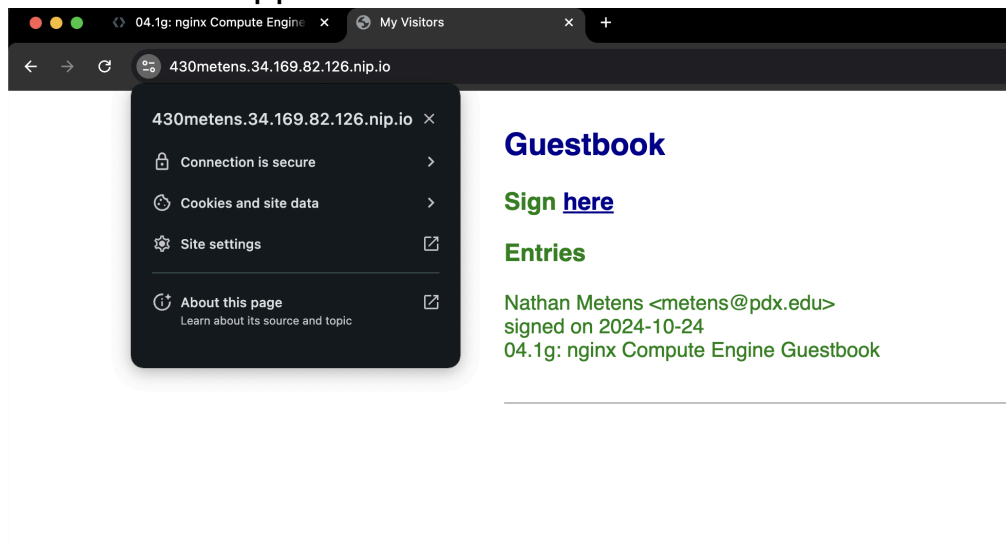


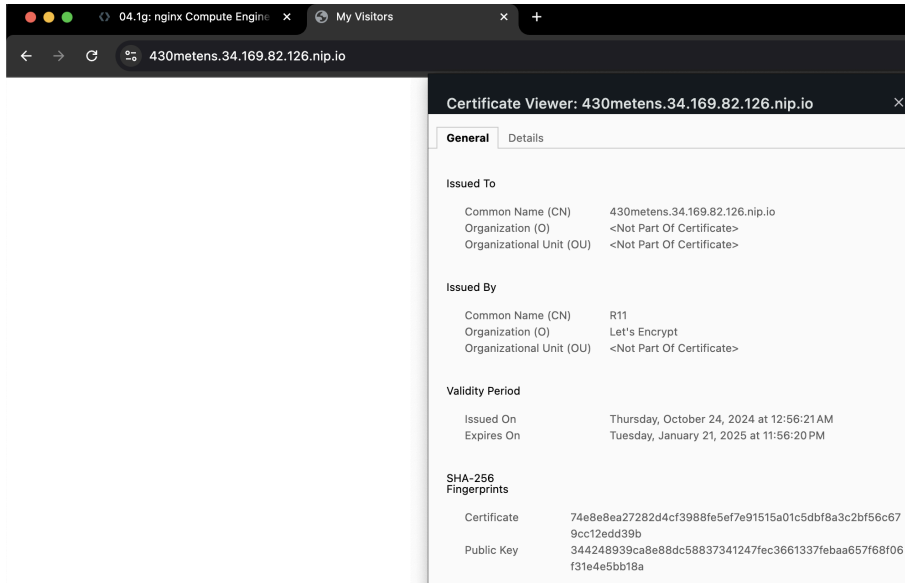
# Week #4 Labs

04.1g: nginx Compute Engine Guestbook	1
6. Install the application	1
04.2g. Docker Guestbook	2
3. Build and run the Ubuntu-based container	2
6. Running from Docker Hub	3
8. Build and run the Alpine-based container	4
9. Docker Hub Alpine	5
10. Compute Engine Ubuntu VM deployment	6
13. -	6

