

1. Containers

- No screenshots or observations

2. Version 1: Ubuntu

```
# Specify your e-mail address as the maintainer of the container image
MAINTAINER BRANDEN CODD "coddbr@sou.edu"
```

3. Build and run the Ubuntu-based container

- Show the image generated and its size in a screenshot for your lab notebook using the command:

```
Successfully tagged helloubuntu:latest
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker images

```

REPOSITORY	TAG	IMAGE ID	CREATED
SIZE			
helloubuntu	latest	bf2d89a09cf6	3 minutes ago
447MB			
ubuntu	18.04	c090eaba6b94	13 days ago
63.3MB			

```
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$
```

4. Docker commands

- We will now get practice running some of the docker commands

```

branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
1cbb79d3e960       helloubuntu        "python app.py"     2 minutes ago       Up 2 minutes       0.0.0.0:80
90->5000/tcp        hellou
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker stop hellou
hellou
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
1cbb79d3e960       helloubuntu        "python app.py"     2 minutes ago       Exited (0) 7 seconds ago
hellou
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker start hellou
hellou
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker exec -it hellou /bin/bash
root@1cbb79d3e960:/app# ls
Dockerfile.alpine  app.py  index.py  requirements.txt  sign.pyc  templates
Dockerfile.ubuntu  gbmodel index.pyc  sign.py          static
root@1cbb79d3e960:/app# exit
exit
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker stop hellou
hellou
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker rm hellou
hellou
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$

```

5. Docker Hub Ubuntu

```

branden@branden-VirtualBox:~/cs356-cloud-files/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: coddb
Password:
WARNING! Your password will be stored unencrypted in /home/branden/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker tag helloubuntu coddb/helloubuntu
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker push coddb/helloubuntu
The push refers to repository [docker.io/coddb/helloubuntu]
12fbf787392f: Pushed
1347fdd8cf5c: Pushed
e77c54f95b34: Pushed
272599d4ea63: Pushed
9f10818f1f96: Mounted from library/ubuntu
27502392e386: Mounted from library/ubuntu
c95d2191d777: Mounted from library/ubuntu
latest: digest: sha256:451909af99749d26b3da29c94dd73ac958141a3615344c88c7769204040a5766 size: 1787
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$

```

6. Running from Docker Hub

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

```

branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker run -di -p 8000:5000 --name hell
ou codd/helloubuntu
Unable to find image 'codd/helloubuntu:latest' locally
latest: Pulling from codd/helloubuntu
d519e2592276: Already exists
d22d2dfcfa9c: Already exists
b3afe92c540b: Already exists
9077c6b6edb4: Pull complete
7c9811e97fdd: Pull complete
d375e4fa0d70: Pull complete
d365bcc1f46f: Pull complete
Digest: sha256:451909af99749d26b3da29c94dd73ac958141a3615344c88c7769204040a5766
Status: Downloaded newer image for codd/helloubuntu:latest
038c5a1be8711a1f018b80ae01fec905cb622f4ed48d7dae239c29f10b429f95
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$

```

- Then, log into Docker Hub with a web browser, navigate to the container image, and take a screenshot of the container image and its size.

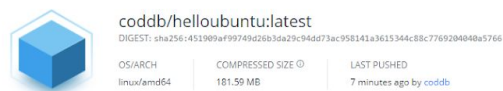


Image Layers

Vulnerabilities

IMAGE LAYERS ②

1	ADD file ... in /	25.47 MB	Command ADD file:ef36fee25b0bd1099979ecb8d54b204cecc13d4e8fd2232189f0d8c5ab9754798 in /
2	/bin/sh -c set -xe &&	852 B	
3	/bin/sh -c [-z "\$(apt-get	0 B	
4	/bin/sh -c mkdir -p /run/systemd	162 B	
5	CMD ["bin/bash"]	0 B	
6	MAINTAINER BRANDEN CODD "codd@osu.edu"	0 B	
7	/bin/sh -c apt-get update -y	24.1 MB	
8	/bin/sh -c apt-get install -y	130.27 MB	
9	COPY dir:2012f755be0372b7a066a0e0a0b160d978a5ed90fa...	3.04 KB	
10	WORKDIR /app	0 B	
11	/bin/sh -c pip install -r	1.74 MB	
12	ENTRYPOINT ["python"]	0 B	
13	CMD ["app.py"]	0 B	

- Finally, visit <https://microbadger.com/> and show the container image metadata using MicroBadger that describes the individual layers of the container.

coddb/helloubuntu ☆

Processing **coddb/helloubuntu** metadata

You're the first person to search for **coddh/helloubuntu**. We're currently fetching its metadata from Docker Hub. It shouldn't take us more than 30s to process and we will show you the metadata once it's ready.

