CS530 F23 Week 4 Lab
Prof. Feng

Amelia Miner
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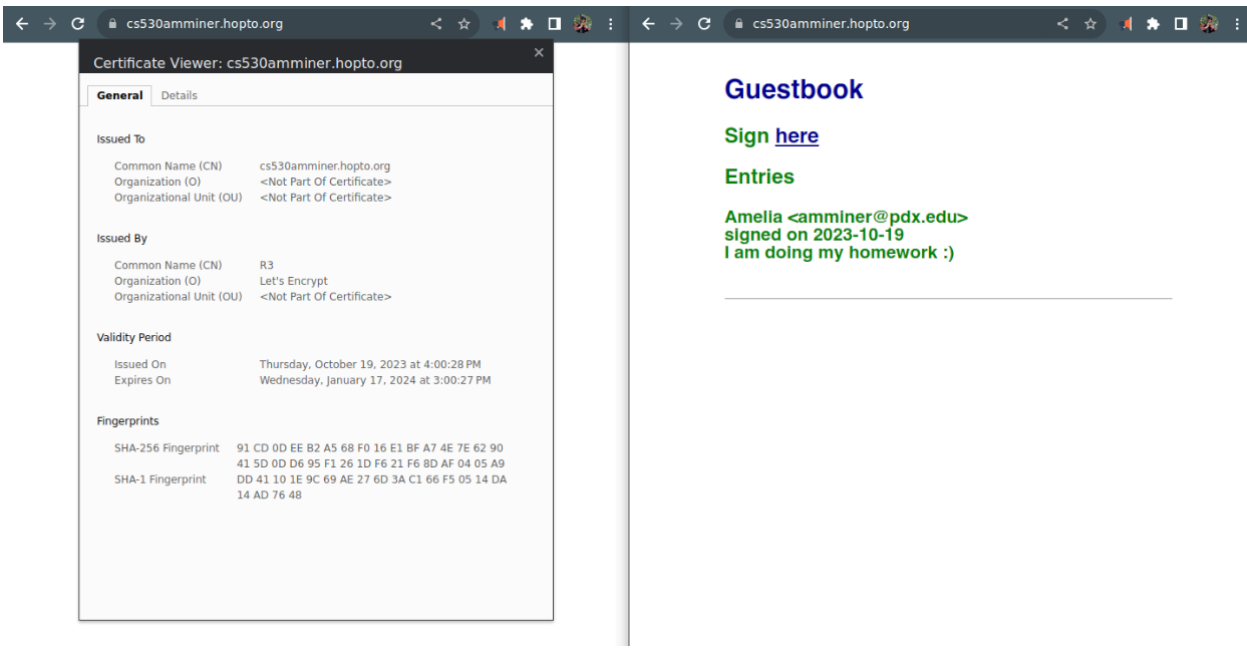
I. Lab 4.1 - nginx Compute Engine Guestbook

1. - 5. setup incl. compute engine VM instance, DNS name

- set up firewall rules to allow http and https
- nginx up at 34.168.62.208 or cs530amminer.hopto.org
- I set permissions such that others can X stuff in ~.
- I cloned the class repository and examined the code.
- No screenshots requested.

6. Install the application & 7. cleanup

- installed the app and got a cert via certbot



- cleanup done!

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II. Lab 4.2 - Docker guestbook

us-west1-b has been down all day so I imaged my machine and cloned it to us-west1-a.