## 04.1g: nginx Compute Engine Guestbook

### 6. Install the application





## 04.2g. Docker Guestbook

### 3. Build and run the Ubuntu-based container

```
---> Running in a667993bd5ce
Removing intermediate container a667993bd5ce
---> 6blef4bccb6f
Step 7/9 : RUN pip install -r requirements.txt
---> Running in 56a0c496f874
Collecting flask
  Downloading flask-3.0.3-py3-none-any.whl (101 kB)
Collecting click>=8.1.3
  Downloading click-8.1.7-py3-none-any.whl (97 kB)
Collecting Werkzeug>=3.0.0
  Downloading werkzeug-3.0.6-py3-none-any.whl (227 kB)
Collecting Jinja2>=3.1.2
  Downloading jinja2-3.1.4-py3-none-any.whl (133 kB)
Collecting blinker>=1.6.2
  Downloading blinker-1.8.2-py3-none-any.whl (9.5 kB)
Collecting importlib-metadata>=3.6.0; python_version < "3.10"
  Downloading importlib_metadata-8.5.0-py3-none-any.whl (26 kB)
Collecting itsdangerous>=2.1.2
  Downloading itsdangerous-2.2.0-py3-none-any.whl (16 kB)
Collecting MarkupSafe>=2.1.1
  Downloading MarkupSafe-2.1.5-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (26 kB)
Collecting zipp>=3.20
  Downloading zipp-3.20.2-py3-none-any.whl (9.2 kB)
Installing collected packages: click, MarkupSafe, Werkzeug, Jinja2, blinker, zipp, importlib-metadata, itsdangerous, flask
Successfully installed Jinja2-3.1.4 MarkupSafe-2.1.5 Werkzeug-3.0.6 blinker-1.8.2 click-8.1.7 flask-3.0.3 importlib-metadata-8.5.0
Removing intermediate container 56a0c496f874
---> 078212157d00
Step 8/9 : ENTRYPOINT ["python3"]
---> Running in f2af21cfd84c
Removing intermediate container f2af21cfd84c
---> 0cabdb774793
Step 9/9 : CMD ["app.py"]
---> Running in eld60324c3ee
Removing intermediate container eld60324c3ee
---> 3e42bc87ffe5
Successfully built 3e42bc87ffe5
Successfully tagged helloubuntu:latest
metens@course-vml:~/cs430-src/04_container_dockerhub$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
helloubuntu   latest    3e42bc87ffe5   9 seconds ago  453MB
ubuntu        20.04     6013ae1a63c2   2 weeks ago   72.8MB
metens@course-vml:~/cs430-src/04_container_dockerhub$
```

