

# Lab Notebook Week 4

## Submitted By: Shrikrishna Bhat

### Table of Contents

<b>Section #1.....</b>	<b>1</b>
<b>1.1 Nginx Compute Engine Guestbook.....</b>	<b>1</b>
<b>Section #2.....</b>	<b>3</b>
<b>2.1 Docker Guestbook.....</b>	<b>3</b>

### Section #1

#### 1.1 Nginx Compute Engine Guestbook

1.1.1 Take a screenshot of the site along with its Let's Encrypt certificate and include it in your lab notebook

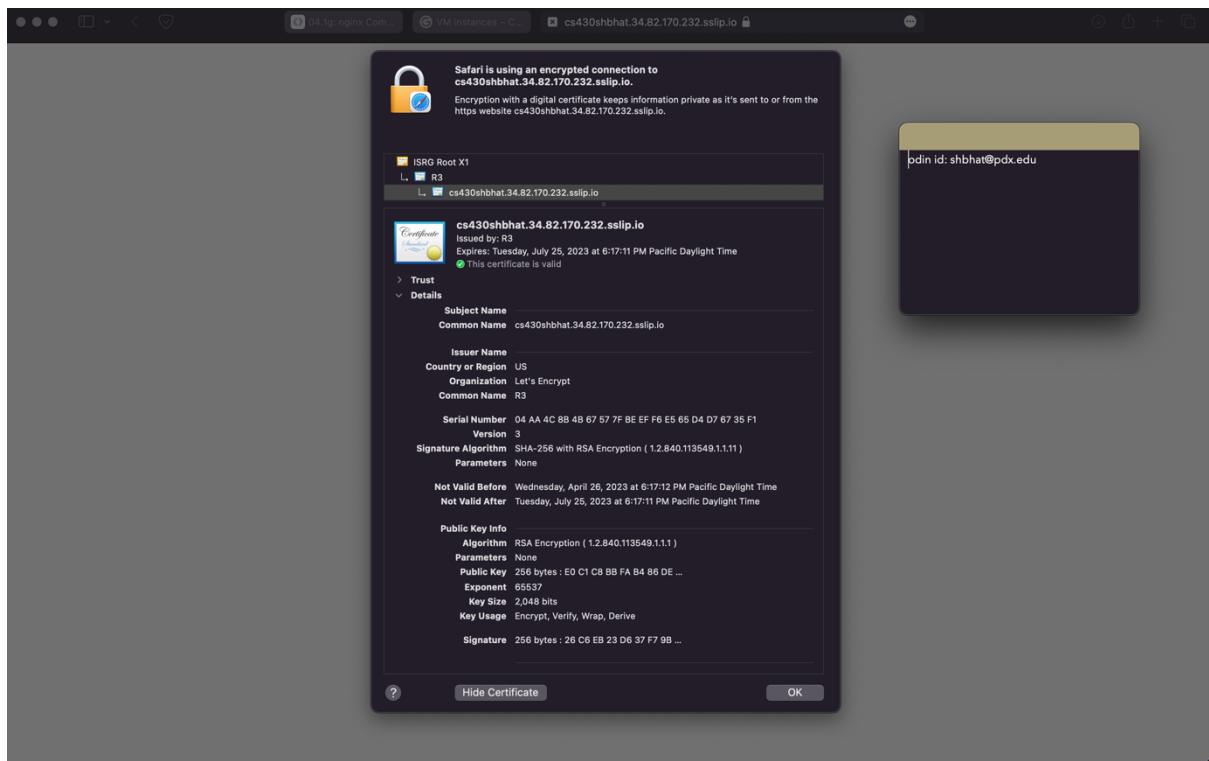
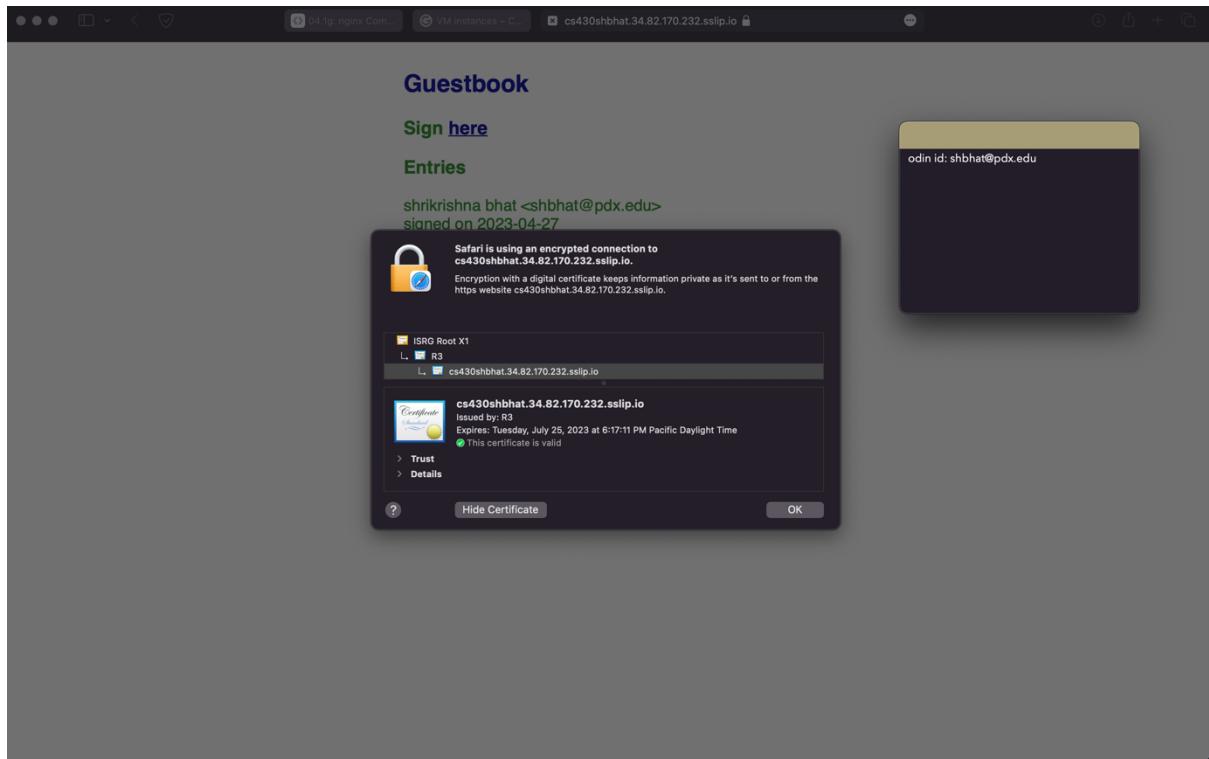
```
No containers need to be restarted.
No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
created virtual environment CPython3.10.6.final.0-64 in 294ms
  creator CPython3Posix(dest=/home/shbhat/cs430-etc/03_nginx_unicorn_certbot/env, clear=False, no_vcs_ignore=False, global=False)
  seeder FromAppData(download=False, pip=bundle, setuptools=bundle, wheel=bundle, via=copy, app_data_dir=/root/.local/share/virtualenv)
  added seed packages: pip==22.0.2, setuptools==59.6.0, wheel==0.37.1
  activators BashActivator,CShellActivator,FishActivator,NushellActivator,PowerShellActivator,PythonActivator
Collecting flask
  Downloading flask-2.3.1-py3-none-any.whl (96 kB) 97.0/97.0 KB 3.8 MB/s eta 0:00:00
Collecting gunicorn
  Downloading gunicorn-20.1.0-py3-none-any.whl (79 kB) 79.5/79.5 KB 13.0 MB/s eta 0:00:00
Collecting blinker>=1.6.2
  Downloading blinker-3.6.2-py3-none-any.whl (13 kB)
Collecting Jinja2>=2.1.2
  Downloading Jinja2-2.1.2-py3-none-any.whl (133 kB) 133.1/133.1 KB 19.8 MB/s eta 0:00:00
Collecting Werkzeug>=2.3.0
  Downloading Werkzeug-2.3.0-py3-none-any.whl (233 kB) 233.7/233.7 KB 35.9 MB/s eta 0:00:00
Collecting itsdangerous>=2.1.2
  Downloading itsdangerous-2.1.2-py3-none-any.whl (15 kB)
Collecting click>=8.1.3
  Downloading click-8.1.3-py3-none-any.whl (96 kB) 96.6/96.6 KB 14.3 MB/s eta 0:00:00
