

# CS 203 Software Tools and Techniques for AI

Group: 12

Name: Harinarayan J (23110128), Vyomika Vasireddy (23110363)

**Link to Docker files:**

Frontend: <https://github.com/HarinarayanJ/CS203-Lab8/blob/main/frontend/dockerfile>

Backend: <https://github.com/HarinarayanJ/CS203-Lab8/blob/main/backend/dockerfile>

**Link for the uploaded images on the docker hub:**

## Fast API 1

Fast API 2

## Elastic Search

## Frontend:

```
C:\Users\hari\Hari\Semester 4\CS 203\Lab_8\frontend>docker build -t frontend .
[+] Building 16.9s (10/10) FINISHED
=> [internal] load build definition from dockerfile
=> => transferring dockerfile: 194B
=> [internal] load metadata for docker.io/library/python:3.13-slim
=> [auth] library/python:pull token for registry-1.docker.io
=> [internal] load .dockerrignore
=> => transferring context: 2B
[+] [1/4] FROM docker.io/library/python:3.13-slim@sha256:8f3aba466a471c0ab903db7cb979abd4bda370b04789d25440cc90372b50e04
=> => resolve docker.io/library/python:3.13-slim@sha256:8f3aba466a471c0ab903db7cb979abd4bda370b04789d25440cc90372b50e04
=> sha256:757c7ac1109553a52a409b794c1bec095cac945f1e2fd92215c68f2ed2d35d4 249B / 249B
=> sha256:757c7ac1109553a52a409b794c1bec095cac945f1e2fd92215c68f2ed2d35d4 3.51MB / 3.51MB
=> sha256:7a7299fc58731e7f30ff938220a70a061a927ccda4468c8717001cb7d89c4 12.58MB / 12.58MB
=> sha256:7a7299fc58731e7f30ff938220a70a061a927ccda4468c8717001cb7d89c4 28.20MB / 28.20MB
=> => extracting sha256:6e9909acdb790c5a1989d9fc795fda5a246ad6664bb27b5c688e2b734b2c5fad
=> => extracting sha256:a6f2701f375f1349521c5cd3f0930289e79ff8f983b2058a76a65609ec30705c4
=> => extracting sha256:7a7299fc58731e7f30ff938220a70a061a927ccda4468c8717001cb7d89c4
=> => extracting sha256:757c77a1059535a2a5409b794c1bec095cac945ffeld92215c68f2ed2d35d4
[+] [internal] load build context
=> => transferring context: 1.58kB
[+] [2/4] WORKDIR /api
=> [3/4] RUN pip install --no-cache-dir fastapi elasticsearch
[+] [4/4] COPY .
=> exporting to image
=> exporting layers
=> => exporting manifest sha256:65944dfcc0d6f11521a19a75623d3340f9648be12d6190369584a702e835bb6f
=> => exporting config sha256:4481d7fdb2fa5e937e46d8e697a91e77b2eff72a08497e0250683b1fb44fc33
=> => exporting attestation manifest sha256:d7579daef6383c26f430349d7a7a2d37c78ec1f14a2881d12b9234988758f
=> => exporting manifest list sha256:f4c90cc054bf5fe9195f2978de58703f26e4b6339c5e9d7f16197915ffcea0e1c0
=> => naming to docker.io/library/frontend:latest
=> => unpacking to docker.io/library/frontend:latest
```

```
\frontend>docker tag frontend:latest j2osak7gxe/fastapi1:latest
```

```
C:\Users\harin\Hari\Semester 4\CS 203\Lab_8\frontend>docker push j2osak7gxe/fastapi1:latest
The push refers to repository [docke.../j2osak7gxe/fastapi1]
7a729f9c5873: Pushed
eb24afabae17: Pushed
c017b9b2f07a: Pushed
6e909acdb790: Pushed
75c77ac11059: Pushed
a6f2701f375f: Pushed
6ed71d25a3c8: Pushed
98774fbf73c2: Pushed
latest: digest: sha256:40fc7894f09b238b31422938d03ab451f6f3aac341c443ee735bda4db040dfa7 size: 856
```

```
C:\Users\harin\Hari\Semester 4\CS 203\Lab_8\frontend>docker pull j2osak7gxe/fastapi1:latest
latest: Pulling from j2osak7gxe/fastapi1
Digest: sha256:40fc7894f09b238b31422938d03ab451f6f3aac341c443ee735bda4db040dfa7
Status: Image is up to date for j2osak7gxe/fastapi1:latest
docker.io/j2osak7gxe/fastapi1:latest
```

```
C:\Users\harin\Hari\Semester 4\CS 203\Lab_8\frontend>docker run -it -p 9567:9567 j2osak7gxe/fastapi1
FastAPI Starting production server 🚀
  Searching for package file structure from directories with __init__.py files
    Importing from /api
  module client.py
  code Importing the FastAPI app object from the module with the following code:
    from client import app
  app Using import string: client:app
  server Server started at http://0.0.0.0:9567
  server Documentation at http://0.0.0.0:9567/docs
  Logs:
  INFO Started server process [7]
  INFO Waiting for application startup.
  INFO Application startup complete.
  INFO Uvicorn running on http://0.0.0.0:9567 (Press CTRL+C to quit)
```

```
g23110128@instance-20250327-162358:~$ sudo docker run j2osak7gxe/fastapi1:latest
```

```
FastAPI Starting production server 🚀
  Searching for package file structure from directories with
  __init__.py files
    Importing from /api
  module client.py
  code Importing the FastAPI app object from the module with the following
  code:
    from client import app
  app Using import string: client:app
  server Server started at http://0.0.0.0:9567
  server Documentation at http://0.0.0.0:9567/docs
  Logs:
  INFO Started server process [6]
  INFO Waiting for application startup.
  INFO Application startup complete.
  INFO Uvicorn running on http://0.0.0.0:9567 (Press CTRL+C to quit)
```