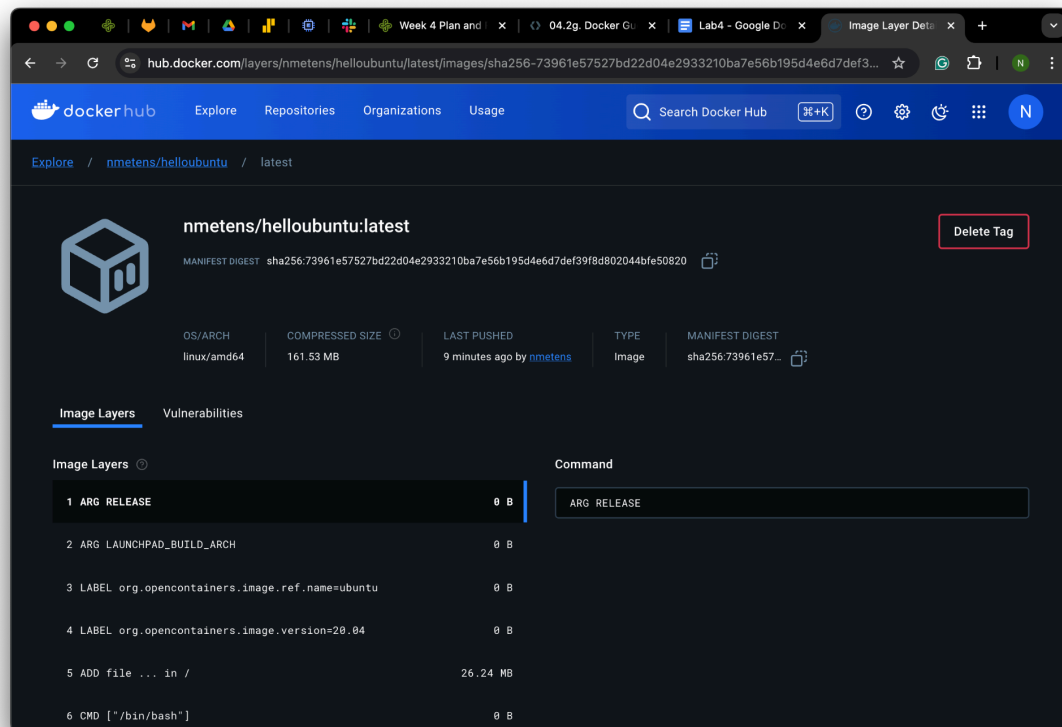
## 6. Running from Docker Hub

```
metens@course-vm1:~/cs430-src/04_container_dockerhub$ docker images
REPOSITORY          TAG         IMAGE ID      CREATED       SIZE
helloubuntu         latest      3e42bc87ffe5  16 minutes ago 453MB
nmetens/helloubuntu latest      3e42bc87ffe5  16 minutes ago 453MB
ubuntu              20.04      6013ae1a63c2  2 weeks ago   72.8MB
metens@course-vm1:~/cs430-src/04_container_dockerhub$ docker rmi helloubuntu nmetens/helloubuntu
Untagged: helloubuntu:latest
Untagged: nmetens/helloubuntu:latest
Untagged: nmetens/helloubuntu@sha256:73961e57527bd22d04e2933210ba7e56b195d4e6d7def39f8d802044bfe50820
Deleted: sha256:3e42bc87ffe54bf504c9fbd3c1a1celled6c611c3c28da8ceee5a52b42c73b
Deleted: sha256:0cabdb7747931e3c5f9645fa2d731ab8dd5190b50df90f291aaafbff05ab019
Deleted: sha256:078212157d003e2e12c352c187e009736686c608bac00fdb273373794bb37e0
Deleted: sha256:f6749a4f2eb3ce0c4e05f7b588c501e5a80a50054f967623bde15a0a8cfb3c46
Deleted: sha256:6b1ef4bccb6ff1241cb73ad5b9fb0f68eb8947bdc8c0550748cfcdfdf76560e
Deleted: sha256:df4b52ec9e05edd492104cc089bb467924199fda40aff963d28f3dedaf4858f0
Deleted: sha256:ebc4425c8e3b7f0eeacf565eb30345d9cfc1cf3fa9b46cfc28d27e3aa2eda465
Deleted: sha256:0b0d47150763647606f17ac0b045b7e90e272a4cd3d3a6780f42cb366b96e994
Deleted: sha256:301c6dcacf25882f27f544362930577dedef066c3e289513901028248285fe50
Deleted: sha256:d79bdc6bb5f7b3976ff2a6ed7844f0258b85db3e9bf40586fc621b31b63ec1fb
Deleted: sha256:88d3c6edc054ba47cf3632c7f84ec85fbc120d37f44c8aa3b2374722769999f6
Deleted: sha256:86f50d778a962aab722cbe8d16843e19f2f055cbbad2aa2613d902154975a7b8
metens@course-vm1:~/cs430-src/04_container_dockerhub$ docker run -di -p 8000:5000 --name hellou nmetens/helloubuntu
Unable to find image 'nmetens/helloubuntu:latest' locally
latest: Pulling from nmetens/helloubuntu
d9802f032d67: Already exists
ebb1a6dd44c3: Pull complete
e96e4efd2c9b: Pull complete
068ff3463e61: Pull complete
4eb8630bb5c5: Pull complete
Digest: sha256:73961e57527bd22d04e2933210ba7e56b195d4e6d7def39f8d802044bfe50820
Status: Downloaded newer image for nmetens/helloubuntu:latest
1b43f8206180441ff248ee88e5f60f2fb92ba2392f80f0701e379bc3234cca24
metens@course-vm1:~/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>metens@course-vm1:~/cs430-src/04_container_dockerhub$
```