Requirement already satisfied: setuptools>=3.0 in ./env/lib/python3.10/site-packages (from gunicorn->--r requirements.txt (line 2)) (59.6.0)
Collecting MarkupSafe<2.1.2-cp310-cp310-manylinux2014_x86_64.manylinux2014_x86_64.whl (25 kB)
  Downloading MarkupSafe-2.1.2-cp310-cp310-manylinux2014_x86_64.manylinux2014_x86_64.whl (25 kB)
Installing collected packages: MarkupSafe, itsdangerous, gunicorn, click, blinker, Werkzeug, Jinja2, flask
Successfully installed Jinja2-3.1.2 MarkupSafe-2.1.2 blinker-1.6.2 click-8.1.3 flask-2.3.1 gunicorn-20.1.0 itsdangerous-2.1.2
Created symlink /etc/systemd/system/multi-user.target.wants/cs430shbhat.service → /etc/systemd/system/cs430shbhat.service.
Installation complete.
shbhat@nginx-qb:~/cs430-etc/03_nginx_unicorn_certbot$ sudo certbot --nginx -d cs430shbhat.34.168.54.69.sslip.io -n -m shbhat@pdx.edu --agree-tos --redirect
Saving debug log to /var/log/letsencrypt/letsencrypt.log
Account registered.
Requesting a certificate for cs430shbhat.34.168.54.69.sslip.io

Successfully received certificate.
Certificate is saved at: /etc/letsencrypt/live/cs430shbhat.34.168.54.69.sslip.io/fullchain.pem
Key is saved at: /etc/letsencrypt/live/cs430shbhat.34.168.54.69.sslip.io/privkey.pem
This certificate expires on 2023-07-24.
These files will be updated when the certificate renews.
Certbot has set up a scheduled task to automatically renew this certificate in the background.

Deploying certificate
Successfully deployed certificate for cs430shbhat.34.168.54.69.sslip.io to /etc/nginx/sites-enabled/cs430shbhat
Congratulations! You have successfully enabled HTTPS on https://cs430shbhat.34.168.54.69.sslip.io

If you like Certbot, please consider supporting our work by:
* Donating to ISRG / Let's Encrypt: https://letsencrypt.org/donate
* Donating to EFF: https://eff.org/donate-le
shbhat@nginx-qb:~/cs430-etc/03_nginx_unicorn_certbot$
```



