-allow-internal	Ingress	Apply to all	IP ranges:	tcp:0-65535 udp:0-65535 icmp	Allow	65534	default	Off

```
g23110314@cloudshell:~ (sttlab08)$ gcloud compute instances list
NAME: docker-vm
ZONE: us-central1-c
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.2
EXTERNAL_IP:
STATUS: TERMINATED

NAME: vm-backend
ZONE: asia-south1-a
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.160.0.3
EXTERNAL_IP: 34.93.96.9
STATUS: RUNNING

NAME: vm-frontend
ZONE: asia-south1-a
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.160.0.2
EXTERNAL_IP: 34.100.247.108
STATUS: RUNNING
g23110314@cloudshell:~ (sttlab08)$ gcloud compute firewall-rules create allow-frontend-backend \
--direction=INGRESS \
--priority=1000 \
--network=default \
--action=ALLOW \
--rules=tcp:9567 \
--source-tags=frontend \
--target-tags=backend \
Creating firewall...working..Created [https://www.googleapis.com/compute/v1/projects/sttlab08/global/firewalls/allow-frontend-back
end].
Creating firewall...done.
NAME: allow-frontend-backend
NETWORK: default
DIRECTION: INGRESS
PRIORITY: 1000
ALLOW: tcp:9567
DENY:
DISABLED: False
g23110314@cloudshell:~ (sttlab08)$
```

```
Cloud Shell Editor

- The resource 'projects/sttlab08/zones/asia-southeast1-b/instances/vm-backend' was not found

p23110314@cloudshell:~ (sttlab08)$ clear
p23110314@cloudshell:~ (sttlab08)$ clear
p23110314@cloudshell:~ (sttlab08)$ gcloud compute instances list
NAME: docker-vm
ZONE: us-central1-c
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.2
EXTERNAL_IP:
STATUS: TERMINATED

NAME: vm-backend
ZONE: asia-south1-a
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.160.0.3
EXTERNAL_IP: 34.93.96.9
STATUS: RUNNING

NAME: vm-frontend
ZONE: asia-south1-a
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.160.0.2
EXTERNAL_IP: 34.100.247.108
STATUS: RUNNING
p23110314@cloudshell:~ (sttlab08)$ gcloud compute firewall-rules create allow-frontend-backend \
--direction=INGRESS \
--priority=1000 \
--network=default \
--action=ALLOW \
--rules=tcp:9567 \
--source-tags=frontend \
--target-tags=backend
Creating firewall...working..Created [https://www.googleapis.com/compute/v1/projects/sttlab08/global/firewalls/allow-frontend-backend].
Creating firewall...done.
NAME: allow-frontend-backend
NETWORK: default
DIRECTION: INGRESS
PRIORITY: 1000
ALLOW: tcp:9567
DENY:
DISABLED: False
p23110314@cloudshell:~ (sttlab08)$ gcloud compute firewall-rules create allow-public-access \
--direction=INGRESS \
--priority=1000 \
--network=default \
--action=ALLOW \
--rules=tcp:9567 \
--source-ranges=0.0.0.0/0 \
--target-tags=frontend
Creating firewall...working..Created [https://www.googleapis.com/compute/v1/projects/sttlab08/global/firewalls/allow-public-access].
Creating firewall...done.
NAME: allow-public-access
NETWORK: default
DIRECTION: INGRESS
PRIORITY: 1000
ALLOW: tcp:9567
DENY:
DISABLED: False
p23110314@cloudshell:~ (sttlab08)$
p23110314@cloudshell:~ (sttlab08)$
```

3. Installing docker (same in frontend and backend)

SSH-in-browser

UPLOAD FILE

DOWNLOAD FILE

Memory usage: 9%
Swap usage: 0%

IPv4 address for ens4: 10.160.0.3

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.

g23110314@vm-backend:~\$ sudo apt update
Hit:1 https://packages.cloud.google.com/apt google-cloud-ops-agent-focal-2 InRelease
Hit:2 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal InRelease
Hit:3 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:4 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:5 http://security.ubuntu.com/ubuntu focal-security InRelease
Reading package lists... Done
Building dependency tree
Reading state information... Done
8 packages can be upgraded. Run 'apt list --upgradable' to see them.
g23110314@vm-backend:~\$ sudo apt install -y \ca-certificates \curl \gnupg
Reading package lists... Done
Building dependency tree
Reading state information... Done
ca-certificates is already the newest version (20240203-20.04.1).
ca-certificates set to manually installed.
curl is already the newest version (7.68.0-1ubuntu2.25).
curl set to manually installed.
gnupg is already the newest version (2.2.19-3ubuntu2.2).
gnupg set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
g23110314@vm-backend:~\$ sudo install -m 0755 -d /etc/apt/keyrings
g23110314@vm-backend:~\$ curl -fsSL https://download.docker.com/linux/debian/gpg | sudo tee /etc/apt/keyrings/docker.asc > /dev/n
ull
g23110314@vm-backend:~\$ sudo chmod a+r /etc/apt/keyrings/docker.asc
g23110314@vm-backend:~\$ echo "deb [arch=\$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc] https://download.do
cker.com/linux/ubuntu \$(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
g23110314@vm-backend:~\$ sudo apt update
Get:1 https://download.docker.com/linux/ubuntu focal InRelease [57.7 kB]
Hit:2 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal InRelease
Get:3 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages [57.2 kB]
Hit:4 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:5 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:6 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:7 https://packages.cloud.google.com/apt google-cloud-ops-agent-focal-2 InRelease
Fetched 115 kB in 1s (111 kB/s)
Reading package lists... Done
Building dependency tree... 50%

```
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 120 MB of archives.
After this operation, 438 MB of additional disk space will be used.
Get:1 https://download.docker.com/linux/ubuntu focal/stable amd64 containerd.io amd64 1.7.25-1 [29.6 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 M
B]
Get:5 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-cli amd64 5:28.0.2-1-ubuntu.20.04-focal [15.8 MB]
Get:6 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce amd64 5:28.0.2-1-ubuntu.20.04-focal [19.1 MB]
Get:7 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-rootless-extras amd64 5:28.0.2-1-ubuntu.20.04-focal
[6097 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 120 MB in 2s (59.4 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_1.7.25-1_amd64.deb ...
Unpacking containerd.io (1.7.25-1) ...
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-cli.
Preparing to unpack .../3-docker-ce-cli_5:28.0.2-1-ubuntu.20.04-focal_amd64.deb ...
Unpacking docker-ce-cli (5:28.0.2-1-ubuntu.20.04-focal) ...
Selecting previously unselected package docker-ce.
Preparing to unpack .../4-docker-ce_5:28.0.2-1-ubuntu.20.04-focal_amd64.deb ...
Unpacking docker-ce (5:28.0.2-1-ubuntu.20.04-focal) ...
Selecting previously unselected package docker-ce-rootless-extras.
Preparing to unpack .../5-docker-ce-rootless-extras_5:28.0.2-1-ubuntu.20.04-focal_amd64.deb ...
Unpacking docker-ce-rootless-extras (5:28.0.2-1-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 (1.7.25-1) ...
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-cli (5:28.0.2-1-ubuntu.20.04-focal) ...
Setting up pigz (2.4-1) ...
Setting up docker-ce-rootless-extras (5:28.0.2-1-ubuntu.20.04-focal) ...
Setting up docker-ce (5:28.0.2-1-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) ...
g23110314@vm-backend:~$ docker --version
Docker version 28.0.2, build 0442a73
g23110314@vm-backend:~$
```