1. Containers

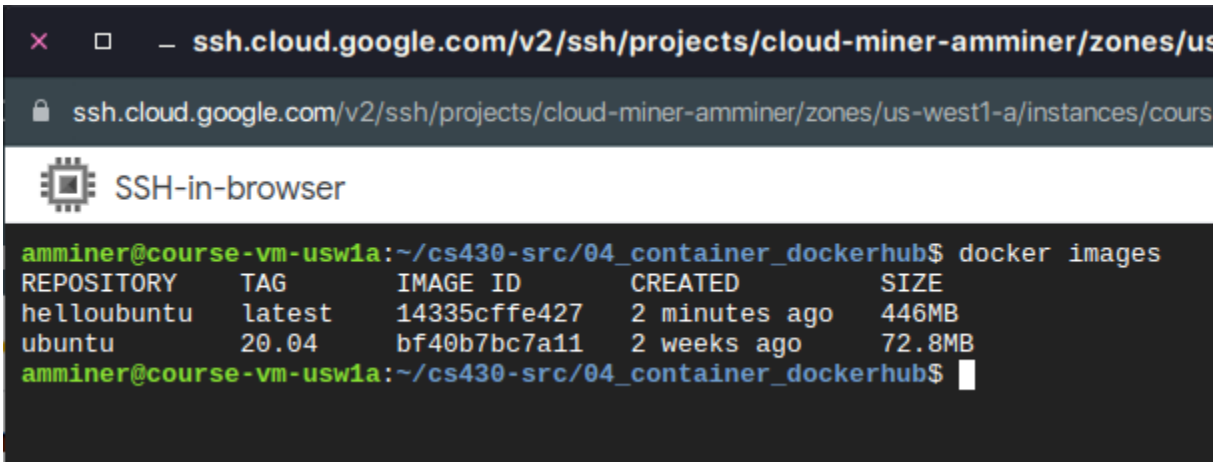
- ssh into the course VM and clone the course repository (no screenshot).

2. Version 1: Ubuntu

- Modify the ubuntu dockerfile - put your email adress in the maintainer label (no screenshot).

3. Build and run the Ubuntu-based container

- Show the output of `docker images`.



- Run the container - `docker run -p 8000:5000 –name hellou -di helloubuntu`. Verify that it's running by GET-ing localhost:8000 (no screenshot).

4. Docker commands

- Docker commands reviewed (no screenshot).

5. Docker Hub Ubuntu

- Logged into Docker Hub via `docker login` (remembered my credentials first try!)
- renamed and pushed my image to Docker Hub.

6. Running from Docker Hub

- Images deleted locally, then pulled again when I ran the image and docker couldn't find it locally
- curl confirms it is running correctly.
- container stopped, removed, and local image removed again.
- Logged into Docker Hub in a browser;
    - Take a screenshot of the container image and its size:

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amminer/helloubuntu:latest

DIGEST: sha256:5983fea456ce8a74e6dacd7430e3aec82ef8f5567d09e5cddcb9f53c0f3012b2

OS/ARCH	COMPRESSED SIZE	LAST PUSHED	TYPE
linux/amd64	156.97 MB	18 minutes ago by amminer	Image

Image Layers Vulnerabilities

IMAGE LAYERS

1	ARG RELEASE	0 B
2	ARG LAUNCHPAD_BUILD_ARCH	0 B
3	LABEL org.opencontainers.image.ref.name=…	0 B
4	LABEL org.opencontainers.image.version=2…	0 B
5	ADD file ... in /	26.23 MB
6	CMD ["/bin/bash"]	0 B
7	LABEL maintainer=amminer@pdx.edu	0 B
8	/bin/sh -c apt-get update -y	31.17 MB
9	**/bin/sh -c apt-get install -y**	**97.64 MB**
10	COPY dir:3dbea73105516461158a5068ac9021…	3 KB
11	WORKDIR /app	0 B
12	/bin/sh -c pip install -r	1.93 MB
13	ENTRYPOINT ["python3"]	0 B
14	CMD ["app.py"]	0 B

Command

```
/bin/sh -c apt-get install -y pyth
```

- What layer adds the most to the image? How much does it add?

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The layer that installs python3-pip. It adds 97.64 MB. It troubles me that the FROM layer is not included here - what's up with that?

7. Version 2: Alpine
   - Added my name to the alpine dockerfile.
8. Build and run the alpine-based container
   - Take a screenshot of the image generated and its size for your lab notebook. How much smaller is the image than the Ubuntu one?

```
amminer@course-vm-usw1a:~/cs430-src/04_container_dockerhub$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED          SIZE
helloalpine   latest    60728a668054   35 seconds ago   66MB
python        alpine    a4c7645b18dc   8 days ago       51.8MB
ubuntu        20.04     bf40b7bc7a11   2 weeks ago      72.8MB
amminer@course-vm-usw1a:~/cs430-src/04_container_dockerhub$
```

The alpine image is 66 MB while the Ubuntu image was 446 MB.