## Section #2

## 2.1 Docker Guestbook

### 2.1.1 Take a screenshot of the results for your lab notebook

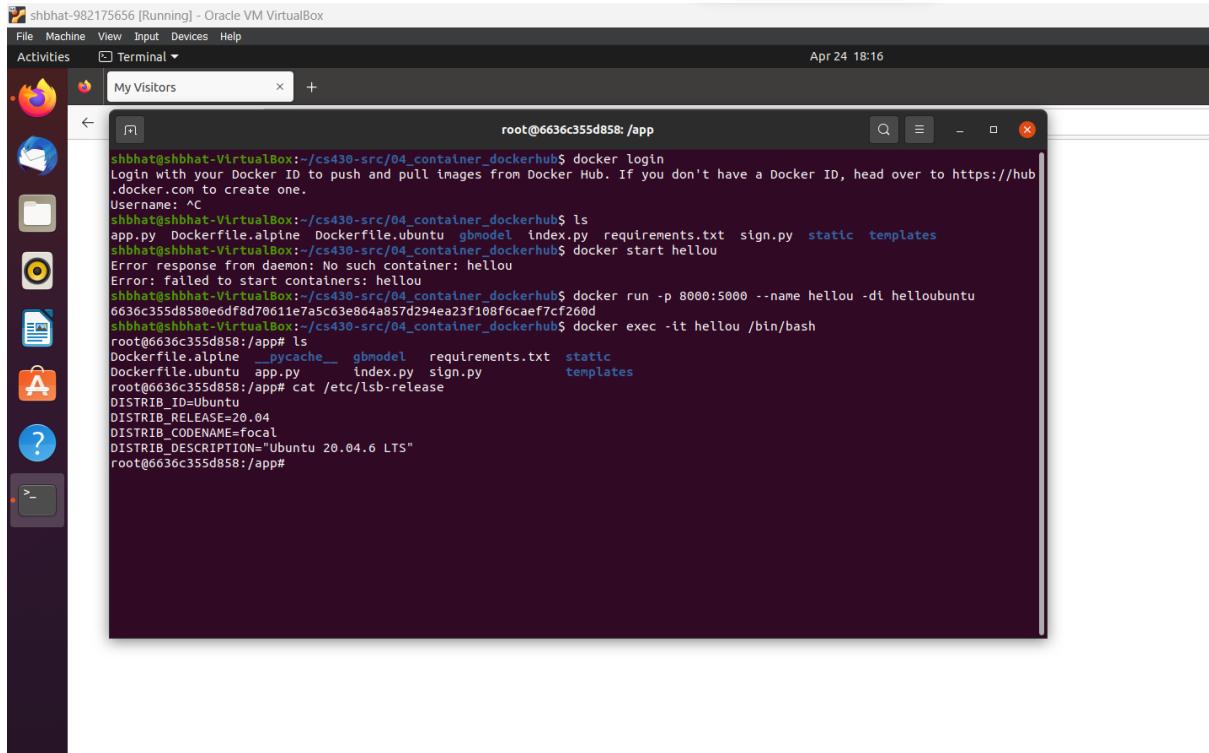
Docker

```
shbhat-982175656 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Apr 24 18:05
shbhat@shbhat-VirtualBox: ~/cs430-src/04_container_dockerhub
shbhat@shbhat-VirtualBox: ~/cs430-src/04_container_dockerhub$ pip install flask
Collecting flask
  Downloading Flask-2.2.3-py3-none-any.whl (101 kB)
Collecting itsdangerous==2.0
  Downloading itsdangerous-2.1.2-py3-none-any.whl (19 kB)
Collecting MarkupSafe==3.1.2
  Downloading MarkupSafe-3.1.2-py3-none-any.whl (6.0 kB)
Collecting importlib-metadata==6.6.0
  Downloading importlib_metadata-6.6.0-py3-none-any.whl (22 kB)
Collecting click>=8.0.0
  Downloading click-8.1.3-py3-none-any.whl (96 kB)
Collecting Werkzeug>=2.2.3
  Downloading Werkzeug-2.2.3-py3-none-any.whl (233 kB)
Collecting Jinja2<3.1.2
  Downloading Jinja2-3.1.2-py3-none-any.whl (133 kB)
Collecting zippp==0.5
  Downloading zippp-3.15.0-py3-none-any.whl (6.8 kB)
Collecting MarkupSafe<3.1.2
  Downloading MarkupSafe-3.1.2-py3-none-any.whl (25 kB)
Installing collected packages: itsdangerous, zippp, importlib-metadata, click, MarkupSafe, Werkzeug, Jinja2, flask
Successfully installed Jinja2-3.1.2 MarkupSafe-3.1.2 Werkzeug-2.2.3 click-8.1.3 flask-2.2.3 importlib-metadata-6.6.0 itsdangerous-2.1.2 zippp-3.15.0
Removing intermediate container 47fb2b34eabb
Step 8/9 : ENTRYPOINT ["python3"]
--> Running in sc056a16b955
Removing intermediate container sc056a16b955
--> b928f5bd3dff
Step 9/9 : RUN pip install app.py
--> Running in ee41a8c82bec
Removing intermediate container ee41a8c82bec
--> d899201d734b
Successfully built d899201d734b
Successfully tagged hellounibuntu:latest
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker images
Got permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://<2>Fvar<2>Run%2Fdocker.sock/v1.24/images/json": dial unix "/var/run/docker.sock": connect: permission denied
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ sudo docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
hellounibuntu latest d899201d734b 11 seconds ago 44MB
Ubuntu 20.04 889928d7189 8 months ago 72.8MB
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$
```

### 2.1.2 Running the container for testing

A screenshot of a Linux desktop environment. On the left is a dock with icons for shbbhat, FileZilla, and a trash bin. The terminal window shows pip dependency installation logs, including Jinja2 and MarkupSafe. The Firefox browser window is open to a page titled 'My Visitors' with the URL 127.0.0.1:8000/. The status bar at the bottom indicates the date as April 24 18:07.