4. Installing python (same in both vms)

SSH-in-browser

UPLOAD FILE

DOWNLOAD FILE

Docker version 28.0.2, build 0442a73

```
g23110314@vm-backend:~$ docker network create es_network
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Head "http://%2Fvar%2Frun%2Fdocker.sock/_ping": dial unix /var/run/docker.sock: connect: permission denied
g23110314@vm-backend:~$ sudo docker network create es_network
fc40ca83d6881c6624c8be50777d0287495bd66f871706c6365820148b945e8a
g23110314@vm-backend:~$ sudo apt install python3 python3-pip -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
python3 is already the newest version (3.8.2-0ubuntu2).
python3 set to manually installed.
The following additional packages will be installed:
  binutils binutils-common binutils-x86-64-linux-gnu build-essential cpp cpp-9 dpkg-dev fakeroot g++ g++-9 gcc gcc-9
  gcc-9-base libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan5 libatomic1 libbinutils
  libc-dev-bin libc6-dev libc6-i386 libcrypt-dev libctf-nobfd0 libctf0 libdpkg-perl libexpat1-dev libfakeroot
  libfile-fcntllock-perl libgcc-9-dev libgomp1 libisl22 libitm1 liblsan0 libmpc3 libpython3-dev libpython3.8-dev libpython3.8-minimal
  libpython3.8-stdlib libquadmath0 libstdc++-9-dev libstdc++6 libubsan1 linux-libc-dev make manpages-dev
  python-pip-whl python3-dev python3-wheel python3.8 python3.8-dev python3.8-minimal zlib1g-dev
Suggested packages:
  binutils-doc cpp-doc gcc-9-locales debian-keyring g++-multilib g++-9-multilib gcc-9-doc gcc-multilib autoconf automake
  libtool flex bison gdb gcc-doc gcc-9-multilib glibc-doc bsr libstdc++-9-doc make-doc python3.8-venv python3.8-doc
  binfmt-support
The following NEW packages will be installed:
  binutils binutils-common binutils-x86-64-linux-gnu build-essential cpp cpp-9 dpkg-dev fakeroot g++ g++-9 gcc gcc-9
  gcc-9-base libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan5 libatomic1 libbinutils
  libc-dev-bin libc6-dev libc6-i386 libcrypt-dev libctf-nobfd0 libctf0 libdpkg-perl libexpat1-dev libfakeroot
  libfile-fcntllock-perl libgcc-9-dev libgomp1 libisl22 libitm1 liblsan0 libmpc3 libpython3-dev libpython3.8-dev libquadmath0
  libstdc++-9-dev libstdc++6 libubsan1 linux-libc-dev make manpages-dev python-pip-whl python3-dev python3-pip python3-wheel
  python3.8-dev zlib1g-dev
The following packages will be upgraded:
  libpython3.8 libpython3.8-minimal libpython3.8-stdlib python3.8 python3.8-minimal
5 upgraded, 50 newly installed, 0 to remove and 3 not upgraded.
Need to get 58.5 MB of archives.
After this operation, 228 MB of additional disk space will be used.
Get:1 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libpython3.8 amd64 3.8.10-0ubuntu1-20.04.17 [162
5 kB]
Get:2 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3.8 amd64 3.8.10-0ubuntu1-20.04.17 [387 kB]
Get:3 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libpython3.8-stdlib amd64 3.8.10-0ubuntu1-20.04.
17 [1676 kB]
Get:4 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3.8-minimal amd64 3.8.10-0ubuntu1-20.04.17
[1901 kB]
Get:5 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libpython3.8-minimal amd64 3.8.10-0ubuntu1-20.04.
17 [720 kB]
Get:6 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 binutils-common amd64 2.34-6ubuntu1.10 [208 kB]
Get:7 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libbinutils amd64 2.34-6ubuntu1.10 [474 kB]
Get:8 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libctf-nobfd0 amd64 2.34-6ubuntu1.10 [48.1 kB]
Get:9 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libctf0 amd64 2.34-6ubuntu1.10 [46.7 kB]
Get:10 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 binutils-x86-64-linux-gnu amd64 2.34-6ubuntu1.1
0 [1613 kB]
Get:11 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 binutils amd64 2.34-6ubuntu1.10 [3380 B]
Get:12 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libc-dev-bin amd64 2.31-0ubuntu9.17 [71.8 kB]
Get:13 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 linux-libc-dev amd64 5.4.0-208.228 [1118 kB]
Get:14 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal/main amd64 libcrypt-dev amd64 1:4.4.0-10ubuntu4 [104 kB]
Get:15 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 libc6-dev amd64 2.31-0ubuntu9.17 [2521 kB]
Get:16 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal-updates/main amd64 gcc-9-base amd64 9.4.0-1ubuntu1-20.04.2 [18.9 k
B]
Get:17 http://asia-south1.gce.archive.ubuntu.com/ubuntu focal/main amd64 libisl22 amd64 0.22.1-1 [592 kB]
```

5. Setting up on network

```
g23110314@vm-backend:~/backend$ sudo docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
aa6ab6a04483        bridge             bridge              local
c0acfa72fd92        host               host                local
2a1f7f836f4b        none               null                local
g23110314@vm-backend:~/backend$ sudo docker network create app_network
9ac2f520d02be970c58421b9147bdebdb728fc3b70f565a318baa1dba3a9fd61
g23110314@vm-backend:~/backend$ docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
9ac2f520d02b        app_network         bridge              local
aa6ab6a04483        bridge             bridge              local
c0acfa72fd92        host               host                local
2a1f7f836f4b        none               null                local
g23110314@vm-backend:~/backend$
```

6. Backend code :

main.py:

```
GNU nano 4.8 main.py
from fastapi import FastAPI, Request
from elasticsearch import Elasticsearch
from pydantic import BaseModel

app = FastAPI()
es = Elasticsearch("http://elasticsearch:9200")

class Document(BaseModel):
    text: str

@app.get("/search")
async def search(query: str):
    res = es.search(index="documents", body={"query": {"match": {"text": query}}})
    hits = res["hits"]["hits"]
    return hits[0]["_source"] if hits else {}

@app.post("/insert")
async def insert(doc: Document):
    res = es.index(index="documents", body={"text": doc.text})
    return {"result": res["result"]}
```

Dockerfile :

```
FROM python:3.9-slim

WORKDIR /app

COPY requirements.txt .
RUN pip install --no-cache-dir -r requirements.txt

COPY . .

EXPOSE 9567

CMD ["uvicorn", "main:app", "--host", "0.0.0.0", "--port", "9567"]
```

(optimized)

requirements.txt :

```
backend > app > requirements.txt
You, 7 days ago | 1 author (You)
1 fastapi
2 uvicorn
3 elasticsearch
4 pydantic You, 7 day
```