## Elastic Search:

```
g23110128@instance-20250327-162358:~$ sudo docker network create -d bridge elastic
706c28e7f4862c056bf4ee6a62d8c0a6a46595a77cbc7bafcl3001453cea73e3
g23110128@instance-20250327-162358:~$ sudo docker pull docker.elastic.co/elasticsearch/elasticsearch:8.17.3
8.17.3: Pulling from elastic/elasticsearch
4bb953b2341e: Pull complete
8e24285bc7e9: Pull complete
712c04fdbd90: Pull complete
4ca545ee6d5d: Pull complete
c8e302a2e0d1: Pull complete
2920558bb9da: Pull complete
425da96d0239: Pull complete
542cc10a95ab: Pull complete
a0a8cf8ea932: Pull complete
ca2cb92388d3: Pull complete
Digest: sha256:224c75e346bd745ce908f06a1cbad7bf10988961dcdfcc22556b3f856b3f0
Status: Downloaded newer image for docker.elastic.co/elasticsearch/elasticsearch:8.17.3
docker.elastic.co/elasticsearch/elasticsearch:8.17.3
g23110128@instance-20250327-162358:~$ sudo docker run -p 127.0.0.1:9200:9200 -d --name elastic search -e "discovery.type=single-node" -e "xpack.security.enabled=false" -e "xpa
ck.license.self_generated.type=trial" -v "/elasticsearch-data:/usr/share/elasticsearch/data" --network=elastic docker.elastic.co/elasticsearch/elasticsearch:8.17.3
03b47e50f34fccc430ffa7519e62a1chad6322ff6e0d526959787d514aac6
g23110128@instance-20250327-162358:~$ curl -X PUT "http://localhost:9200/india_doc" -H "Content-Type: application/json" -d '{
  "mappings": {
    "properties": {
      "id": { "type": "keyword" },
      "text": { "type": "text" }
    }
  }
}'
{"acknowledged":true,"shards_acknowledged":true,"index":"india_doc"}g23110128@instance-20250327-162358:~$ 
g23110128@instance-20250327-162358:~$ curl -X POST "http://localhost:9200/india_doc/_bulk" -H "Content-Type: application/json" --data-binary @-
<<EOF
{ "index": { "id": "1" } }
{ "id": "1", "text": "India, officially the Republic of India, is a country in South Asia. It is the seventh-largest country by area; the most populous country from June 2023 onward; and since its independence in 1947, the world's most populous democracy. 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; 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": { "id": "2" } }
{ "id": "2", "text": "Modern humans arrived on the Indian subcontinent from Africa no later than 55,000 years ago. Their long occupation, predominantly in isolation as hunter-gatherers, has made the region highly diverse, second only to Africa in human genetic diversity. 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. By 1200 BCE, an archaic form of Sanskrit, an Indo-European language, had diffused into India from the northwest. Its hymns recorded the dawning of Hinduism in India. India's pre-existing Dravidian languages were supplanted in the northern regions. By 400 BCE, caste had emerged within Hinduism, and Buddhism and Jainism had arisen, proclaiming social orders linked to heredity. Early political consolidations gave rise to the loose-knit Maurya and Gupta Empires. Widespread creativity suffused this era, but the status of women declined, and untouchability became an organized belief. In South India, the Middle Kingdoms exported Dravidian language scripts and religious cultures to the kingdoms of Southeast Asia." }

{ "index": { "id": "3" } }
{ "id": "3", "text": "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 institutional 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." }

{ "index": { "id": "4" } }
{ "id": "4", "text": "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$2,601, and its literacy rate from 16.6% to 74%. A comparatively destitute country in 1951, India has become a fast-growing major economy and hub for information technology services; it has an expanding middle class. Indian movies and music increasingly influence global culture. India has reduced its poverty rate, though at the cost of increasing economic inequality. It is a nuclear weapons state that ranks high in military expenditure. It has disputes over Kashmir with its neighbors, Pakistan and China, unresolved since the mid-20th century. Among the socio-economic challenges India faces are gender inequality, child malnutrition, and rising levels of air pollution. India's land is megadiverse with four biodiversity hotspots. India's wildlife, which has traditionally been viewed with tolerance in its culture, is supported in protected habitats." }
EOF
{"errors":false,"took":0,"items":[{"_index":"india_doc","_id":"1","_version":1,"result":{"created","shards":{"total":2,"successful":1,"failed":0},"seq_no":0,"primary_term":1,"status":201}},{"_index":"india_doc","_id":"2","_version":1,"result":{"created","shards":{"total":2,"successful":1,"failed":0},"seq_no":1,"primary_term":1,"status":201}},{"_index":"india_doc","_id":"3","_version":1,"result":{"created","shards":{"total":2,"successful":1,"failed":0},"seq_no":2,"primary_term":1,"status":201}},{"_index":"india_doc","_id":"4","_version":1,"result":{"created","shards":{"total":2,"successful":1,"failed":0},"seq_no":3,"primary_term":1,"status":201}}]}g23110128@instance-20250327-162358:~$ 
```