   - create an instance. Verify that it's functioning by GET-ing from the server. Try to open an interactive shell session via docker exec -it helloa /bin/bash. What might have happened?

```
amminer@course-vm-usw1a:~/cs430-src/04_container_dockerhub$ docker run -di -p 8000:5000 --name helloa helloalpine
b61506994dca9360f226cfc5e1c019ef041889ccec275e8e4d4034e9dde061e5
amminer@course-vm-usw1a:~/cs430-src/04_container_dockerhub$ curl "http://127.0.0.1:8000"
<!doctype html>
<html>
<title>My Visitors</title>
<link rel=stylesheet type=text/css href="/static/style.css">
<div class=page>

    <h2>Guestbook</h2>

    <h3>Sign <a href="/sign/">here</a></h3>
    <h3>Entries</h3>



</div>
</html>amminer@course-vm-usw1a:~/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
amminer@course-vm-usw1a:~/cs430-src/04_container_dockerhub$ docker exec -it helloa /bin/sh
/app # echo "it's giving BSD"
it's giving BSD
/app # exit
amminer@course-vm-usw1a:~/cs430-src/04_container_dockerhub$
```

bash doesn't come with the alpine linux base layer as a space-saving measure.

   - Replace /bin/bash with /bin/sh and repeat the command. Within the container, examine the file specifying the alpine release being used (/etc/alpine-release) and perform a process listing command (ps -ef).
     I swear I didn't read ahead, I just figured alpine linux probably wasn't so stripped back that it ditched sh.

```
amminer@course-vm-usw1a:~/cs430-src/04_container_dockerhub$ docker exec -it helloa /bin/sh
/app # cat /etc/alpine-release
3.18.4
/app # ps -ef
PID   USER     TIME  COMMAND
    1 root      0:00 python3 app.py
    7 root      0:00 /usr/local/bin/python3 app.py
   22 root      0:00 /bin/sh
   29 root      0:00 ps -ef
/app #
```

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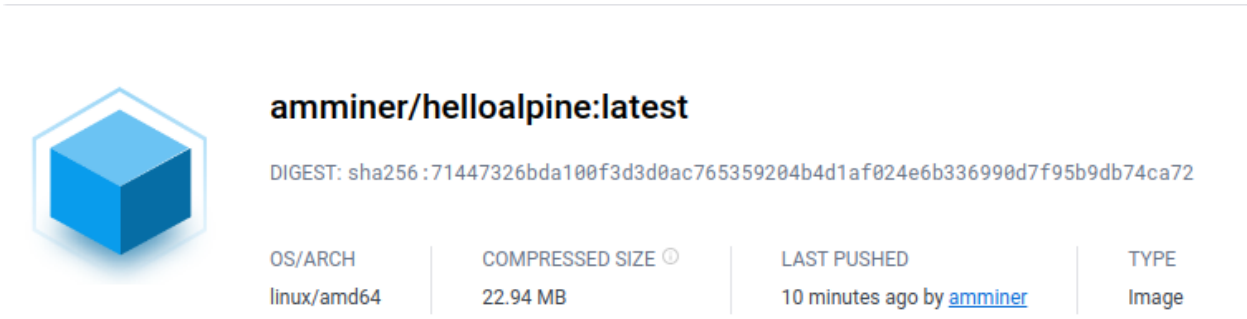
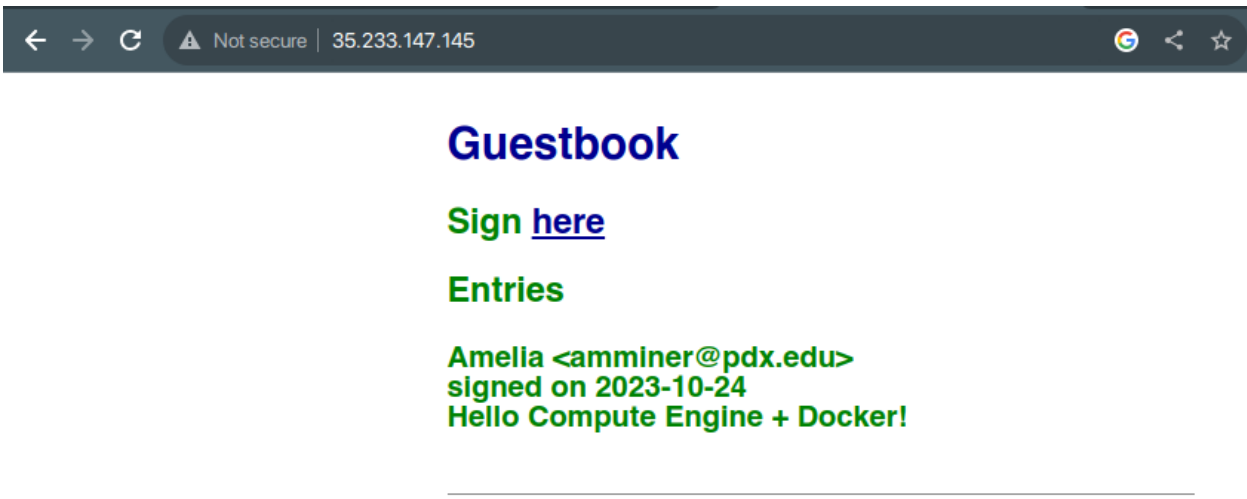
9. Docker Hub Alpine
    - Repeat the push-and-run process from the Ubuntu section, but with the alpine image. Show the container and its size on dockerhub.