7. Creating docker images and running containers (backend)

```
g23110314@vm-backend:~$ mkdir ~/backend
g23110314@vm-backend:~$ cd backend/
g23110314@vm-backend:~/backend$ nano main.py Dockerfile requirements.txt
g23110314@vm-backend:~/backend$ ls
Dockerfile  main.py  requirements.txt
g23110314@vm-backend:~/backend$ docker build -t fastapi:2 .
ERROR: permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Head "http://%2Fvar%2Frun%2Fdocker.sock/_ping": dial unix /var/run/docker.sock: connect: permission denied
g23110314@vm-backend:~/backend$ sudo docker build -t fastapi:2 .
[+] Building 14.1s (10/10) FINISHED                                docker:default
=> [internal] load build definition from Dockerfile                0.0s
=> => transferring dockerfile: 241B                                0.0s
=> [internal] load metadata for docker.io/library/python:3.9-slim 1.7s
=> [internal] load .dockerignore                                    0.0s
=> => transferring context: 2B                                       0.0s
=> [1/5] FROM docker.io/library/python:3.9-slim@sha256:e52ca5f579cc58fed41efcbb55a0ed5dccc6c7a156cba76acfb4ab42fc19dd00 0.0s
=> [internal] load build context                                    0.0s
=> => transferring context: 944B                                       0.0s
=> CACHED [2/5] WORKDIR /app                                       0.0s
=> [3/5] COPY requirements.txt .                                    0.0s
=> [4/5] RUN pip install --no-cache-dir -r requirements.txt       11.7s
=> [5/5] COPY . .                                                  0.1s
=> exporting to image                                              0.5s
=> => exporting layers                                              0.5s
=> => writing image sha256:c255655afb4555902ebcf052f324b75b970529f6efeb81fb52164d7553c1a197 0.0s
=> => naming to docker.io/library/fastapi:2                       0.0s
g23110314@vm-backend:~/backend$

2311/1030140 none null local
g23110314@vm-backend:~/backend$ docker run -d --name backend --network app_network -p 9567:9567 fastapi:2
docker: permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Head "http://%2Fvar%2Frun%2Fdocker.sock/_ping": dial unix /var/run/docker.sock: connect: permission denied

Run 'docker run --help' for more information
g23110314@vm-backend:~/backend$ sudo docker run -d --name backend --network app_network -p 9567:9567 fastapi:2
6ad51d1d91d79a6e968f67ced8e6b16002469de62ea012f5e75cab13510d23df
g23110314@vm-backend:~/backend$ docker ps
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.48/containers/json": dial unix /var/run/docker.sock: connect: permission denied
g23110314@vm-backend:~/backend$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS
NAMES
6ad51d1d91d7  fastapi:2 "uvicorn main:app --..." 10 seconds ago Up 10 seconds 0.0.0.0:9567->9567/tcp, [::]:9567->9567/tcp
backend
g23110314@vm-backend:~/backend$
```

8. Elastic search setup - image and container


```
SSH-in-browser

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

System information as of Fri Mar 21 12:39:00 UTC 2025

System load: 0.01 Processes: 116
Usage of /: 37.3% of 9.51GB Users logged in: 1
Memory usage: 11% IPv4 address for ena4: 10.160.0.3
Swap usage: 0%

Expanded Security Maintenance for Applications is not enabled.

3 updates can be applied immediately.
2 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

2 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

New release '22.04.5 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Fri Mar 21 12:37:59 2025 from 35.235.243.129
q23110314@vm-backend:~$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS
6a5d1d1d91d7   fastapi:2 "uvicorn main:app --..." 52 minutes ago Up 52 minutes 0.0.0.0:9567->9567/tcp, [::]:9567->9567/tcp   backend

q23110314@vm-backend:~$ docker network ls
NETWORK ID     NAME      DRIVER    SCOPE
9ac2f520d02b   app_network   bridge    local
aafab4a04483   bridge       bridge    local
c8e4fa72f692   host         host      local
2e1f7f536f4b   none         null      local

q23110314@vm-backend:~$ docker run -d --name elasticsearch \
> --network app_network \
> -p 9200:9200 -p 9300:9300 \
> -e "discovery.type=single-node" \
> -e "xpack.security.enabled=false" \
> -e "ES_JAVA_OPTS=-Xms512m -Xmx512m" \
> -v elasticsearch_data:/usr/share/elasticsearch/data \
> docker.elastic.co/elasticsearch/elasticsearch:7.10.2
Unable to find image 'docker.elastic.co/elasticsearch/elasticsearch:7.10.2' locally
7.10.2: Pulling from elasticsearch/elasticsearch
ddf49b915d7: Pull complete
e734878e27ad: Pull complete
7487c9d8e3be: Pull complete
9ac0b7efe1f0c: Pull complete
d0ec6dec98db: Pull complete
8a19b4854661: Pull complete
1e595ae1b7d: Pull complete
06cc198dbf22: Pull complete
53b9b350e68: Pull complete
Digest: sha256:d5280cc81720265974f4fe7a0f12fee328dc02e5a2c754b45b9a84c84695bf4d9
Status: Downloaded newer image for docker.elastic.co/elasticsearch/elasticsearch:7.10.2
1df1bed9a357ca6f16cb7aec5705f44ec40a903b18da23abe6107844342326f7
q23110314@vm-backend:~$
```

9. Frontend code :

main.py:

```
You, 2 days ago | 1 author (You)
from fastapi import FastAPI, Request
from elasticsearch import Elasticsearch
from pydantic import BaseModel

app = FastAPI()
es = Elasticsearch("http://elasticsearch:9200")

You, 2 days ago | 1 author (You)
class Document(BaseModel):
    text: str

@app.get("/search")
async def search(query: str):
    res = es.search(index="documents", body={"query": {"match": {"text": query}}})
    hits = res["hits"]["hits"]
    return hits[0]["_source"] if hits else {}

@app.post("/insert")
async def insert(doc: Document):
    res = es.index(index="documents", body={"text": doc.text})
    return {"result": res["result"]}
```

templates / index.html :

```

nd > app > templates > index.html > ...
You, 2 days ago | 1 author (You)
<!DOCTYPE html>
<html>
<head>
  <title>Elasticsearch Frontend</title>
</head>
<body>
  <h2>Elasticsearch Interface</h2>

  <form action="/get" method="post">
    <input type="text" name="query" placeholder="Search Query" required>
    <button type="submit">Get</button>
  </form>

  <form action="/insert" method="post">
    <textarea name="text" placeholder="Document Text" required></textarea>
    <button type="submit">Insert</button>
  </form>

  <h3>Result:</h3>
  <pre>{{ result }}</pre>
</body>
</html>

```

Dockerfile:

```

# Use a lightweight Python image
FROM python:3.9-slim

WORKDIR /app

# Copy requirements and install dependencies
COPY requirements.txt .
RUN pip install --no-cache-dir -r requirements.txt

# Copy app code
COPY . .

# Expose port 9567 for public access
EXPOSE 9567

# Run FastAPI app
CMD ["uvicorn", "main:app", "--host", "0.0.0.0", "--port", "9567"]

```

```

p23110314@vm-frontent:~$ ls
frontend
p23110314@vm-frontent:~$ cd frontend/
p23110314@vm-frontent:~/frontend$ ls
Dockerfile main.py requirements.txt templates
p23110314@vm-frontent:~/frontend$ nano main.py

Use "fg" to return to nano.

[1]+  Stopped                  nano main.py
p23110314@vm-frontent:~/frontend$ nano main.py

Use "fg" to return to nano.

[2]+  Stopped                  nano main.py
p23110314@vm-frontent:~/frontend$ nano main.py
p23110314@vm-frontent:~/frontend$ nano main.py
p23110314@vm-frontent:~/frontend$ docker build -t fastapi:1 .
[*] Building 2.2s (10/10) FINISHED
-> [internal] load build definition from Dockerfile
=> transferring dockerfile: 390B
=> [internal] load metadata for docker.io/library/python:3.9-slim
=> [internal] load .dockerignore
=> transferring context: 2B
=> [5/6] FROM docker.io/library/python:3.9-slim@sha256:e52ca5f579cc5fed41efcbb55a0ed5d0cf6c7a156cbe76acfb4ab42f0c19dd00
=> [internal] load build context
=> transferring context: 1.06kB
=> CACHED [2/5] WORKDIR /app
=> CACHED [3/5] COPY requirements.txt .
=> CACHED [4/5] RUN pip install --no-cache-dir -r requirements.txt
=> [5/5] COPY . .
=> exporting to image
=> writing image sha256:af7d62e57f0c69d71e290bd0a0e24c65adb6b130c02b0a90aeadd0e86907d2
=> naming to docker.io/library/fastapi:1
p23110314@vm-frontent:~/frontend$