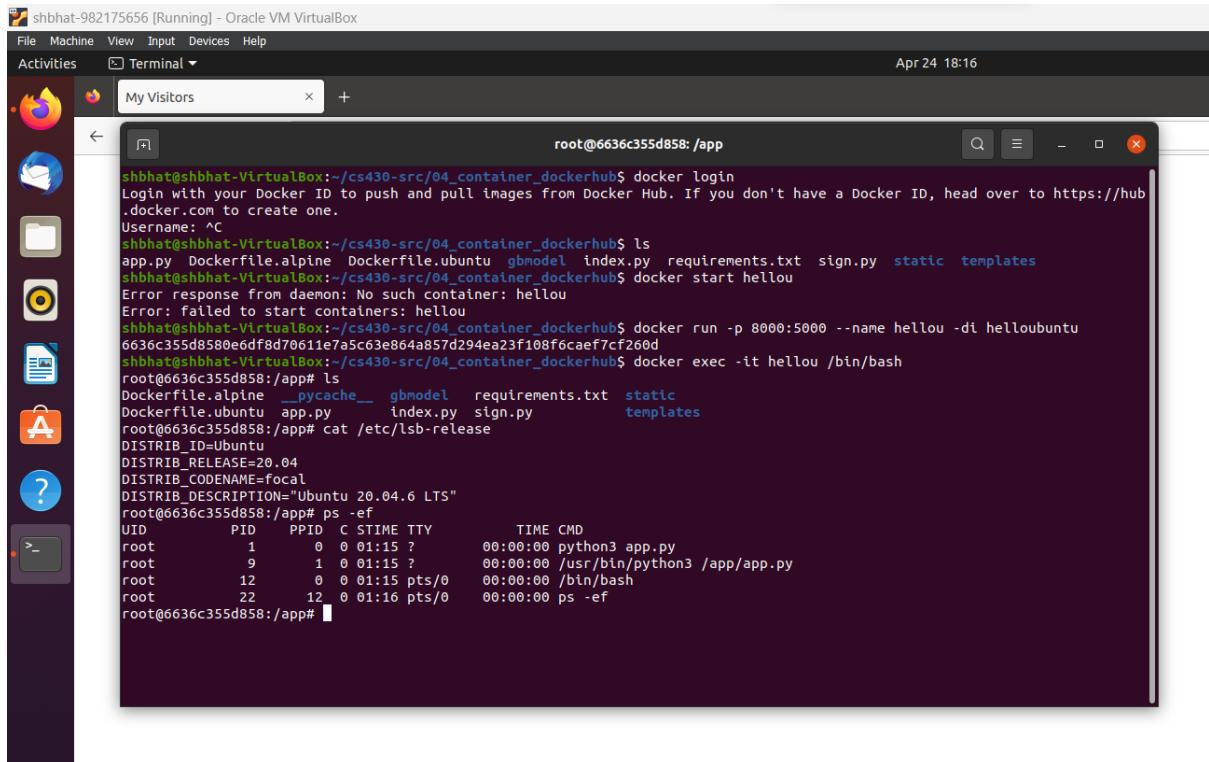
2.1.3 Within the container, show the contents of the current directory via ls, the contents of the file specifying the Linux standard base being used (/etc/lsb-release),



A screenshot of a Linux desktop environment (Ubuntu) running in Oracle VM VirtualBox. The terminal window shows the following command-line session:

```
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://hub.docker.com to create one.
Username: ^C
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ ls
app.py Dockerfile.alpine Dockerfile.ubuntu gbnodel index.py requirements.txt sign.py static templates
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker start hellou
Error response from daemon: No such container: hellou
Error: failed to start containers: hellou
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker run -p 8000:5000 --name hellou -d helloubuntu
663c355d8580e6df8d70611e7a5c63e864a857d294ea23f108f6caeef7cf260d
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker exec -it hellou /bin/bash
root@663c355d858:~# ls
Dockerfile.alpine __pycache__ gbnodel requirements.txt static
Dockerfile.ubuntu app.py index.py sign.py templates
root@663c355d858:~# cat /etc/lsb-release
DISTRIB_ID=Ubuntu
DISTRIB_RELEASE=20.04
DISTRIB_CODENAME=focal
DISTRIB_DESCRIPTION="Ubuntu 20.04.6 LTS"
root@663c355d858:~#
```

2.1.4 Output of the process listing command (ps -ef).



A screenshot of a Linux desktop environment (Ubuntu) running in Oracle VM VirtualBox. The terminal window shows the following command-line session, including the output of the ps -ef command:

```
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://hub.docker.com to create one.
Username: ^C
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ ls
app.py Dockerfile.alpine Dockerfile.ubuntu gbnodel index.py requirements.txt sign.py static templates
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker start hellou
Error response from daemon: No such container: hellou
Error: failed to start containers: hellou
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker run -p 8000:5000 --name hellou -d helloubuntu
663c355d8580e6df8d70611e7a5c63e864a857d294ea23f108f6caeef7cf260d
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker exec -it hellou /bin/bash
root@663c355d858:~# ls
Dockerfile.alpine __pycache__ gbnodel requirements.txt static
Dockerfile.ubuntu app.py index.py sign.py templates
root@663c355d858:~# cat /etc/lsb-release
DISTRIB_ID=Ubuntu
DISTRIB_RELEASE=20.04
DISTRIB_CODENAME=focal
DISTRIB_DESCRIPTION="Ubuntu 20.04.6 LTS"
root@663c355d858:~# ps -ef
UID        PID    PPID  C STIME TTY          TIME CMD
root         1      0  0 01:15 ?        00:00:00 python3 app.py
root         9      1  0 01:15 ?        00:00:00 /usr/bin/python3 /app/app.py
root        12      0  0 01:15 pts/0   00:00:00 /bin/bash
root        22     12  0 01:16 pts/0   00:00:00 ps -ef
root@663c355d858:~#
```