## Backend:

```
C:\Users\harin\Harini Semester 4\CS 203\Lab_8\backend>docker build -t backend .  
[+] Building 4.1s (10/10) FINISHED  
--> [internal] load build definition from dockerfile 0.2s  
--> => transferring dockerfile: 266B 0.1s  
--> [internal] load metadata for docker.io/library/python:3.13-slim 3.1s  
--> [auth] library/python:pull token for registry-1.docker.io 0.0s  
--> [internal] load .dockerrcignore 0.1s  
--> => transferring context: 2B 0.0s  
--> [internal] load build context 0.1s  
--> => transferring context: 1.38kB 0.0s  
--> [1/4] FROM docker.io/library/python:3.13-slim@sha256:8f3aba466a471c0ab903dbd7cb979abd4bda370b04789d25440cc90372b50e04 0.1s  
--> => resolve docker.io/library/python:3.13-slim@sha256:8f3aba466a471c0ab903dbd7cb979abd4bda370b04789d25440cc90372b50e04 0.1s  
--> CACHED [2/4] WORKDIR /api 0.0s  
--> CACHED [3/4] RUN pip install --no-cache-dir "fastapi[standard]" elasticsearch 0.0s  
--> [4/4] COPY . 0.0s  
--> exporting to image 0.1s  
--> exporting layers 0.1s  
--> => exporting manifest sha256:68d96033f2ae cbd0dc0d127cf64b94fdd70752eb29b7c7b621764cf6160ee99b 0.0s  
--> => exporting config sha256:87ff0fa31db43b06dc07ce9a177214ad90d098cd00a71510c27bf6ff226e27e2 0.0s  
--> => exporting attestation manifest sha256:4fffab8387c9f5d3c34cc10d67ecc5e5994c0f5997c16b89805140926861b14c 0.1s  
--> => exporting manifest list sha256:2086a1b24721109beccfc0f583c6f5498a3db438cfdb92a4cfdf9d64c53cfbd5fd7 0.0s  
--> => naming to docker.io/library/backend:latest 0.0s  
--> => unpacking to docker.io/library/backend:latest 0.1s
```

```
C:\Users\harin\Hari\Semester 4\CS 203\Lab_8\backend>docker tag backend:latest j2osak7gxe/fastapi2:latest  
C:\Users\harin\Hari\Semester 4\CS 203\Lab_8\backend>docker push j2osak7gxe/fastapi2:latest  
The push refers to repository [docker.io/j2osak7gxe/fastapi2]  
aed929474ed6: Mounted from j2osak7gxe/fastapi1  
798b3a22c0cc: Pushed  
95e79f4d30f1: Pushed  
7a729f9c5873: Mounted from j2osak7gxe/fastapi1  
6e909acdb790: Mounted from j2osak7gxe/fastapi1  
75c77ac11059: Mounted from j2osak7gxe/fastapi1  
a6f2701f375f: Mounted from j2osak7gxe/fastapi1  
eb24afabae17: Mounted from j2osak7gxe/fastapi1  
latest: digest: sha256:2086a1b24721109beccf0583c6f5498a3db438cfdb92a4cf9d64c53cf5df7 size: 856
```

```
g2311012@instance-20250327-162358:~$ sudo docker run -it -p 9567:9567 --network=elastic-net --add-host=host.docker.internal:host-gateway j2osak7gx/fastapi2:latest
FastAPI Starting production server 🚀

    Searching for package file structure from directories with init .py files
/api/py/server.py:14: ElasticsearchWarning: Elasticsearch built-in security features are not enabled. Without authentication, your cluster could be accessible to anyone. See https://www.elastic.co/guide/en/elasticsearch/reference/7.17/security-minimal-setup.html to enable security.
    if not es.indices.exists(index=index.name):
/api/py/server.py:15: ElasticsearchWarning: Elasticsearch built-in security features are not enabled. Without authentication, your cluster could be accessible to anyone. See https://www.elastic.co/guide/en/elasticsearch/reference/7.17/security-minimal-setup.html to enable security.
    es.indices.create(index=index.name, body = {
        Importing from /api/py

module: @server.py

code: Importing the FastAPI app object from the module with the following code:
from server import app

app: Using import string: server:app

server: Server started at http://0.0.0.0:9567
server: Documentation at http://0.0.0.0:9567/docs

Logs:
INFO: Started server process [?]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: Unicorn running on http://0.0.0.0:9567 (Press CTRL+C to quit)
```

## Virtual Machine:

### Machine configuration

Name \*  (?)