The screenshot shows the Docker Hub page for the `nmetens/helloubuntu:latest` image. The page includes the Docker Hub logo, navigation links, and a search bar. The main content area displays the image's details, including the manifest digest, OS/ARCH, compressed size, last pushed time, and type. Below this, there are tabs for "Image Layers" and "Vulnerabilities". The "Image Layers" tab is active, showing a list of layers with their arguments, sizes, and commands. The layers are:

- 1 ARG RELEASE (0 B)
- 2 ARG LAUNCHPAD\_BUILD\_ARCH (0 B)
- 3 LABEL org.opencontainers.image.ref.name=ubuntu (0 B)
- 4 LABEL org.opencontainers.image.version=20.04 (0 B)
- 5 ADD file ... in / (26.24 MB)
- 6 CMD ["/bin/bash"] (0 B)

The total size of the image is 161.53 MB. Layer 9 adds the most to the container image. The command on layer 9: `/bin/sh -c apt-get install -y python3-pip` adds 97.67 MB to the image.

Image Layers	Command
1 ARG RELEASE	0 B
2 ARG LAUNCHPAD_BUILD_ARCH	0 B
3 LABEL org.opencontainers.image.ref.name=ubuntu	0 B
4 LABEL org.opencontainers.image.version=20.04	0 B
5 ADD file ... in /	26.24 MB
6 CMD ["/bin/bash"]	0 B
7 LABEL maintainer=metens@pdx.edu	0 B
8 /bin/sh -c apt-get update -y	35.61 MB
9 /bin/sh -c apt-get install -y	97.67 MB
10 COPY dir:b61e4fe960451e680348bed089301ec3976dfbd77659a35_	3.01 KB
11 WORKDIR /app	0 B
12 /bin/sh -c pip install -r	2 MB
13 ENTRYPOINT ["python3"]	0 B
14 CMD ["app.py"]	0 B

## 8. Build and run the Alpine-based container

```
metens@course-vm1:~/cs430-src/04_container_dockerhub$ docker images
REPOSITORY      TAG          IMAGE ID       CREATED        SIZE
helloalpine     latest      9e1c1d26d257  7 seconds ago  57.3MB
python          alpine     408c9504056e  7 days ago    44.6MB
ubuntu         20.04      6013ae1a63c2  2 weeks ago   72.8MB
metens@course-vm1:~/cs430-src/04_container_dockerhub$
```