## 2.1.5 Run the image directly from Docker Hub and show a screenshot of the output of the command in your lab notebook.

```

shbhat-982175656 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Apr 24 18:25
My Visitors + ↻
shbhat@shbhat-VirtualBox: ~/cs430-src/04_container_dockerhub$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
helloubuntu latest d809201d734b 18 minutes ago 441MB
shbhat21/helloubuntu latest d809201d734b 18 minutes ago 441MB
ubuntu 20.04 88bd6d8917189 11 days ago 72.8MB
shbhat@shbhat-VirtualBox: ~/cs430-src/04_container_dockerhub$ docker rmi helloubuntu shbhat21/helloubuntu
Untagged: shbhat21/helloubuntu:latest
Untagged: shbhat21/helloubuntu:latest
Deleted: sha256:d809201d734b57e5dd6e9d33c5dcdbab8b27ea45083430256236e4f87a1c14558c
Deleted: sha256:b928fb5b1df1ff80d5a9c79ebcd2606ce8e772897697d84badf0645084627c5225b
Deleted: sha256:e6c370ca5f233b5f3b1c6c5da0e4ddc6f7caab8ef48fd4627f1be62526dded0d
Deleted: sha256:6ec64e195a37c30968e9aa2f3e0106aa1f9743d33c737c77a69bdc6abcc73
Deleted: sha256:5cef5dfaf5bf2b2c8723172f2eb36e9bb8e3fffc9dccae4627cf6dfb2a2170
Deleted: sha256:22a32eb62262db90714933dc5b1c1f5544954763c8a0c649b198e4accf3cdc7
Deleted: sha256:80420832aa8ee3a732171056fcdec05c5a110d83b597db5a59da8cc1b7560165
Deleted: sha256:4e0af9b1096474556c4e05dfbd0d2cf82df64b5c529b80e83735a918c534e05
Deleted: sha256:c8ca4583de3e43d96d3904e52d7557ae1173a4dd0e66c26a00e1218c072a7135
Deleted: sha256:ee2b37f9a955dc8babde3ca3bd90573626fec3d94f324465e428219088507d1
Deleted: sha256:a22a2b499866864b6d6537e40865e3ac90ad6177611a21e780625c5670f06bb
Deleted: sha256:407d7eadec1656acf50b126c13142dc43c88a4e571d29a681b35cb5b6804df46
shbhat@shbhat-VirtualBox: ~/cs430-src/04_container_dockerhub$ docker run -di -p 8000:5000 --name hellou shbhat21/helloubuntu
Unable to find image 'shbhat21/helloubuntu:latest' locally
latest: Pulling from shbhat21/helloubuntu
ca1778b69356: Already exists
cdf641dee41: Pull complete
2149cc74a7e7: Pull complete
30bd381a0f04c: Pull complete
f7cb43daef9c: Pull complete
Digest: sha256:c09dd81422303692071e01085b9b0b5da826c87cdc54eb465db2bfee95257c4
Status: Downloaded newer image for shbhat21/helloubuntu:latest
289ed3c720ff63a6a097d973d150cbcd7924599b9e4bcab94929a89deab88071
shbhat@shbhat-VirtualBox: ~/cs430-src/04_container_dockerhub$ 

```

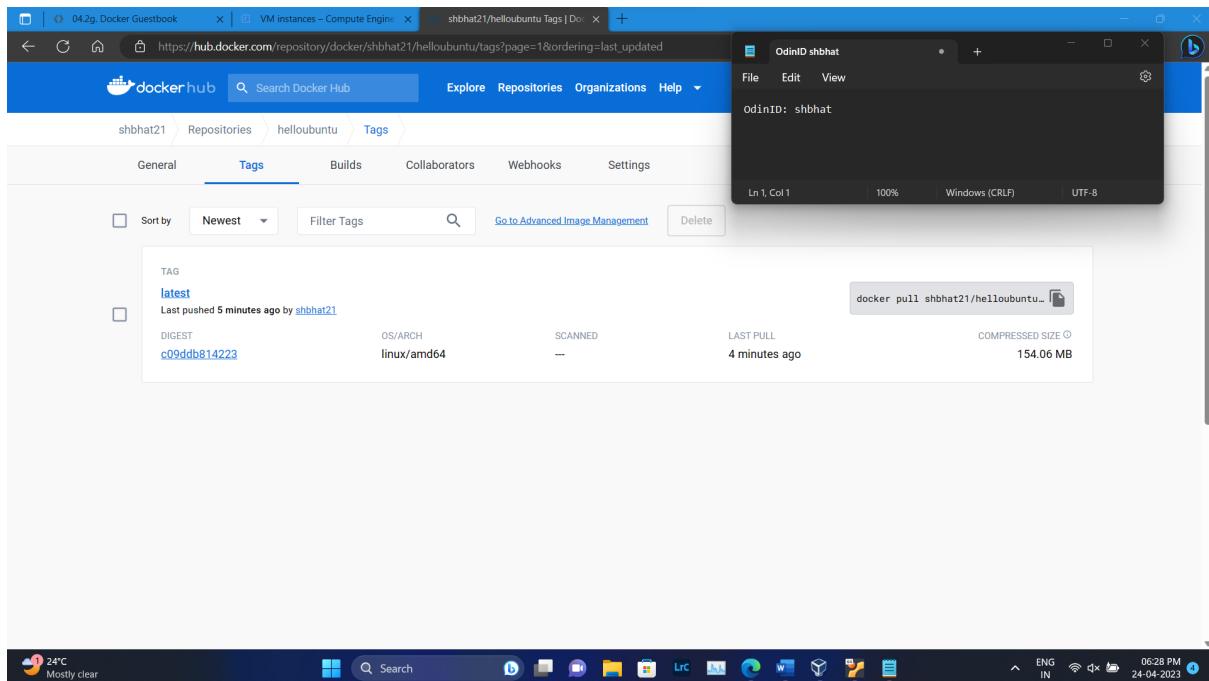
Guestbook

[Sign here](#)