Region \*  ▼ (?)

Zone \*  ▼ (?)

Region is permanent Zone is permanent

General purpose    Compute optimized    Memory optimized    Storage optimized    GPUs

Machine types for common workloads, optimized for cost and flexibility

Series <span>(?)</span>	Description	vCPUs <span>(?)</span>	Memory <span>(?)</span>	CPU Platform
<input checked="" type="radio"/> C4	Consistently high performance	2 - 192	4 - 1,488 GB	Intel Emerald
<input type="radio"/> C4A	Arm-based consistently high performance	1 - 72	2 - 576 GB	Google Axion
<input type="radio"/> N4	Flexible & cost-optimized	2 - 80	4 - 640 GB	Intel Emerald
<input type="radio"/> C3	Consistently high performance	4 - 192	8 - 1,536 GB	Intel Sapphire
<input type="radio"/> C3D	Consistently high performance	4 - 360	8 - 2,880 GB	AMD Genoa
<input type="radio"/> E2	Low cost, day-to-day computing	0.25 - 32	1 - 128 GB	Intel Broadwe
<input type="radio"/> N2	Balanced price & performance	2 - 128	2 - 864 GB	Intel Cascade
<input type="radio"/> N2D	Balanced price & performance	2 - 224	2 - 896 GB	AMD Milan
<input type="radio"/> T2A	Scale-out workloads	1 - 48	4 - 192 GB	Ampere Altra
<input type="radio"/> T2D	Scale-out workloads	1 - 60	4 - 240 GB	AMD Milan
<input type="radio"/> N1	Balanced price & performance	0.25 - 96	0.6 - 624 GB	Intel Haswell

### Machine type

Choose a machine type with preset amounts of vCPUs and memory that suit most workloads.

c4-standard-2 (2 vCPU, 1 core, 7 GB memory) ▼



vCPU

2 (1 core)

Memory

7 GB

▼ Advanced configurations

## Boot disk

Select an image or snapshot to create a boot disk; or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in [Marketplace](#)

[Public images](#)

Custom images

Snapshots

Archive Snapshots

Existing Disks

Operating system

Ubuntu

Version \*

Ubuntu 24.04 LTS

x86/64, amd64 noble image built on 2025-03-13

Boot disk type \*

Hyperdisk Balanced

[Compare disk types](#)

Size (GB) \*

50

Provision between 10 and 524288 GB

Provisioned IOPS \*

3300

IOPS [?](#)

Provision between 3,000 and 25,000 IOPS

Provisioned throughput \*

215

MB/s [?](#)

Provision between 140 and 825 MB/s

[▼ Show advanced configuration](#)

## Networking

### Firewall [?](#)

Add tags and firewall rules to allow specific network traffic from the Internet

Allow HTTP traffic

Allow HTTPS traffic

Allow Load Balancer Health Checks

```
g23110128@instance-20250327-162358:~$ gcloud compute firewall-rules create allow-es1 --allow=tcp:9567 --source-ranges=0.0.0.0/0
Creating firewall...done.
Created [https://www.googleapis.com/compute/v1/projects/cs203-stt-ai/global/firewalls/allow-es1].
NAME      NETWORK  DIRECTION  PRIORITY  ALLOW      DENY  DISABLED
allow-es1  default   INGRESS    1000      tcp:9567    False
```

## VM instances

VM instances						
<input type="checkbox"/> Status	Name ↑	Zone	Recommendations	In use by	⋮	Connect
<input checked="" type="checkbox"/>	<a href="#">instance-20250327-162358</a>	us-central1-a		1	SSH	⋮

```
g23110128@instance-20250327-162358:~$ sudo snap install docker
docker 27.5.1 from Canonical✓ installed
```