The image was submitted 5 minutes ago.



- Currently letting it run in background but could not view the meta data

7. Version 2: Alpine

- As before, make a single edit to this file before using it. In the `MAINTAINER` line, specify your name and SOU e-mail address for the container image that will be built.

[illegible]

8. Build and run the Alpine-based container

- Show the image generated and its size in a screenshot for your lab notebook. How much smaller is the image?

```
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
helloalpine         latest             3b096013ca59       About a minute ago 55.1MB
python              alpine            53261e7e236b       2 days ago         44.9MB
ubuntu              18.04             c090eaba6b94       13 days ago        63.3MB
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$
```

- The alpine based container is about 12 MB smaller
- Show the output of this command in a screenshot for your lab notebook. What might have happened?

```
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
471f1ebcf1c7       helloalpine        "python app.py"     20 seconds ago     Up 19 seconds      0.0.0.0:80
00->5000/tcp        helloa

branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$ docker exec -it helloa /bin/bash
OCI runtime exec failed: exec failed: container_linux.go:349: starting container process caused "exec: \"/bin/
bash\": stat /bin/bash: no such file or directory": unknown
branden@branden-VirtualBox:~/cs356-cloud-files/04_container_dockerhub$
```

- What might have happened here is that the image does not have the binary `/bin/bash` installed like our previous image did.
- Then, replace `/bin/bash` with `/bin/sh` and repeat the command. Within the container, show the contents of the file specifying the Alpine release being used (`/etc/alpine-release`) and the output of the process listing command (`ps -ef`). Exit out of the shell and container.

```
/app # cat /etc/alpine-release
3.12.3
/app # ps -ef
PID   USER     TIME   COMMAND
  1  root      0:00   python app.py
  6  root      0:01   /usr/local/bin/python /app/app.py
 20  root      0:00   /bin/sh
 27  root      0:00   ps -ef
/app #
```

9. Docker Hub Alpine

- Then, log into Docker Hub with a web browser, navigate to the container image, and take a screenshot of the container image and its size.



coddb/helloalpine:latest

DIGEST: sha256:788f8cfc92e2b71e51329c3a36ac759fed29987a6ff61f4a88da83cebf8bc

OS/ARCH
linux/amd64

COMPRESSED SIZE
19.99 MB

LAST PUSHED
2 minutes ago by coddb

Image Layers Vulnerabilities

IMAGE LAYERS ⓘ

1	ADD file ... in /	2.67 MB
2	CMD ["/bin/sh"]	0 B
3	ENV PATH=/usr/local/bin:/usr/local/sbin:/usr/local/bin/..	0 B
4	ENV LANG=C.UTF-8	0 B
5	/bin/sh -c set -eux; apk	638.37 KB
6	ENV GPG_KEY=E3FF2839C4486D4008825C9940DE8E9826995E310250560	0 B
7	ENV PYTHON_VERSION=3.9.1	0 B
8	/bin/sh -c set -ex &&	11.02 MB
9	/bin/sh -c cd /usr/local/bin &&	229 B
10	ENV PYTHON_PIP_VERSION=21.0.1	0 B
11	ENV PYTHON_GET_PIP_URL=https://github.com/pypa/get-pip/r...	0 B
12	ENV PYTHON_GET_PIP_SHA256=0006625004f55e10d99a4214f0870...	0 B
13	/bin/sh -c set -ex; wget	2.06 MB
14	CMD ["python3"]	0 B
15	MAINTAINER BRAIDEN CODD "coddb@osu.edu"	0 B
16	COPY dir:b7a1e2c425c43999cdecc388aa683f224439f54419e...	3.04 KB
17	WORKDIR /app	0 B
18	/bin/sh -c pip install --no-cache	3.61 MB
19	ENTRYPOINT ["python"]	0 B
20	CMD ["app.py"]	0 B

Command

ADD file:ec475c2abb2d46435286b5ae5efac75b5b1a9c3b6293b6db3c0172b5b9658b in /

- Finally, visit <https://microbadger.com/> and show the container image metadata using MicroBadger that describes the individual layers of the container.

coddb/helloalpine ☆

Processing coddb/helloalpine metadata

You're the first person to search for **coddb/helloalpine**. We're currently fetching its metadata from Docker Hub. It shouldn't take us more than 30s to process and we will show you the metadata once it's ready.

The image was submitted 9 minutes ago.