Entries

Guestbook

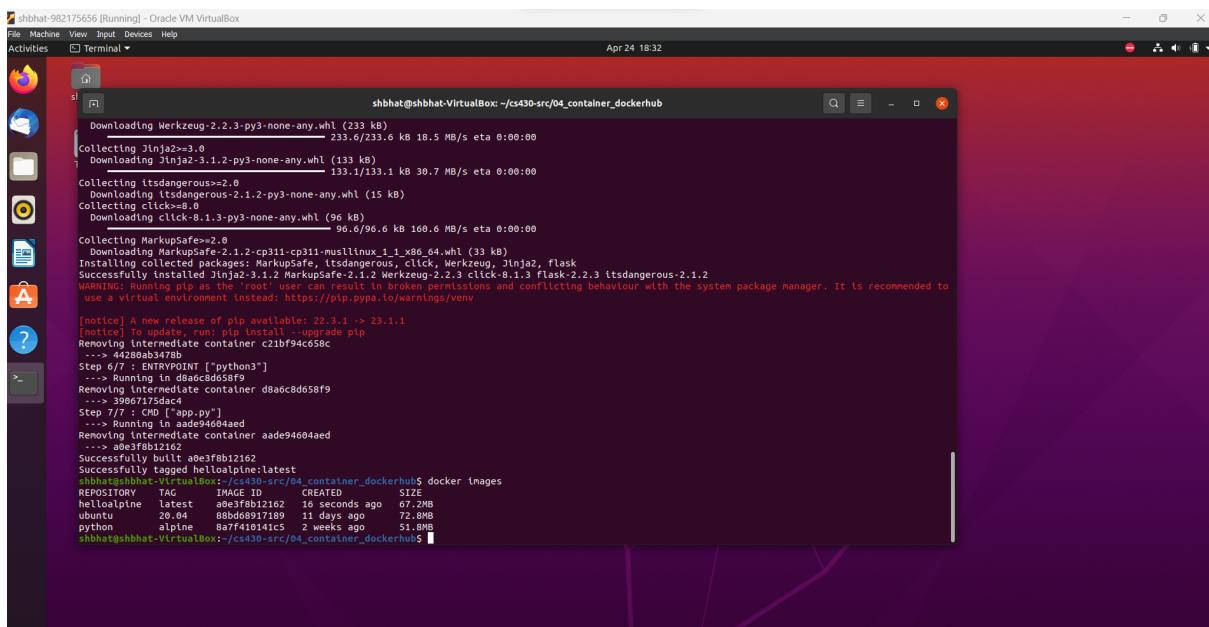
## 2.1.6 Take a screenshot of the container image and its size for your lab notebook.



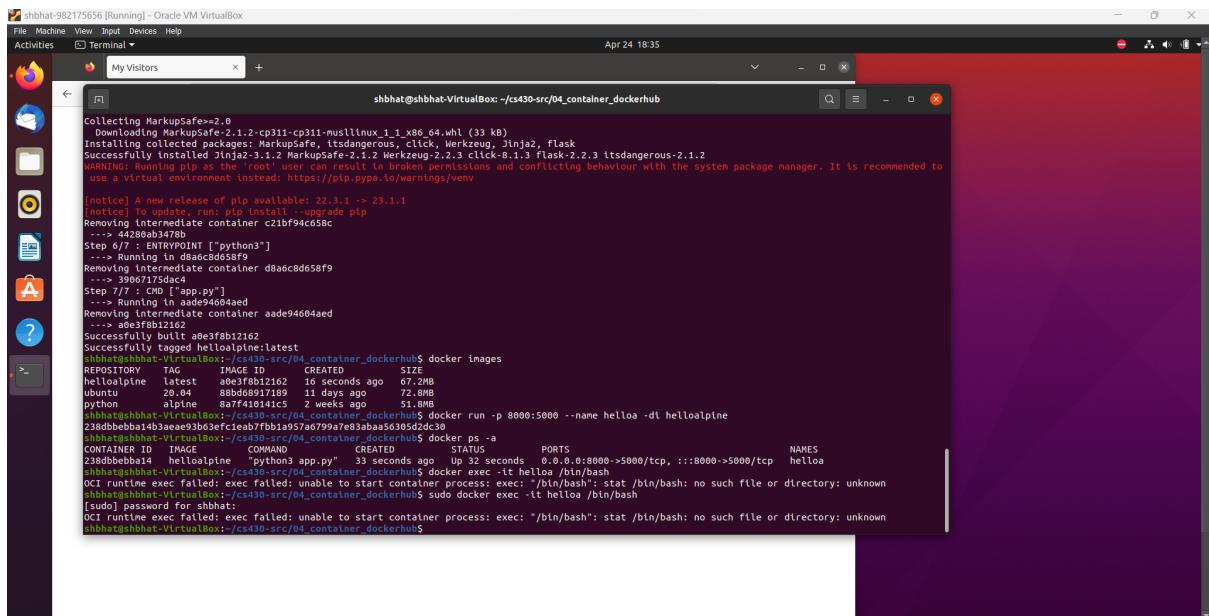
## 2.1.7 Take a screenshot of the image generated and its size for your lab notebook. How much smaller is the image than the Ubuntu one?