```

9. Building docker image and running container (frontend)

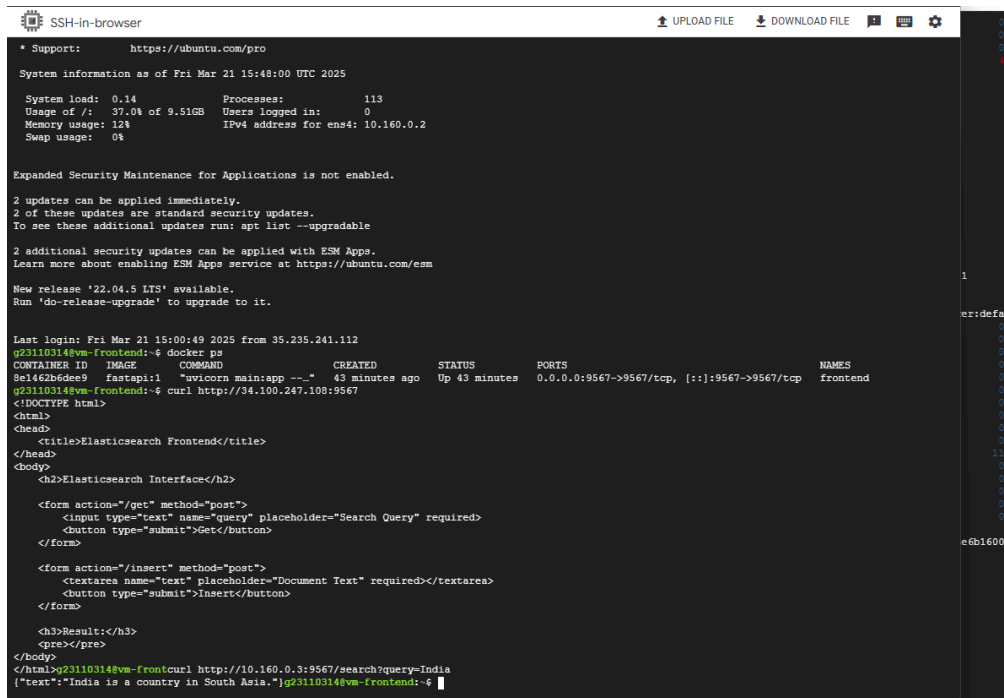
```
g23110314@vm-frontent:~/frontend$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
g23110314@vm-frontent:~/frontend$ docker network create app_network
355bc5adffbefb5d571d544beaa5f1278b9f87c32ddbd01352fed5a0ffe563f
g23110314@vm-frontent:~/frontend$ docker network ls
NETWORK ID     NAME      DRIVER    SCOPE
355bc5adffb    app_network  bridge    local
5626d4820f2    bridge      bridge    local
bdac052e87d    host        host      local
a940d4d22dc    none        null      local
```

```
g23110314@vm-frontent:~/frontend/templates$ cd ..
g23110314@vm-frontent:~/Frontend$ docker build -t fastapi:1 .
[+] Building 22.8s (10/10) FINISHED
=> [internal] load build definition from Dockerfile                                docker:default
=> => transferring dockerfile: 390B                                              0.0s
=> [internal] load metadata for docker.io/library/python:3.9-slim                0.0s
=> [internal] load .dockerignore                                                  3.1s
=> => transferring context: 2B                                                    0.0s
=> [1/5] FROM docker.io/library/python:3.9-slim@sha256:e52ca5f579cc58fed41efcbb55a0ed5dccc6c7a156cba76acfb4ab42fc19dd00 0.0s
=> => resolve docker.io/library/python:3.9-slim@sha256:e52ca5f579cc58fed41efcbb55a0ed5dccc6c7a156cba76acfb4ab42fc19dd00 5.7s
=> => sha256:246e088f8d9bae1efc1d3f0ab4a800616403520b3aecdc810f30e27dc9d69e0b4 1.75kB / 1.75kB 0.0s
=> => sha256:bea3dea871787412b8fa17205b317e46dd3f37bdfb1952d6022290726219b9bc 5.28kB / 5.28kB 0.0s
=> => sha256:6e909acdb790c5a1989d9cfc795fda5a246ad6664bb27b5c688e2b734b2c5fad 28.20MB / 28.20MB 1.2s
=> => sha256:cec49b84de9df5777ee48546b2fd933b7ae87ec6746f4aa181d6893175331a21 3.51MB / 3.51MB 0.4s
=> => sha256:dalcbe0d584f421af08256ce9d3d64b361a433126b700d76ac42c23da4259346 14.93MB / 14.93MB 1.2s
=> => sha256:e52ca5f579cc58fed41efcbb55a0ed5dccc6c7a156cba76acfb4ab42fc19dd00 10.41kB / 10.41kB 0.0s
=> => sha256:9a95d1744747ce9c4e854b9f5822065468265f57a58dae4d8fcec30f1e60216f 249B / 249B 0.9s
=> => extracting sha256:6e909acdb790c5a1989d9cfc795fda5a246ad6664bb27b5c688e2b734b2c5fad 2.4s
=> => extracting sha256:cec49b84de9df5777ee48546b2fd933b7ae87ec6746f4aa181d6893175331a21 0.3s
=> => extracting sha256:dalcbe0d584f421af08256ce9d3d64b361a433126b700d76ac42c23da4259346 1.3s
=> => extracting sha256:9a95d1744747ce9c4e854b9f5822065468265f57a58dae4d8fcec30f1e60216f 0.0s
=> [internal] load build context                                                  0.0s
=> => transferring context: 2.02kB                                                0.0s
=> [2/5] WORKDIR /app                                                            0.9s
=> [3/5] COPY requirements.txt .                                                  0.1s
=> [4/5] RUN pip install --no-cache-dir -r requirements.txt                      12.3s
=> [5/5] COPY . .                                                                0.1s
=> exporting to image                                                            0.5s
=> => exporting layers                                                            0.5s
=> => writing image sha256:8db87dd5abd55c242c8540c2b4de5efbf4bef79255544dabab4e49692e676c28 0.0s
=> => naming to docker.io/library/fastapi:1                                     0.0s
g23110314@vm-frontent:~/Frontend$
```

```
g23110314@vm-frontent:~/Frontend$ docker run -d --name frontend --network app_network -p 9567:9567 fastapi:1
04221297549c8d11b68e580ff5dd5679ea81588a4225b8d5d62364f10fae3acc
g23110314@vm-frontent:~/Frontend$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
04221297549c  fastapi:1 "uvicorn main:app --..." 4 seconds ago Up 3 seconds 0.0.0.0:9567->9567/tcp, [::]:9567->9567/tcp frontend
g23110314@vm-frontent:~/Frontend$
```