The `docker images` command shows that the **helloalpine image is 57.3 MB**. In the previous `docker images` command ran in step 6 above, the **helloubutnu image was 453 MB**, about 8 times larger than the alpine image.

```
metens@course-vm1:~/cs430-src/04_container_dockerhub$ docker run -p 8000:5000 --name helloa -di helloalpine
202c7838ea9f051c84e98241ef8d0a0d7b7df2ec7af7a4c99e7f3e6b962acdd
metens@course-vm1:~/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>

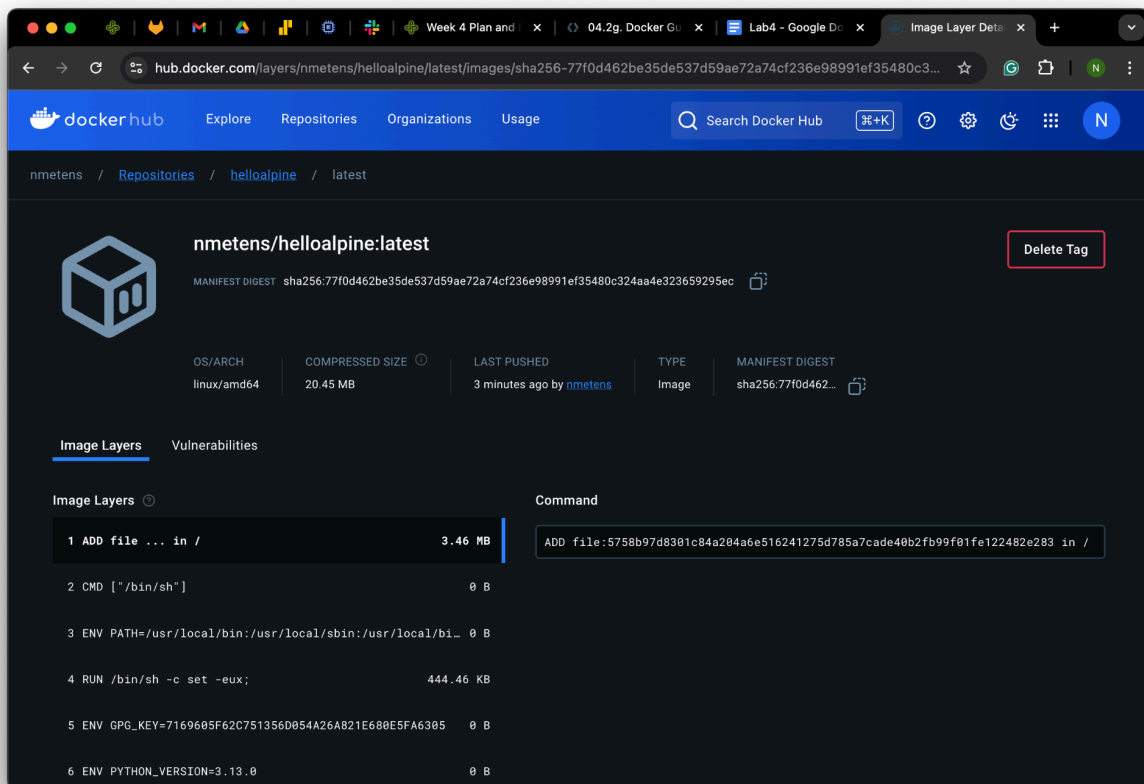
  <h3>Sign <a href="/sign/">here</a></h3>
  <h3>Entries</h3>

</div>
</html>metens@course-vm1:~/cs430-src/04_container_dockerhub$ docker ps -a
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS                               NAMES
202c7838ea9f   helloalpine  "python3 app.py"        23 seconds ago  Up 22 seconds  0.0.0.0:8000->5000/tcp, :::8000->5000/tcp  helloa
metens@course-vm1:~/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
```

After running the `docker exec -it helloa /bin/bash` command, we see an OCI runtime exec fail. The directory `/bin/bash` doesn't exist.

```
metens@course-vm1:~/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
metens@course-vm1:~/cs430-src/04_container_dockerhub$ docker exec -it helloa /bin/sh
/app # /etc/alpine-release
/bin/sh: /etc/alpine-release: Permission denied
/app # /etc/alpine-release
/bin/sh: /etc/alpine-release: Permission denied
/app # ps -ef
PID   USER     TIME   COMMAND
1      root      0:00   python3 app.py
7      root      0:01   /usr/local/bin/python3 app.py
57     root      0:00   /bin/sh
66     root      0:00   ps -ef
/app #
```