## Virtual Machine 1:

```
g23110128@instance-20250327-182750:~$ sudo docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
cecf5f2cacd52 j2osak7gxe/fastapi1 "sh -c 'fastapi run ...'" 20 minutes ago Exited (130) 26 seconds ago
b31db495a5cd j2osak7gxe/fastapi1 "sh -c 'fastapi run ...'" 21 minutes ago Created
88df676dd1c7 8f1f26f6d386 "sh -c 'fastapi run ...'" 27 minutes ago Created
54277073ccce 8f1f26f6d386 "sh -c 'fastapi run ...'" 28 minutes ago Exited (137) 20 minutes ago
eloquent_ardinghelli
```

```
g23110128@instance-20250327-182750:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 204 kB of archives.
After this operation, 811 kB of additional disk space will be used.
Get:1 http://us-central1.gce.archive.ubuntu.com/ubuntu noble/main amd64 net-tools amd64 2.10-0.1ubuntu4 [204 kB]
Fetched 204 kB in 0s (9749 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 70703 files and directories currently installed.)
Preparing to unpack .../net-tools_2.10-0.1ubuntu4_amd64.deb ...
Unpacking net-tools (2.10-0.1ubuntu4) ...
Setting up net-tools (2.10-0.1ubuntu4) ...
Processing triggers for man-db (2.12.0-4build2) ...
uScanning processes...
doScanning processes... [=====
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
g23110128@instance-20250327-182750:~$ sudo netstat -antp | grep LISTEN
tcp        0      0 127.0.0.54:53          0.0.0.0:*          LISTEN      427/systemd-resolve
tcp        0      0 127.0.0.53:53          0.0.0.0:*          LISTEN      427/systemd-resolve
tcp6       0      0 ::1:22              ::*:*               LISTEN      1/init
```

```
g23110128@instance-20250327-182750:~$ sudo docker images
REPOSITORY           TAG      IMAGE ID      CREATED      SIZE
j2osak7gxe/fastapi1 latest   1fa72e9179b8  25 minutes ago  194MB
j2osak7gxe/fastapi1 <none>   8f1f26f6d386  2 hours ago   194MB
```

## Virtual Machine 2

```
g23110128@instance-20250327-162358:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 27 not upgraded.
Need to get 204 kB of archives.
After this operation, 811 kB of additional disk space will be used.
Get:1 http://us-central1.gce.archive.ubuntu.com/ubuntu noble/main amd64 net-tools amd64 2.10-0.1ubuntu4 [204 kB]
Fetched 204 kB in 0s (9771 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 70703 files and directories currently installed.)
Preparing to unpack .../net-tools 2.10-0.1ubuntu4_amd64.deb ...
Unpacking net-tools (2.10-0.1ubuntu4) ...
Setting up net-tools (2.10-0.1ubuntu4) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
g23110128@instance-20250327-162358:~$ 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 0.0.0.0:9200          0.0.0.0:*              LISTEN      -
tcp        0      0 127.0.0.54:53         0.0.0.0:*              LISTEN      -
tcp        0      0 127.0.0.53:53         0.0.0.0:*              LISTEN      -
tcp6       0      0 ::1:9200            ::*:*                  LISTEN      -
tcp6       0      0 ::1:22              ::*:*                  LISTEN      -
g23110128@instance-20250327-162358:~$
```

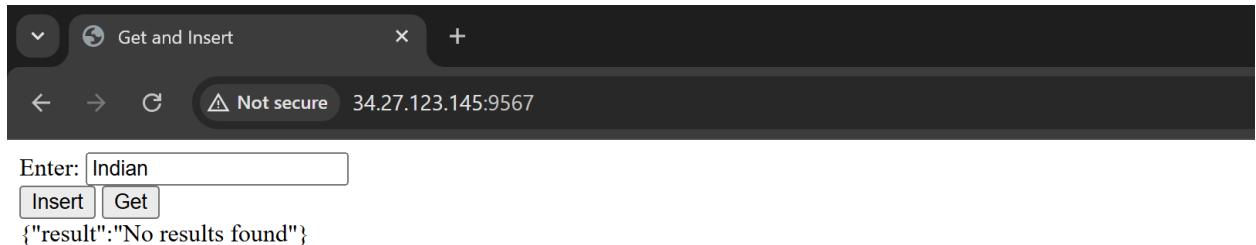
```
g23110128@instance-20250327-162358:~$ sudo docker images
REPOSITORY                      TAG      IMAGE ID      CREATED        SIZE
j2osak7gxe/fastapi2             latest   858a788f33d3  19 minutes ago  194MB
j2osak7gxe/fastapi2             <none>   ae08e142542f  21 minutes ago  194MB
j2osak7gxe/fastapi2             <none>   87ff0fa31db4  28 minutes ago  194MB
docker.elastic.co/elasticsearch/elasticsearch  8.17.3   869b1daa5a9f  3 weeks ago   1.32GB
docker.elastic.co/elasticsearch/elasticsearch  7.17.0   6fe993d6e7ed  3 years ago   612MB
g23110128@instance-20250327-162358:~$
```

## Final Screenshots:

### Get:



Enter: India  
Insert Get  
{"result": [{"\_index": "doc", "\_id": "-7220104922862381816", "\_score": 0.13353139, "\_source": {"id": "-7220104922862381816", "t": "India"} }]



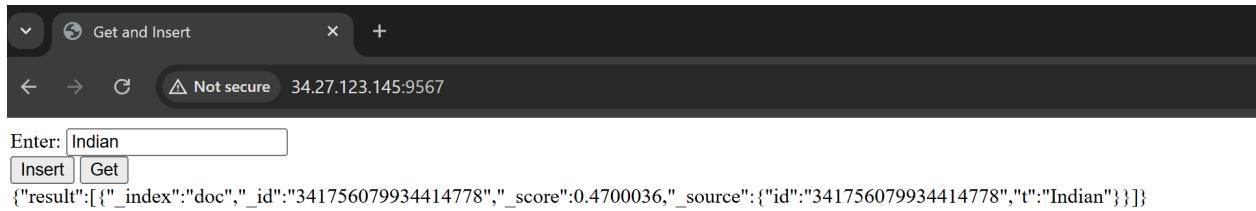
Enter: Indian  
Insert Get  
{"result": "No results found"}