10. Access the frontend from Base OS -

- `curl http://<PUBLIC_VM_FRONTEND_IP>:9567 -> HTML response from frontend service , confirming the service is accessible`
- `curl http://<INTERNAL_BACKEND_IP>:9567/search?query=India -> return a JSON or text response containing search results related to "India" from the backend service.`



```
* Support: https://ubuntu.com/pro
System information as of Fri Mar 21 15:48:00 UTC 2025

System load:  0.14          Processes:           113
Usage of /:   37.0% of 9.51GB Users logged in:      0
Memory usage: 12%          IPv4 address for ens4: 10.160.0.2
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

2 updates can be applied immediately.
2 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

2 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

New release '22.04.5 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Fri Mar 21 15:00:49 2025 from 35.235.241.112
g23110314@vm-frontent:~$ docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS                               NAMES
8e1462b6dee9   fastapi:1 "uvicorn main:app --..." 43 minutes ago Up 43 minutes 0.0.0.0:9567->9567/tcp, [::]:9567->9567/tcp frontend
g23110314@vm-frontent:~$ curl http://34.100.247.108:9567
<!DOCTYPE html>
<html>
<head>
<title>Elasticsearch Frontend</title>
</head>
<body>
<h2>Elasticsearch Interface</h2>
<form action="/get" method="post">
  <input type="text" name="query" placeholder="Search Query" required>
  <button type="submit">Get</button>
</form>
<form action="/insert" method="post">
  <textarea name="text" placeholder="Document Text" required></textarea>
  <button type="submit">Insert</button>
</form>
<h3>Result:</h3>
<pre></pre>
</body>
</html>g23110314@vm-frontent:~$ curl http://10.160.0.3:9567/search?query=India
{"text": "India is a country in South Asia."}g23110314@vm-frontent:~$
```

- **When 'India' is searched**



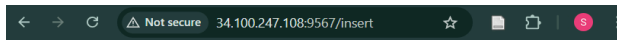
← → 🔍 Not secure 34.100.247.108:9567/get

Elasticsearch Interface

Result:

```
{'text': "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"
```

- **Inserting text**



Elasticsearch Interface

Get

Insert

Result:

```
{'result': 'created'}
```

11. Docker logs - to verify process

```
g23110314@vm-backend: ~/backend$ docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS
5854ce980c0f   fastapi:2                           "uvicorn main:app --l..." 3 seconds ago  Up 3 seconds  0.0.0.0:9567->9567/
tcp, [::]:9567->9567/tcp
1df3bec9a357   docker.elastic.co/elasticsearch/elasticsearch:7.10.2  "/bin -- /usr/local..." 3 hours ago   Up 3 hours    0.0.0.0:9200->9200/tcp, 0.0.0.0:9300->9300/tcp, [::]:9300->9300/tcp
g23110314@vm-backend:~/backend$ curl http://10.160.0.3:9567
{"detail": "Not Found"}
g23110314@vm-backend:~/backend$ docker logs backend
INFO: Started server process [1]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: Uvicorn running on http://0.0.0.0:9567 (Press CTRL+C to quit)
INFO: 10.160.0.2:45128 - "GET /search?query=India HTTP/1.1" 200 OK
INFO: 10.160.0.2:47936 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:150118 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:53898 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:37108 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:37122 - "GET /search?query=Islam HTTP/1.1" 200 OK
INFO: 10.160.0.2:34702 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.3:54144 - "GET / HTTP/1.1" 404 Not Found
g23110314@vm-backend:~/backend$
```

On inserting a text

Elasticsearch Interface

Get

Insert

Result:

```
{'result': 'created'}
```

SSH in browser

```
g23110314@vm-backend:~/backend$ docker run -d --name backend --network app_network -p 9567:9567 fastapi:2
docker: Error response from daemon: Conflict. The container name "/backend" is already in use by container "4e01d1d91d7b8e46f877c0d1e6b1602449
de2e6d1f5f75c6b1501d623d4". You have to remove (or rename) that container to be able to reuse that name.

Run "docker run --help" for more information.
g23110314@vm-backend:~/backend$ docker stop backend
backend
g23110314@vm-backend:~/backend$ docker run -d --name backend --network app_network -p 9567:9567 fastapi:2
5854ce980c0f70ab316e40870905d6e26426d487af594ba64ec4e300bdf
g23110314@vm-backend:~/backend$ docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS
5854ce980c0f   fastapi:2                           "uvicorn main:app --l..." 3 seconds ago  Up 3 seconds  0.0.0.0:9567->9567/
tcp, [::]:9567->9567/tcp
1df3bec9a357   docker.elastic.co/elasticsearch/elasticsearch:7.10.2  "/bin -- /usr/local..." 3 hours ago   Up 3 hours    0.0.0.0:9200->9200/tcp, 0.0.0.0:9300->9300/tcp, [::]:9300->9300/tcp
g23110314@vm-backend:~/backend$ curl http://10.160.0.3:9567
{"detail": "Not Found"}
g23110314@vm-backend:~/backend$ docker logs backend
INFO: Started server process [1]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: Uvicorn running on http://0.0.0.0:9567 (Press CTRL+C to quit)
INFO: 10.160.0.2:45128 - "GET /search?query=India HTTP/1.1" 200 OK
INFO: 10.160.0.2:47936 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:150118 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:53898 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:37108 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:37122 - "GET /search?query=Islam HTTP/1.1" 200 OK
INFO: 10.160.0.2:34702 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.3:54144 - "GET / HTTP/1.1" 404 Not Found
g23110314@vm-backend:~/backend$ docker logs backend
INFO: Started server process [1]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: Uvicorn running on http://0.0.0.0:9567 (Press CTRL+C to quit)
INFO: 10.160.0.2:45128 - "GET /search?query=India HTTP/1.1" 200 OK
INFO: 10.160.0.2:47936 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:150118 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:53898 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:37108 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.2:37122 - "GET /search?query=Islam HTTP/1.1" 200 OK
INFO: 10.160.0.2:34702 - "POST /insert HTTP/1.1" 200 OK
INFO: 10.160.0.3:54144 - "GET / HTTP/1.1" 404 Not Found
g23110314@vm-backend:~/backend$
```

12. Docker inspect containers and networks

Frontend :

```
ExecIDs: null,
"HostConfig": {
  "Binds": null,
  "ContainerIDFile": "",
  "LogConfig": {
    "Type": "json-file",
    "Config": {}
  },
  "NetworkMode": "app_network",
  "PortBindings": {
    "9567/tcp": [
      {
        "HostIp": "",
        "HostPort": "9567"
      }
    ]
  },
}
```

The container internally exposes port 9567 using TCP.
The host machine maps this port 9567 to the container's 9567.
The port is available on all network interfaces (default 0.0.0.0).
use `http://<server-ip>:9567` (since we are running on remote machine)

```
//
"NetworkSettings": {
  "Bridge": "",
  "SandboxID": "63bfe6a1046b74d1de515b17ba12727af05a62c086751ca01f3b29b8b2aead57",
  "SandboxKey": "/var/run/docker/netns/63bfe6a1046b",
  "Ports": {
    "9567/tcp": [
      {
        "HostIp": "0.0.0.0",
        "HostPort": "9567"
      },
      {
        "HostIp": "::",
        "HostPort": "9567"
      }
    ]
  },
  "HairpinMode": false,
  "LinkLocalIPv6Address": "",
  "LinkLocalIPv6PrefixLen": 0,
  "SecondaryIPAddresses": null,
  "SecondaryIPv6Addresses": null,
  "EndpointID": "",
  "Gateway": "",
  "GlobalIPv6Address": "",
  "GlobalIPv6PrefixLen": 0,
  "IPAddress": "",
  "IPPrefixLen": 0,
  "IPv6Gateway": "",
  "MacAddress": "",
  "Networks": {
    "app_network": {
      "IPAMConfig": null,
      "Links": null,
      "Aliases": null,
      "MacAddress": "4e:17:b6:73:4d:b7",
      "DriverOpts": null,
      "GwPriority": 0,
      "NetworkID": "fb5713132c9de6c172ba6ff46e5be792bc181cae7e2d6677e3992e7e483e546d",
      "EndpointID": "d45b76b5e95f76618ff3dcb70b2c1a9c36501edbe9603e834b2d2030f3bd5df4",
      "Gateway": "172.18.0.1",
      "IPAddress": "172.18.0.2",
      "IPPrefixLen": 16,
      "IPv6Gateway": "",
      "GlobalIPv6Address": "",
      "GlobalIPv6PrefixLen": 0,
      "DNSNames": [
        "frontend",
        "8e1462b6dee9"
      ]
    }
  }
}
```