## 9. Docker Hub Alpine

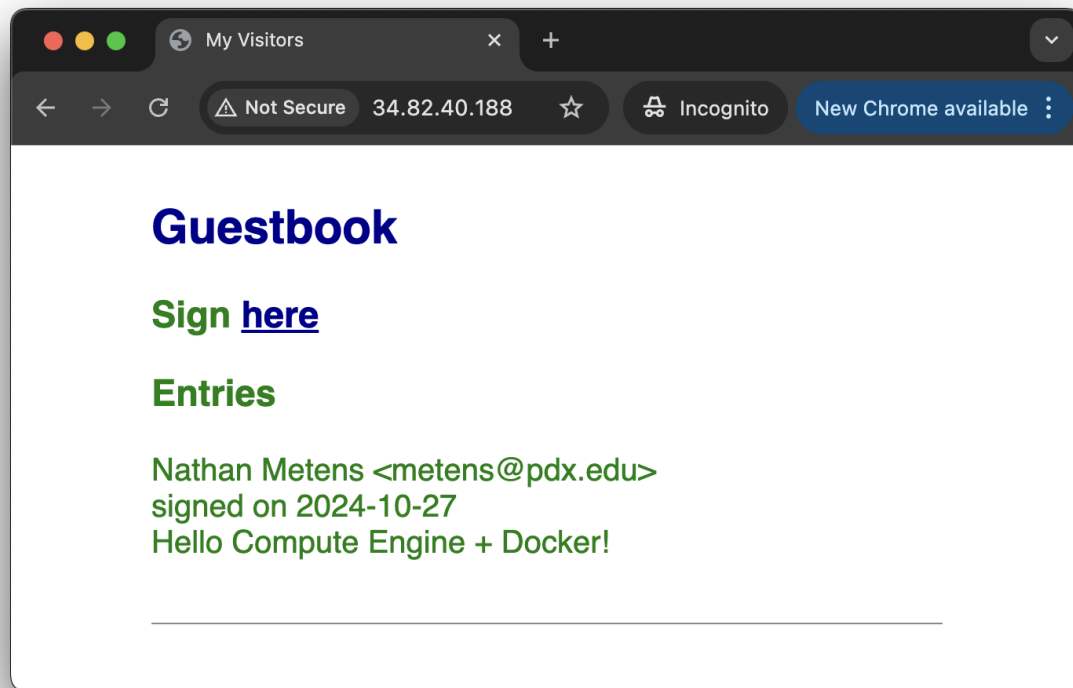


The screenshot shows the Docker Hub page for the `nmetens/helloalpine:latest` image. The page includes the Docker Hub logo, the repository name, and a "Delete Tag" button. Below this, there is a table with columns for OS/ARCH, COMPRESSED SIZE, LAST PUSHED, TYPE, and MANIFEST DIGEST. The table shows that the image is for `linux/amd64`, has a size of 20.45 MB, was pushed 3 minutes ago by `nmetens`, and is of type `Image`. The manifest digest is `sha256:77f0d462be35de537d59ae72a74cf236e98991ef35480c324aa4e323659295ec`.

Below the table, there are two tabs: "Image Layers" and "Vulnerabilities". The "Image Layers" tab is selected, showing a list of layers. The first layer is "1 ADD file ... in /" with a size of 3.46 MB. The second layer is "2 CMD ["/bin/sh"]" with a size of 0 B. The third layer is "3 ENV PATH=/usr/local/bin:/usr/local/sbin:/usr/local/bi..." with a size of 0 B. The fourth layer is "4 RUN /bin/sh -c set -eux;" with a size of 444.46 KB. The fifth layer is "5 ENV GPG\_KEY=7169605F62C751356D054A26A821E680E5FA6305" with a size of 0 B. The sixth layer is "6 ENV PYTHON\_VERSION=3.13.0" with a size of 0 B.

Below the layers, there is a "Command" field with the text `ADD file:5758b97d8301c84a204a6e516241275d785a7cade40b2fb99f01fe122482e283 in /`.

## 10. Compute Engine Ubuntu VM deployment



## 13. -