### Insert:



Enter: Indian  
Insert Get  
{"result": "updated", "id": "341756079934414778"}

## Get Again:

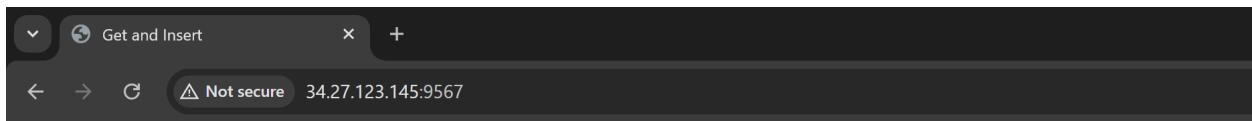
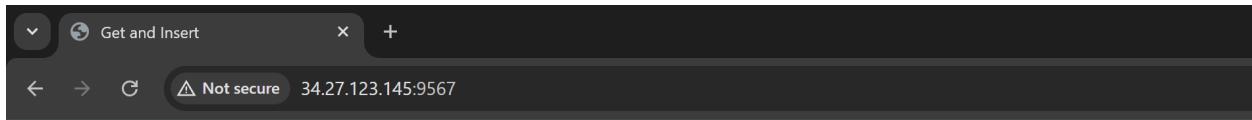


## Removing all images:

```
g23110128@instance-20250327-162358:~$ sudo docker stop $(sudo docker ps -a -q)
4c46c01247dd
02b8716c6a55
283886b48c29
a90e0e05d6cb
33a6b8213c76
b5e49d39f1f4
4f44eb82d9e4
7f1c433d7a99
00ab85614169
6e1ea1c2d552
9f8e79dafd84
da60a653dd88
06df59948043
b27b0980af89
4fa36a2f9635
44e7c89356db
```

```
g23110128@instance-20250327-162358:~$ sudo docker rm $(sudo docker ps -a -q)
4c46c01247dd
02b8716c6a55
283886b48c29
a90e0e05d6cb
33a6b8213c76
b5e49d39f1f4
4f44eb82d9e4
7f1c433d7a99
00ab85614169
6e1ea1c2d552
9f8e79dafd84
da60a653dd88
06df59948043
b27b0980af89
4fa36a2f9635
44e7c89356db
```

## After Removing:



## Docker Inspect:

### Containers:

#### VM 1:

```
g23110128@instance-20250327-182750:~$ sudo docker inspect $(sudo docker ps -a -q)
[{"id": "1645606a394d14b447dd47851979ef3f273d44012ea7e6cb0d5e69568423",
 "Created": "2025-03-27T19:20:22.682181319Z",
 "Path": "sh",
 "Args": [
   "-c",
   "fastapi run client.py --port 9567"
 ],
 "State": {
   "Status": "exited",
   "Running": false,
   "Paused": false,
   "Restarting": false,
   "OOMKilled": false,
   "Dead": false,
   "PID": 0,
   "ExitCode": 130,
   "Error": "",
   "StartedAt": "2025-03-27T19:20:22.763667346Z",
   "FinishedAt": "2025-03-27T19:37:12.393570866Z"
 },
 "Image": "sha256:1fa72e917968823d960d247ed468c9f6835c5c48ed1f135f43eb5a763490f15",
 "ResolvConfPath": "/var/snap/docker/common/var-lib-docker/containers/1645606a394d14b447dd47853979ef3f273d44012ea7e6cb0d5e69568425/resolv.conf",
 "HostnamePath": "/var/snap/docker/common/var-lib-docker/containers/1645606a394d14b447dd47853979ef3f273d44012ea7e6cb0d5e69568425/hostname",
 "MountPath": "/var/snap/docker/common/var-lib-docker/containers/1645606a394d14b447dd47853979ef3f273d44012ea7e6cb0d5e69568425",
 "LogPath": "/var/snap/docker/common/var-lib-docker/containers/1645606a394d14b447dd47853979ef3f273d44012ea7e6cb0d5e69568425/log",
 "Name": "/sharp_grothendieck",
 "RestartCount": 0,
 "Driver": "overlay2",
 "Platform": "linux",
 "MountLabel": "",
 "ProcessLabel": "",
 "AppArmorProfile": "docker-default",
 "ExecID": null,
 "HostConfig": {
   "Binds": null,
   "ContainerIDFrom": "",
   "LogConfig": {
     "Type": "json-file",
     "Config": {}
   },
   "NetworkMode": "bridge",
   "PortBindings": {
     "9567/tcp": [
       {
         "HostIP": "",
         "HostPort": "9567"
       }
     ]
   },
   "RestartPolicy": {
     "Name": "no",
     "MaximumRetryCount": 0
   },
   "AutoRemove": false,
   "VolumeDriver": "",
   "VolumesFrom": null,
   "ConsoleSize": [
     52,
     181
   ]
 }
```