10. Compute Engine Ubuntu VM deployment
    - We will now run the alpine container in a gcloud VM - the beauty of container registries is that their containers can be pulled and run anywhere.
    - **I used zone us-west1-a because us-west1-b has severe availability issues today.**
    - Run the container on the VM and create a guestbook entry; show a screenshot of the guestbook running at the VM's external IP.



11. Compute Engine ContainerOS VM Deployment
    - Firewall rule created to pass tcp in on port 5000 (no screenshot).
12. Creating the ContainerOS VM
    - Again I used us-west1-a due to availability issues.
    - VM created (no screenshot).
13. Access the ContainerOS VM
    - SSH'd in and curl'd localhost:5000 successfully.
    - Repeat the last screenshot with the ContainerOS external IP:

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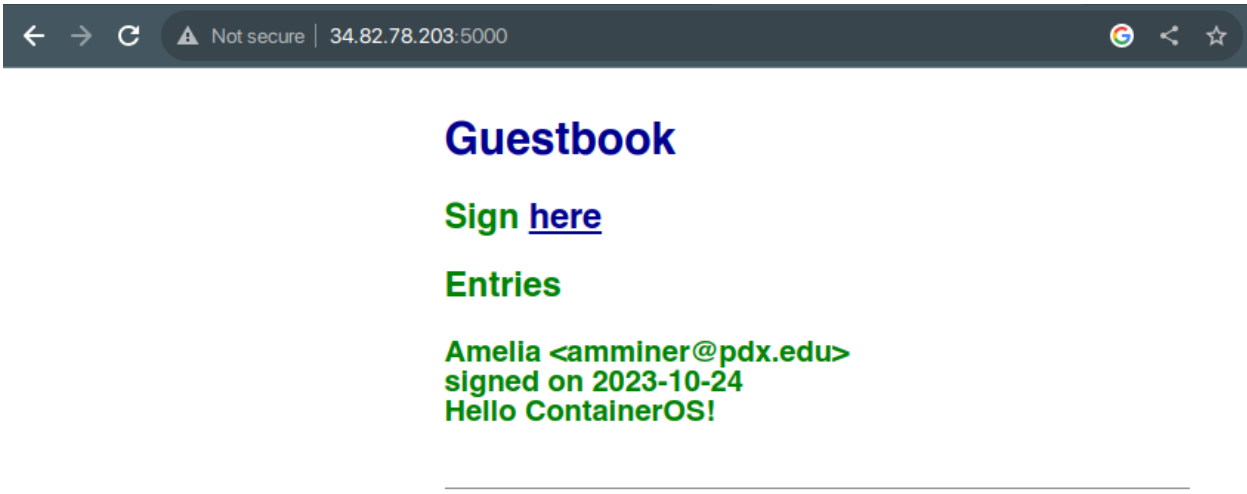

14. Cleanup
    - Done! (No screenshot)