- frontend is running inside the container and is publicly accessible.

```

g23110314@vm-frontend:~$ curl http://localhost:9567
<!DOCTYPE html>
<html>
<head>
  <title>Elasticsearch Frontend</title>
</head>
<body>
  <h2>Elasticsearch Interface</h2>

  <form action="/get" method="post">
    <input type="text" name="query" placeholder="Search Query" required>
    <button type="submit">Get</button>
  </form>

  <form action="/insert" method="post">
    <textarea name="text" placeholder="Document Text" required></textarea>
    <button type="submit">Insert</button>
  </form>

  <h3>Result:</h3>
  <pre></pre>
</body>
</html>g23110314@vm-frontend:~$ curl http://10.160.0.2:9567
<!DOCTYPE html>
<html>
<head>
  <title>Elasticsearch Frontend</title>
</head>
<body>
  <h2>Elasticsearch Interface</h2>

  <form action="/get" method="post">
    <input type="text" name="query" placeholder="Search Query" required>
    <button type="submit">Get</button>
  </form>

  <form action="/insert" method="post">
    <textarea name="text" placeholder="Document Text" required></textarea>
    <button type="submit">Insert</button>
  </form>

  <h3>Result:</h3>
  <pre></pre>
</body>
</html>g23110314@vm-frontend:~$ curl http://34.100.247.108:9567
<!DOCTYPE html>

```

Backend :

```

g23110314@vm-backend:~$ curl http://localhost:9567
{"detail": "Not Found"}g23110314@vm-backend:~$ curl http://34.93.96.9:9567
{"detail": "Not Found"}g23110314@vm-backend:~$ curl http://10.160.0.3:9567
{"detail": "Not Found"}g23110314@vm-backend:~$ curl http://10.160.0.2:9567
<!DOCTYPE html>
<html>
<head>
  <title>Elasticsearch Frontend</title>
</head>
<body>
  <h2>Elasticsearch Interface</h2>

  <form action="/get" method="post">
    <input type="text" name="query" placeholder="Search Query" required>
    <button type="submit">Get</button>
  </form>

  <form action="/insert" method="post">
    <textarea name="text" placeholder="Document Text" required></textarea>
    <button type="submit">Insert</button>
  </form>

  <h3>Result:</h3>
  <pre></pre>

```

- backend service is isolated within the VM and cannot be accessed externally .

13 . To check health status of an Elasticsearch cluster

```

}
g23110314@vm-backend:~/backend$ curl http://localhost:9200/_cluster/health?pretty
{
  "cluster_name" : "docker-cluster",
  "status" : "yellow",
  "timed_out" : false,
  "number_of_nodes" : 1,
  "number_of_data_nodes" : 1,
  "active_primary_shards" : 1,
  "active_shards" : 1,
  "relocating_shards" : 0,
  "initializing_shards" : 0,
  "unassigned_shards" : 1,
  "delayed_unassigned_shards" : 0,
  "number_of_pending_tasks" : 0,
  "number_of_in_flight_fetch" : 0,
  "task_max_waiting_in_queue_millis" : 0,
  "active_shards_percent_as_number" : 50.0
}
g23110314@vm-backend:~/backend$

```

14. Stored insertions

```

g23110314@vm-backend:~/backend$ curl http://localhost:9200/_cat/indices?v
health status index      uuid                pri rep docs.count docs.deleted store.size pri.store.size
yellow open   documents IGTHitvV3RAWqEn93JDlxmw 1 1      8             0      24.3kb      24.3kb
g23110314@vm-backend:~/backend$

```

```

g23110314@vm-backend:~/backend$ curl -X GET "http://localhost:9200/documents/_search?pretty"
{
  "took": 14,
  "timed_out": false,
  "_shards": {
    "total": 1,
    "successful": 1,
    "skipped": 0,
    "failed": 0
  },
  "hits": {
    "total": {
      "value": 8,
      "relation": "eq"
    },
    "max_score": 1.0,
    "hits": [
      {
        "_index": "documents",
        "_type": "_doc",
        "_id": "1",
        "_score": 1.0,
        "_source": {
          "text": "India is a country in South Asia."
        }
      },
      {
        "_index": "documents",
        "_type": "_doc",
        "_id": "2",
        "_score": 1.0,
        "_source": {
          "text": "New Delhi is the capital of India."
        }
      },
      {
        "_index": "documents",
        "_type": "_doc",
        "_id": "EvlunZUBNUG5scFp3gkvW",
        "_score": 1.0,
        "_source": {
          "text": "India, officially the Republic of India,[1][21] 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."
        }
      },
      {
        "_index": "documents",
        "_type": "_doc",
        "_id": "E_lunZUBNUG5scFp3t0tk",
        "_score": 1.0,
        "_source": {
          "text": "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 Civilization of the third millennium BCE.[32] By 1200 BCE, an archaic form of Sanskrit, an Indo-European language, had diffused into India from the"
        }
      }
    ]
  }
}

```



```

"text": "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 Civilization 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 spoken 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. [1] [42] In South India, the Middle kingdoms exported Dravidian language scripts and religious cultures to the kingdoms of Southeast Asia. [43]"
}
}
{
  "index": "documents",
  "type": "doc",
  "id": "Ff1uzIuZURNUGScFp330ta",
  "score": 1.0,
  "source": {
    "text": "In the early medieval 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 vast network of medieval 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. [a] [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 influential nationalist movement, and its demand for nonviolent resistance, became the major factor in ending British rule. [55] [56] In 1947, the British Indian Empire was partitioned into two independent dominions, [57] [58] [59] [60] 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. [61]"
  }
}
{
  "index": "documents",
  "type": "doc",
  "id": "Ff1IvaZURNUGScFp3BEuv",
  "score": 1.0,
  "source": {
    "text": "Since 1950, the country 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. [62] During this time, its nominal per capita income increased from US$64 annually to US$2,601, and its literacy rate from 16.8% to 74%. A comparatively destitute country in 1951, [63] India has become a fast-growing major economy and hub for information technology services; it has an expanding middle class. [64] Indian movies and music influence global culture. [65] India has reduced its poverty rate, though at the cost of increasing economic inequality. [66] 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. [67] Among the socio-economic challenges India faces are gender inequality, child malnutrition, [68] and rising levels of air pollution. [69] India's land is megadiverse with four biodiversity hotspots. [70] India's wildlife, which has traditionally been viewed with tolerance in its culture, [71] is supported in protected habitats."
  }
}
{
  "index": "documents",
  "type": "doc",
  "id": "Ff1IvaZURNUGScFp300sC",
  "score": 1.0,
  "source": {
    "text": "Hi , the food at IIT gn is very nice"
  }
}
{
  "index": "documents",
  "type": "doc",
  "id": "Ff1IvaZURNUGScFp3V0sI",
  "score": 1.0,
  "source": {
    "text": ""
  }
}