#### VM 2:

```
g23110128@instance-20250327-162358:~$ sudo docker inspect $(sudo docker ps -a -q)
[{"id": "dd0bc6ebcfdf29fc5ca5af5dbcc68301b58efd201de36aa28ffd46f1c113b7d",
 "Created": "2025-03-27T19:29:27.446178012Z",
 "Path": "sh",
 "Args": [
   "-c",
   "fastapi run py/server.py --port 9567"
 ],
 "State": {
   "Status": "exited",
   "Running": false,
   "Paused": false,
   "Restarting": false,
   "OOMKilled": false,
   "Dead": false,
   "PID": 0,
   "ExitCode": 130,
   "Error": "",
   "StartedAt": "2025-03-27T19:29:27.525888624Z",
   "FinishedAt": "2025-03-27T19:30:54.390670501Z"
 },
 "Image": "sha256:1fa72e917968823d960d247ed468c9f6835c5c48ed1f135f43eb5a763490f15",
 "ResolvConfPath": "/var/snap/docker/common/var-lib-docker/containers/dd0bc6ebcfdf29fc5ca5af5dbcc68301b58efd201de36aa28ffd46f1c113b7d/resolv.conf",
 "HostnamePath": "/var/snap/docker/common/var-lib-docker/containers/dd0bc6ebcfdf29fc5ca5af5dbcc68301b58efd201de36aa28ffd46f1c113b7d/hostname",
 "MountPath": "/var/snap/docker/common/var-lib-docker/containers/dd0bc6ebcfdf29fc5ca5af5dbcc68301b58efd201de36aa28ffd46f1c113b7d/host",
 "Name": "/nifty_lawin",
 "RestartCount": 0,
 "Driver": "overlay2",
 "Platform": "linux",
 "MountLabel": "",
 "ProcessLabel": "",
 "AppArmorProfile": "docker-default",
 "ExecID": null,
 "HostConfig": {
   "Binds": null,
   "ContainerIDFrom": "",
   "LogConfig": {
     "Type": "json-file",
     "Config": {}
   },
   "NetworkMode": "elastic-net",
   "PortBindings": {
     "9567/tcp": [
       {
         "HostIP": "",
         "HostPort": "9567"
       }
     ]
   },
   "RestartPolicy": {
     "Name": "no",
     "MaximumRetryCount": 0
   },
   "AutoRemove": false,
   "VolumeDriver": "",
   "VolumesFrom": null,
   "ConsoleSize": [
     52,
     181
   ]
 }
```

```

        "id": "e81f250ab34c17fd00388bb8c292f82e0ba7alc134f83cdc36e547930fb06b10f",
        "created": "2025-03-27T19:29:10.229+00:04579",
        "path": "sh",
        "args": [
            "-c",
            "fastapi run py/server.py --port 9567"
        ],
        "state": {
            "Status": "exited",
            "Running": false,
            "Paused": false,
            "Restarting": false,
            "OOMKilled": false,
            "Dead": false,
            "ExitCode": 0,
            "Error": "",
            "StartedAt": "2025-03-27T19:29:10.37042708Z",
            "FinishedAt": "2025-03-27T19:29:13.044948316Z"
        },
        "image": "sha256:2ad8e8f1fa9cccd55b08c7a2dea24360cd149152814ed6942a901f7f5ceee2bd9",
        "reonyConfPath": "/var/snap/docker/common/var-lib-docker/containers/e81f250ab34c17fd0538bb8c292f92e0ba7alc134f83cdc36e547930fb06b10f/resolv.conf",
        "hostnamePath": "/var/snap/docker/common/var-lib-docker/containers/e81f250ab34c17fd0538bb8c292f92e0ba7alc134f83cdc36e547930fb06b10f/hostname",
        "hostPath": "/var/snap/docker/common/var-lib-docker/containers/e81f250ab34c17fd0538bb8c292f92e0ba7alc134f83cdc36e547930fb06b10f/host",
        "logPath": "/var/snap/docker/common/var-lib-docker/containers/e81f250ab34c17fd0538bb8c292f92e0ba7alc134f83cdc36e547930fb06b10f/json.log",
        "name": "vigilant_hodgkin",
        "restartCount": 0,
        "platform": "linux",
        "platformId": "linux",
        "mountable": "*",
        "processLabel": "*",
        "appArmorProfile": "docker-default",
        "execDriver": "native",
        "hostConfig": {
            "binds": null,
            "containerRmFile": "*",
            "logConfig": {
                "type": "json-file",
                "config": {}
            },
            "networkMode": "elastic-net",
            "portMappings": [
                {
                    "hostPort": 5567,
                    "containerPort": 9567,
                    "hostIp": "*",
                    "hostPort": "9567"
                }
            ],
            "restartPolicy": {
                "Name": "no",
                "MaximumRetryCount": 0
            },
            "autoRemove": false,
            "volumeDriver": "*",
            "volumeFrom": null,
            "consoleSize": 52,
            "mounts": [
                {
                    "type": "volume",
                    "name": "elasticsearch-data",
                    "source": "/var/snap/docker/common/var-lib-docker/volumes/elasticsearch-data/_data",
                    "destination": "/usr/share/elasticsearch/data",
                    "driver": "local",
                    "mode": "rw",
                    "rwm": true,
                    "propagation": ""
                }
            ],
            "config": {
                "hostname": "41c7d8769af",
                "domainname": "elasticsearch",
                "uid": "1000:0",
                "attachStdin": false,
                "attachStdout": false,
                "attachStderr": false,
                "exposePorts": [
                    "9200/tcp",
                    "9300/tcp"
                ],
                "rmi": false,
                "openStdin": false,
                "stdinOnce": false,
                "env": [
                    "discovery.type=single-node",
                    "xpack.security.enabled=false",
                    "xpack.license.self_generated.type=trial",
                    "PATH=/usr/share/elasticsearch/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/bin",
                    "ELASTIC_CONTAINER=true",
                    "SHELL=/bin/bash"
                ],
                "cmd": [
                    "eswarpper"
                ],
                "image": "docker.elastic.co/elasticsearch/elasticsearch:8.17.3",
                "volumes": null,
                "workingDir": "/usr/share/elasticsearch",
                "entryPoint": [
                    "/bin/tini",
                    "-c",
                    "/usr/local/bin/docker-entrypoint.sh"
                ],
                "onBuild": null,
                "labels": {
                    "org.label-schema.build-date": "2025-02-28T10:07:26.089129809z",
                    "org.label-schema.license": "Elastic-License-2.0",
                    "org.label-schema.vendor": "Elasticsearch",
                    "org.label-schema.url": "https://www.elastic.co",
                    "org.label-schema.usage": "https://www.elastic.co/guide/en/elasticsearch/reference/index.html",
                    "org.label-schema.vcs-ref": "a091390ded485bdcb1b78847fe565ccad010d2",
                    "org.label-schema.vcs-url": "https://github.com/Elastic/elasticsearch"
                }
            }
        }
    }
}