Answer:

Docker alpine is nearly 5 mb smaller than the ubuntu version.



2.1.8 Show the output of this command in a screenshot for your lab notebook. What might have happened?



The screenshot shows a terminal window titled "Terminal" with the command "My Visitors" running. The terminal output is as follows:

```
shbhat@shbhat-VirtualBox: ~/c430-src/04_container_dockerhub$ 
Collecting MarkupSafe==2.0
  Downloading MarkupSafe-2.0.2-cp311-cp311-musllinux_1_1_x86_64.whl (33 kB)
Installing collected packages: MarkupSafe, itsdangerous, click, Werkzeug, Jinja2, Flask
Successfully installed Jinja2-3.1.2 MarkupSafe-2.1.2 Werkzeug-2.2.3 click-8.1.3 Flask-2.2.3 itsdangerous-2.1.2
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is recommended to use a virtual environment instead: https://pip.pypa.io/warnings/venv

[notice] A new release of pip available: 22.3.1 -> 23.1.1
[notice] To update, run: pip install --upgrade pip
Removing intermediate container c21bf94c658c
-> 44280ab3478b
Step 6/7 : CMD ["python3"]
--> Running in d8a6c8d658f9
Removing intermediate container d8a6c8d658f9
---- 39867375dac4
Step 7/7 : CMD ["app.py"]
--> Container created: aade94604aed
Removing intermediate container aade94604aed
---- a8e3fb12162
Successfully built a8e3fb12162
Successfully tagged helloalpine:latest
shbhat@shbhat-VirtualBox:~/c430-src/04_container_dockerhub$ docker images
REPOSITORY          TAG           IMAGE ID            CREATED             SIZE
helloalpine        latest        a8e3fb12162   16 seconds ago   67.2MB
ubuntu              20.04         88bd68917189   11 days ago     72.8MB
python              alpine        8a7f410141c5   2 weeks ago      51.8MB
shbhat@shbhat-VirtualBox:~/c430-src/04_container_dockerhub$ docker run -p 8000:5000 --name helloa -d helloalpine
238dbbbb19b3ba9e93fcfb7b1a95a799a7e93baab5620542d4c30
shbhat@shbhat-VirtualBox:~/c430-src/04_container_dockerhub$ docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS               NAMES
238dbbbb19b3ba9e93fcfb7b1a95a799a7e93baab5620542d4c30
shbhat@shbhat-VirtualBox:~/c430-src/04_container_dockerhub$ docker exec -it helloa /bin/bash
OCI runtime exec failed: unable to start container process: exec: "/bin/bash": stat /bin/bash: no such file or directory: unknown
shbhat@shbhat-VirtualBox:~/c430-src/04_container_dockerhub$ sudo docker exec -it helloa /bin/bash
[sudo] password for shbhat:
OCI runtime exec failed: unable to start container process: exec: "/bin/bash": stat /bin/bash: no such file or directory: unknown
shbhat@shbhat-VirtualBox:~/c430-src/04_container_dockerhub$
```

The error message indicates that the container cannot find the /bin/bash executable file. This may be due to the file being deleted or relocated from its original location within the container.

2.1.9 Replace /bin/bash with /bin/sh and repeat the command.

Finally, within the container, examine the file specifying the Alpine release being used (/etc/alpine-release) and perform a process listing command (ps -ef).

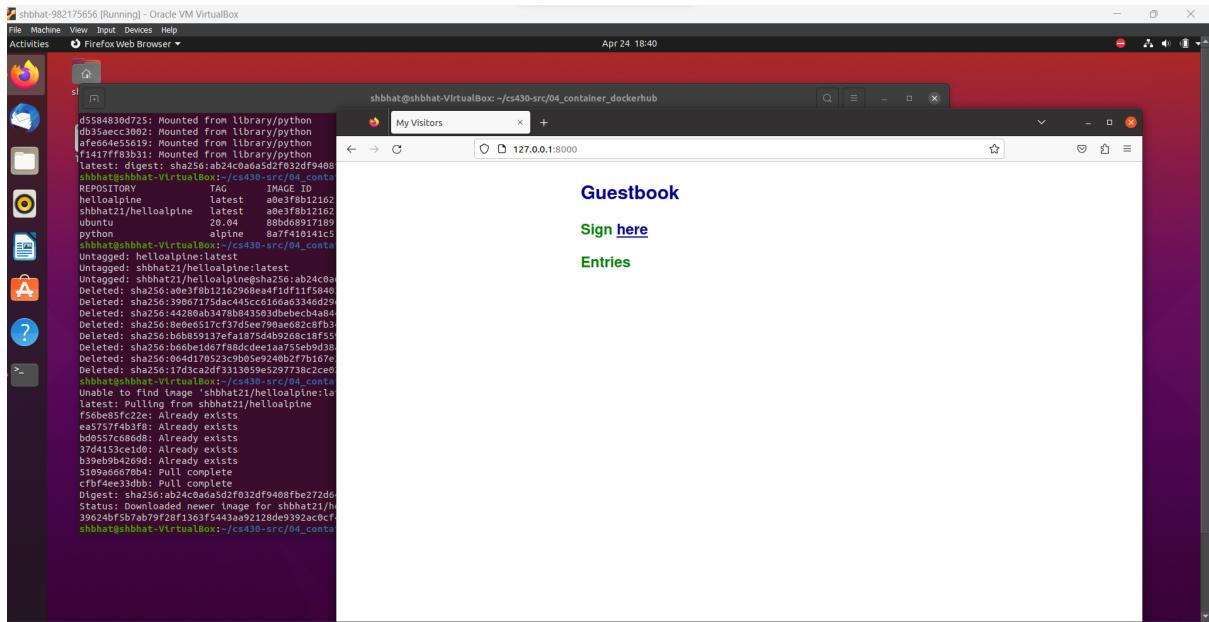
Take a screenshot of the output of each.

```

shbhat-982175656 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal My Visitors + Ap 24 18:36
shbhat@shbhat-VirtualBox: ~/cs430-src/04_container_dockerhub$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
helloalpine latest a0e3f8b12162 11 days ago 72.8MB
ubuntu 20.04 88bd68917189 2 weeks ago $1.95
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker run -p 0:8000:5000 --name helloa -d helloalpine
238dbbebb1ab3baea93b3e3fc1eb7fb1057a0799a7e3abaa563052dc30
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
238dbbebb1ab3baea93b3e3fc1eb7fb1057a0799a7e3abaa563052dc30 helloalpine "python3 app.py" 93 seconds ago Up 9s 0.0.0.0:8000->5000/tcp, :::8000->5000/tcp helloa
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ docker exec -it helloa /bin/bash
OCI runtime exec failed: exec failed: unable to start container process: exec: "/bin/bash": stat /bin/bash: no such file or directory: unknown
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ sudo docker exec -it helloa /bin/bash
[sudo] password for shbhat:
OCI runtime exec failed: exec failed: unable to start container process: exec: "/bin/bash": stat /bin/bash: no such file or directory: unknown
shbhat@shbhat-VirtualBox:~/cs430-src/04_container_dockerhub$ /app # /etc/alpine-release
/app # /etc/alpine-release: Permission denied
/app # cat /etc/alpine-release
3.17
/app # ps -ef
PID USER TIME COMMAND
1 root 0:00 python3 app.py
6 root 0:00 /usr/local/bin/python3 /app/app.py
22 root 0:00 /bin/sh
36 root 0:00 ps -ef
/app #