- As with the previous container i could not view the metadata using microbadger

10. Compute Engine Ubuntu VM deployment

<input type="checkbox"/> Name ^	Zone	Recommendation	In use by	Internal IP	External IP	Network	Connect
<input type="checkbox"/> lab04-2	us-west1-b			10.138.0.11 (nic0)	104.198.12.4	default	SSH

Filter VM instances								Columns
<input type="checkbox"/> Name	Zone	Recommendation	In use by	Internal IP	External IP	Network	Connect	
<input type="checkbox"/> <input checked="" type="checkbox"/> lab04-2	us-west1-b			10.138.0.11 (nic0)	104.198.12.4	default	SSH	

```

codd@lab04-2: ~ - Google Chrome
ssh.cloud.google.com/projects/cs356-w21-branden-codd/zones/us-west1-b/instances/lab04-2?useAdminProxy=true&authuser=1&hl=...
Connected, host fingerprint: ssh-rsa 0 62:5E:7F:D7:3F:38:F9:EC:D6:33:DB:E5:4B:EC
07:E6:FD:BA:B8:9F:FE:F1:91:AA:96:E5:DB:E9:09:4E:21:A8
Linux lab04-2 4.19.0-13-cloud-amd64 #1 SMP Debian 4.19.160-2 (2020-11-28) x86_64

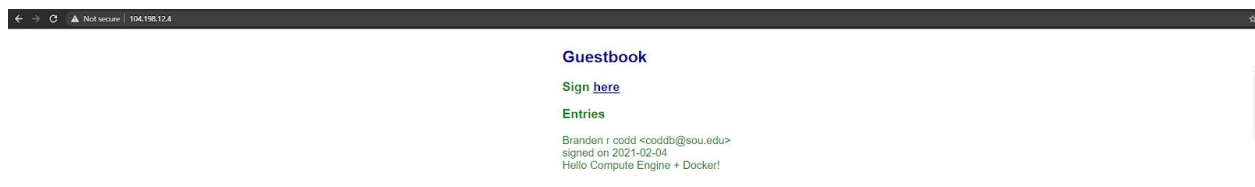
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Feb  4 00:21:17 2021 from 35.235.240.146
codd@lab04-2:~$ 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 http
s://hub.docker.com to create one.
Username: codd
Password:
WARNING! Your password will be stored unencrypted in /home/codd/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
codd@lab04-2:~$ docker run -di -p 80:5000 --name helloa codd/helloalpine
Unable to find image 'codd/helloalpine:latest' locally
latest: Pulling from codd/helloalpine
801bf6a63ef2: Pull complete
8723b2b92bec: Pull complete
4e07029ccd64: Pull complete
594990504179: Pull complete
077e13ccccbd: Pull complete
9edabcaf9e7: Pull complete
6188830347a7: Pull complete
Digest: sha256:768f8cfc92e2b71e51329c3a36ac759fedd29907a0ff61f4a98dba83ce0ef0bc
Status: Downloaded newer image for codd/helloalpine:latest
da694f4a1a1225c34bd83e382ca412612c276ac7f9e2975623735d436ad19fb5
codd@lab04-2:~$

```

- Show in a screenshot that the site is running via the VM's external IP address with a guestbook entry with the message "Hello Compute Engine + Docker!"



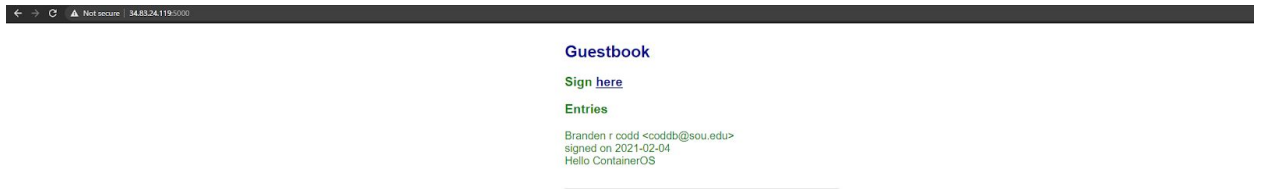
11. Compute Engine ContainerOS VM deployment (1)

- No screenshots or observations

12. Compute Engine ContainerOS VM deployment (2)

<input type="checkbox"/> <input checked="" type="checkbox"/> contain	us-west1-b	10.138.0.12 (nic0)	34.83.24.119	default	SSH	
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- Finally, visit the site via the external IP address on port 5000 to show the site is running. Add a "Hello ContainerOS!" guestbook entry and take a screenshot for your lab.



13. Clean up

- Deleted the vms