```

## Images:

## **VM 1:**

## VM 2:

```
{
  "id": "sha256:869b1daa5a9f7d3087840d9aa8601cc8f7e02678b6d224b107295e2f3504edaf",
  "RepoTags": [
    "docker.elastic.co/elasticsearch/elasticsearch:8.17.3"
  ],
  "RepoDigests": [
    "docker.elastic.co/elasticsearch/elasticsearch@sha256:224c75e346b7745ce908f06a1ched7bf10988961dcddcfccb22556b3f856b3f0"
  ],
  "Parent": "",
  "Comment": "buildkit.dockerfile.v0",
  "Created": "2025-02-28T10:14:59.196599602Z",
  "Dockerization": "",
  "ImageSize": "0B",
  "Config": {
    "Hostname": "*",
    "Domainname": "*",
    "User": "root",
    "AttachStdin": false,
    "AttachStdout": false,
    "AttachStderr": false,
    "ExposedPorts": {
      "9200/tcp": {},
      "9300/tcp": {}
    },
    "Tty": false,
    "OpenStdin": false,
    "StdinOnce": false,
    "Env": [
      "HTTP_HOST=/share/elasticsearch/bin;/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
      "ELASTIC_CONTAINER=true",
      "/SHELL=/bin/bash"
    ],
    "Cmd": [
      "-eswarpper"
    ],
    "ArgsEscaped": true,
    "Image": "sha256:869b1daa5a9f7d3087840d9aa8601cc8f7e02678b6d224b107295e2f3504edaf",
    "MountPoint": "/",
    "EntryPoint": [
      "/bin/entrypoint",
      "--",
      "/usr/local/bin/docker-entrypoint.sh"
    ],
    "OnBuild": null,
    "Labels": {
      "org.label-schema.build-date": "2025-02-28T10:07:26.089129809Z",
      "org.label-schema.license": "Elastic-Licence-2.0",
      "org.label-schema.name": "elasticsearch",
      "org.label-schema.schema-version": "1.0",
      "org.label-schema.url": "https://www.elastic.co/products/elasticsearch",
      "org.label-schema.vendor": "https://www.elastic.co/guide/en/elasticsearch/reference/index.html",
      "org.label-schema.vcs-ref": "a091390de485bd4b127884f7e565c0cad95b1042",
      "org.label-schema.vcs-url": "https://github.com/elastic/elasticsearch",
      "org.label-schema.version": "8.17.3",
      "org.opencontainers.image.created": "2025-02-28T10:07:26.089129809Z",
      "org.opencontainers.image.documentation": "https://www.elastic.co/guide/en/elasticsearch/reference/index.html",
      "org.opencontainers.image.licenses": "Elastic-Licence-2.0",
      "org.opencontainers.image.ref.name": "ubuntu"
    }
  }
}
```

## Architectural diagram:

First, we run the frontend on VM 1 and run the backend and elastic search on VM 2.