```

2.1.10 As before, the container is brought up and the local port of 8000 is mapped into the container port of 5000. Test the container by retrieving <http://127.0.0.1:8000> using a browser on the VM, wget, or curl.



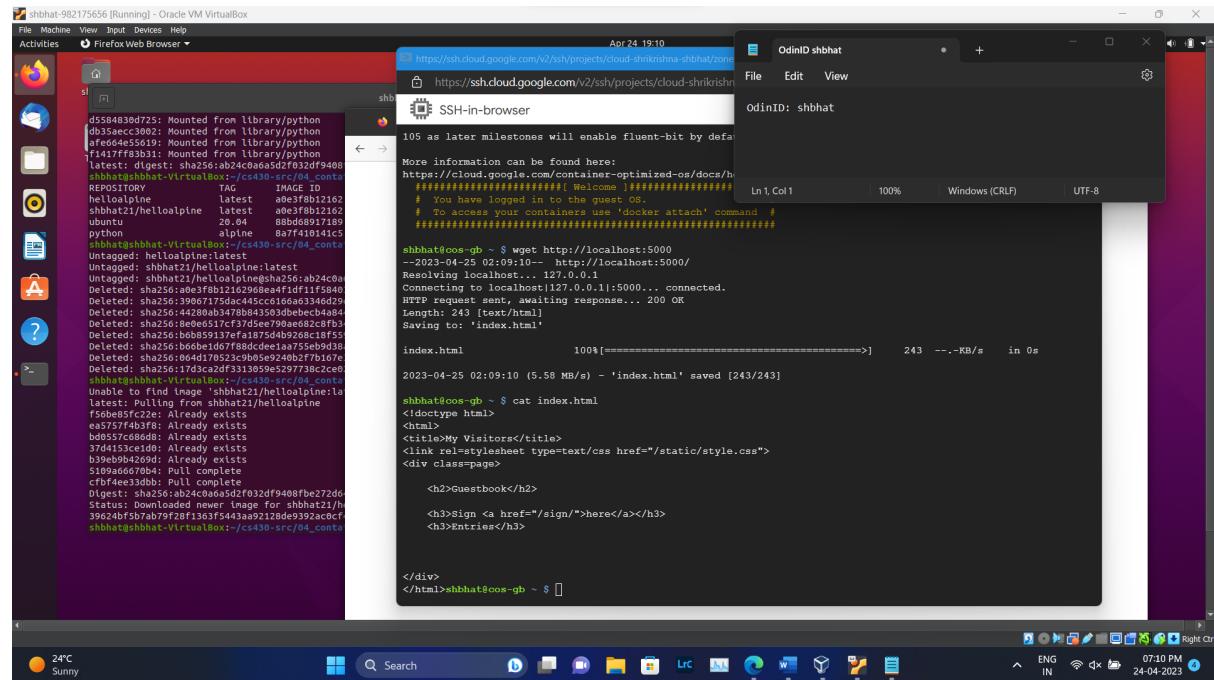
## 2.1.11 Take a screenshot of the container image and its size.

The screenshot shows the Docker Hub interface for the repository shbhat21/helloalpine. The 'Tags' tab is selected. It lists two tags: 'latest' (pushed 2 minutes ago by shbhat21) and a digest 'ab24c0a6a5d2'. The digest tag includes a 'docker pull' command and a compressed size of 24.03 MB.

## 2.1.12 Take a screenshot of the entry that includes the VM's external IP address for your lab notebook

The screenshot shows a guestbook application running on a VM. The entry includes the text 'OdinID: shbhat' and the external IP address '34.82.124.239'.

2.1.13 Perform a local request to the web app (e.g. wget http://localhost:5000) to ensure the container is running.



2.1.14 Take a screenshot of the entry that includes the VM's external IP address for your lab notebook