```

15. Listen

```

q23110314vm-backend:~# sudo apt install net-tools -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 3 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://asia-south1-05.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-lubuntu [196 kB]
Fetched 196 kB in 1s (296 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 68851 files and directories currently installed.)
Preparing to unpack .../net-tools-1.60+git20180626.aebd88e-lubuntu amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-lubuntu) ...
Setting up net-tools (1.60+git20180626.aebd88e-lubuntu) ...
Processing triggers for man-db (2.9.1-1) ...
q23110314vm-backend:~# netstat -antp | grep LISTEN
(Not all processes could be identified, non-owned process info
will not be shown, you may have to be root to see it all.)
tcp        0      0 0.0.0.0:9200          0.0.0.0:*           LISTEN -
tcp        0      0 0.0.0.0:0:22         0.0.0.0:*           LISTEN -
tcp        0      0 0.127.0.0.53:53      0.0.0.0:*           LISTEN -
tcp        0      0 0.0.0.0:20202        0.0.0.0:*           LISTEN -
tcp        0      0 0.0.0.0:9300         0.0.0.0:*           LISTEN -
tcp        0      0 0.0.0.0:0:93567      0.0.0.0:*           LISTEN -
tcp6       0      0 :::9200              :::*                LISTEN -
tcp6       0      0 :::22                :::*                LISTEN -
tcp6       0      0 :::20201             :::*                LISTEN -
tcp6       0      0 :::9300              :::*                LISTEN -
tcp6       0      0 :::93567             :::*                LISTEN -
q23110314vm-backend:~#

```

```

Last login: Fri Mar 21 16:46:10 2025 from 35.235.243.129
g23110314@vm-frontent:~$ sudo apt install net-tools -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
net-tools is already the newest version (1.60+git20180626.aebd88e-1ubuntu1).
0 upgraded, 0 newly installed, 0 to remove and 3 not upgraded.
g23110314@vm-frontent:~$ netstat -antp | grep LISTEN
(Not all processes could be identified, non-owned process info
will not be shown, you would have to be root to see it all.)
tcp        0      0 0.0.0.0:9567          0.0.0.0:*            LISTEN     -
tcp        0      0 0.0.0.0:20202        0.0.0.0:*            LISTEN     -
tcp        0      0 0.0.0.0:22           0.0.0.0:*            LISTEN     -
tcp        0      0 0.0.0.0:53:53       0.0.0.0:*            LISTEN     -
tcp6       0      0 :::9567              :::*                  LISTEN     -
tcp6       0      0 :::20201              :::*                  LISTEN     -
tcp6       0      0 :::22                 :::*                  LISTEN     -
g23110314@vm-frontent:~$

```

16. Manually testing elastic search

And stopping elastic search and then restarting - document is saved.
(Data persists even after restarting)

Internal Server Error

SSH-in-browser

```

g23110314@vm-backend:~$ curl -X POST "localhost:9200/test_index/_doc/1" -H "Content-Type: application/json" -d '{"name": "Test Document"}'
{"_index": "test_index", "_type": "_doc", "_id": "1", "_version": 2, "result": "updated", "shards": {"total": 2, "successful": 1, "failed": 0}, "_seq_no": 1, "_primary_term": 1}
g23110314@vm-backend:~$ curl -X GET "localhost:9200/test_index/_doc/1?pretty"
{
  "_index" : "test_index",
  "_type" : "_doc",
  "_id" : "1",
  "_version" : 2,
  "_seq_no" : 1,
  "_primary_term" : 1,
  "found" : true,
  "_source" : {
    "name" : "Test Document"
  }
}
g23110314@vm-backend:~$ docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS
58540e9800f    fastapi:1.2                        "uvicorn main:app --..." 52 minutes ago Up 52 minutes 0.0.0.0:9567->9567/tcp, [::]:9567->9567/tcp
1d1b6ed3b35    docker.elastic.co/elasticsearch:7.10.2 "/bin/bash -c 'set /usr/local..." 4 hours ago    Up 4 hours    0.0.0.0:9200->9200/tcp, [::]:9200->9200/tcp
g23110314@vm-backend:~$ docker stop elasticsearch
g23110314@vm-backend:~$

```

```

g23110314@vm-backend:~$ curl -X GET "localhost:9200/test_index/_doc/1?pretty"
{
  "_index" : "test_index",
  "_type" : "_doc",
  "_id" : "1",
  "_version" : 2,
  "_seq_no" : 1,
  "_primary_term" : 1,
  "found" : true,
  "_source" : {
    "name" : "Test Document"
  }
}

```

17. Docker images

Backend

```

g23110314@vm-backend:~$ docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
fastapi              2                  fd4603fe5c2d       59 minutes ago     149MB
<none>              <none>            c255655afb45       5 hours ago        153MB
fastapi              1                  2224cbf57e09       5 hours ago        148MB
docker.elastic.co/elasticsearch/elasticsearch 7.10.2             0b58e1cea500       4 years ago        814MB
g23110314@vm-backend:~$

```

```
g23110314@vm-backend:~$
```

1


```




g23110314@vm-frontent:~$ docker images
REPOSITORY          TAG             IMAGE ID         CREATED          SIZE
fastapi              1              af7d62e57fc1    26 hours ago    148MB
sohanggaonkar314/fastapi_frontend 1              af7d62e57fc1    26 hours ago    148MB
g23110314@vm-frontent:~$ docker inspect af7d62e57fc1
[
  {
    "Id": "sha256:af7d62e57fc16c9d71e290bd0a0a24c65adb6b130c02b0a9a90aead0a86907d2",
    "RepoTags": [
      "fastapi:1",
      "sohanggaonkar314/fastapi_frontend:1"
    ],
    "RepoDigests": [
      "sohanggaonkar314/fastapi_frontend@sha256:3cb106f35253a2d4934333e06022863ba746a90755c9b40c79b87ea2a7afad9a"
    ],
    "Parent": "",
    "Comment": "buildkit.dockerfile.v0",
    "Created": "2025-03-21T15:03:47.074603712Z",
    "DockerVersion": "",
    "Author": "",
    "Config": {
      "Hostname": "",
      "Domainname": "",
      "User": "",
      "AttachStdin": false,
      "AttachStdout": false,
      "AttachStderr": false,
      "ExposedPorts": {
        "9567/tcp": {}
      },
      "Tty": false,
      "OpenStdin": false,
      "StdinOnce": false,
      "Env": [
        "PATH=/usr/local/bin:/usr/local/sbin:/usr/bin:/sbin:/bin",
        "LANG=C.UTF-8",
        "GPG_KEY=E3FF2839C048B25C094DEB98B659E310250568",
        "PYTHON_VERSION=3.9.21",
        "PYTHON_SHA256=3126f59592c9b0d798584755f2bf7b081fa1ca33ca7a6fea980108d752a05bb1"
      ],
      "Cmd": [
        "uvicorn",
        "main:app",
        "--host",
        "0.0.0.0",
        "--port",
        "9567"
      ],
      "ArgsEscaped": true,
      "Image": "",
      "Volumes": null,
      "WorkingDir": "/app",
      "Entrypoint": null,
      "OnBuild": null,
      "Labels": null
    },
    "Architecture": "amd64",
    "Os": "linux",
    "Size": 147659756,
    "GraphDriver": {
      "Data": {
        "LowerDir": "/var/lib/docker/overlay2/oxft6c9dujm2811acroc614w2j/diff:/var/lib/docker/overlay2/ad6b1h8nc1ff:/var/lib/docker/overlay2/1011ff7c83fbd6ff6718b1842955b3a67ff725b2b098a7870acb775b28fe039/diff:/var/lib/docker/overl
: /var/lib/docker/overlay2/0a9f92f2aeb447b345d334640d10f7f917659cd8ada82a55607b2a7f233b144d/diff:/var/lib/docker/overlay2
        "MergedDir": "/var/lib/docker/overlay2/lv6l1d9ah3835oaxr21ietv35/merged",
        "UpperDir": "/var/lib/docker/overlay2/lv6l1d9ah3835oaxr21ietv35/diff",
        "WorkDir": "/var/lib/docker/overlay2/lv6l1d9ah3835oaxr21ietv35/work"
      },
      "Name": "overlay2"
    },
    "RootFS": {
      "Type": "layers",
      "Layers": [
        "sha256:1287fbcedfcca6ee8c1f2436a3b9e9d86a4648db2d91080377d499737f1b307f3",
        "sha256:140ac0a8af03880fb53bca492a8630996d0f734c6ca329dc2d1a8ca1256dae9",
        "sha256:04f6a4cfc28a74355ff17ed823937c7c383a8435406994499aa3f637745a2f1a",
        "sha256:0796a33961a7bdc069b7a0ba8533463c67a639c1134253f0a29ad70f04b74b2c",
        "sha256:65d24a9df3a3298cf9640a9b9f61f7a9123a30731c7c03cdac7844079cbb64fc",
        "sha256:9aaa7789635c74b9f4b58d933a7dd46762207910d4cdf2f6a976172f0b5df0fd",
        "sha256:b2da599b8c056404fa812f38ac6746f0c34693b0126f566cbdaab8df3997a831",
        "sha256:f437bd64972fbale494662dbd13bd1aeb0d3ba73aa08b9f01b3936b16bfc8a0"
      ]
    },
    "Metadata": {
      "LastTagTime": "2025-03-21T18:54:36.430663674Z"
    }
  }
]
g23110314@vm-frontent:~$

```

18. Pushing docker images to docker hub

```

 SSH-in-browser



---



```

g23110314@vm-frontend:~$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
fastapi 1 af7d62e57fc1 4 hours ago 148MB
sohamgaonkar/fastapi_frontend 1 af7d62e57fc1 4 hours ago 148MB
<none> <none> 8db87dd5abd5 6 hours ago 148MB

g23110314@vm-frontend:~$ docker rmi sohamgaonkar/fastapi_frontend:1
Untagged: sohamgaonkar/fastapi_frontend:1
g23110314@vm-frontend:~$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
fastapi 1 af7d62e57fc1 4 hours ago 148MB
<none> <none> 8db87dd5abd5 6 hours ago 148MB

g23110314@vm-frontend:~$ docker image prune -f
Deleted Images:
deleted: sha256:8db87dd5abd550c242c8540c2b4de5efbf4bef79255544dabab4e49692e676c28

Total reclaimed space: 0B

g23110314@vm-frontend:~$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
fastapi 1 af7d62e57fc1 4 hours ago 148MB

g23110314@vm-frontend:~$ docker info | grep Username
Username: sohamgaonkar314

g23110314@vm-frontend:~$ docker tag af7d62e57fc1 sohamgaonkar314/fastapi_frontend:1
g23110314@vm-frontend:~$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
fastapi 1 af7d62e57fc1 4 hours ago 148MB
sohamgaonkar314/fastapi_frontend 1 af7d62e57fc1 4 hours ago 148MB



g23110314@vm-frontend:~$ docker push sohamgaonkar314/fastapi_frontend:1
The push refers to repository [docker.io/sohamgaonkar314/fastapi_frontend]
f437b8d64972: Pushed
b2de599b8c05: Pushed
9aaa7789635c: Pushed
65d24a9df3e3: Pushed
0796a33961ef: Pushed
04f6e4cfc28e: Pushed
140ec0aa8af0: Pushed
1287fbecdffc: Pushed
1: digest: sha256:3cb106f35253a2d4934333e06022863b746a90755c9b40c79b97ea2e7afad9a size: 1991

g23110314@vm-frontend:~$ █

```


```

```

SSH-in-browser


UPLOADED

g23110314@vm-backend:~/backend$ docker images
REPOSITORY                                TAG                IMAGE ID            CREATED             SIZE
fastapi                                  2                  fd4603fe5c2d       3 hours ago        149MB
fastapi                                  1                  2224cbf57c09       8 hours ago        148MB
docker.elastic.co/elasticsearch/elasticsearch  7.10.2            0b58e1cea500       4 years ago        814MB
sohamgaonkar314/elasticsearch            7.10.2            0b58e1cea500       4 years ago        814MB
g23110314@vm-backend:~/backend$ docker tag fd4603fe5c2d sohamgaonkar314/fastapi_backend:2
g23110314@vm-backend:~/backend$ docker images
REPOSITORY                                TAG                IMAGE ID            CREATED             SIZE
fastapi                                  2                  fd4603fe5c2d       3 hours ago        149MB
sohamgaonkar314/fastapi_backend          2                  fd4603fe5c2d       3 hours ago        149MB
fastapi                                  1                  2224cbf57c09       8 hours ago        148MB
docker.elastic.co/elasticsearch/elasticsearch  7.10.2            0b58e1cea500       4 years ago        814MB
sohamgaonkar314/elasticsearch            7.10.2            0b58e1cea500       4 years ago        814MB
g23110314@vm-backend:~/backend$ docker push sohamgaonkar314/fastapi_backend:2
The push refers to repository [docker.io/sohamgaonkar314/fastapi_backend]
f4a524265e3f: Mounted from sohamgaonkar/fastapi
09669625c484: Mounted from sohamgaonkar/fastapi
5805516c7f92: Mounted from sohamgaonkar/fastapi
619760b45e1c: Mounted from sohamgaonkar/fastapi
0796a33961ef: Mounted from sohamgaonkar/fastapi
04f6e4cfc28e: Mounted from sohamgaonkar/fastapi
140ec0aa8af0: Mounted from sohamgaonkar/fastapi
1287fbecdcc0: Mounted from sohamgaonkar/fastapi
2: digest: sha256:b2e89b70639e9f5a043d08664a7e7ea7bd8122b7c98b056229fa365365687f44 size: 1990
g23110314@vm-backend:~/backend$ docker push sohamgaonkar314/elasticsearch:7.10.2
The push refers to repository [docker.io/sohamgaonkar314/elasticsearch]
ed550bd77d77: Mounted from sohamgaonkar/elasticsearch
ef9c31027ef1: Mounted from sohamgaonkar/elasticsearch
61e27783aed2: Mounted from sohamgaonkar/elasticsearch
5c67a4bfdee9: Mounted from sohamgaonkar/elasticsearch
5b6e7a3340cf: Mounted from sohamgaonkar/elasticsearch
61c3ab20ec54: Mounted from sohamgaonkar/elasticsearch
cca87868cf9f: Mounted from sohamgaonkar/elasticsearch
890d044a2aba: Mounted from sohamgaonkar/elasticsearch
2653d992f4ef: Mounted from sohamgaonkar/elasticsearch
7.10.2: digest: sha256:ccc094529ca2f542ece2e52354763d9b1beb56458982b35b13fab7035c861910 size: 2203
g23110314@vm-backend:~/backend$

```

Link for images on docker hub -

Frontend :

https://hub.docker.com/repository/docker/sohamgaonkar314/fastapi_frontend/general

Backend :

https://hub.docker.com/repository/docker/sohamgaonkar314/fastapi_backend/general

Elastic search :

<https://hub.docker.com/repository/docker/sohamgaonkar314/elasticsearch/general>