Assignment 1, Web Application Development

Status	Planning
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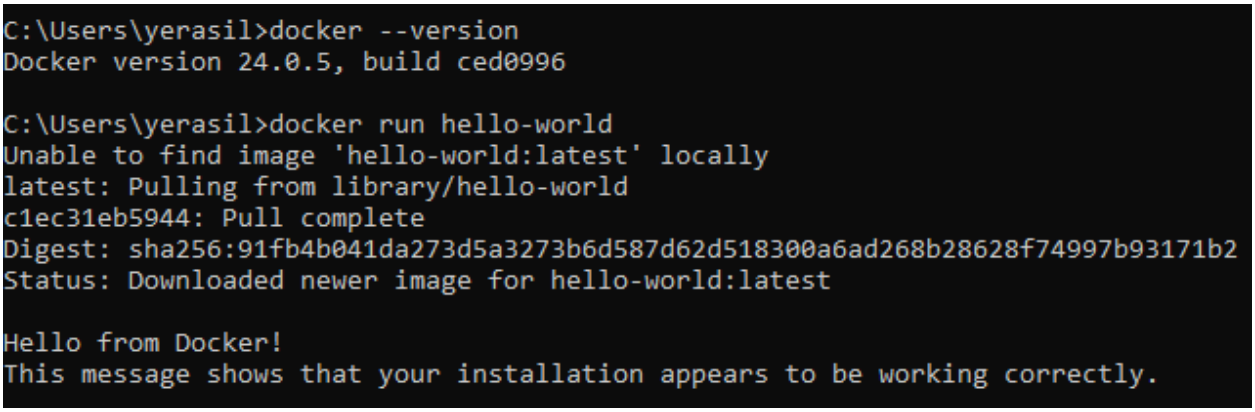
Exercise 1: Installing Docker



1. Key components of Docker is Docker Engine, Docker CLI, Docker Images, Docker Containers, **Docker Hub**
2. Docker runs directly on the OS kernel, while the virtual machine runs a full-fledged OS based on the Hypervisor. Therefore, Docker containers are much lighter than a Virtual Machine, hence launching a Docker container is very fast

3. The output was “Hello from Docker!” . It signify that Docker Client contacted to Docker Daemon, it checks if we have the image locally, if not, it goes to Docker hub and pull it. After that it creates container from this image and start it. This image configured to print this phrase to Stdout

Exercise 2: Basic Docker Commands

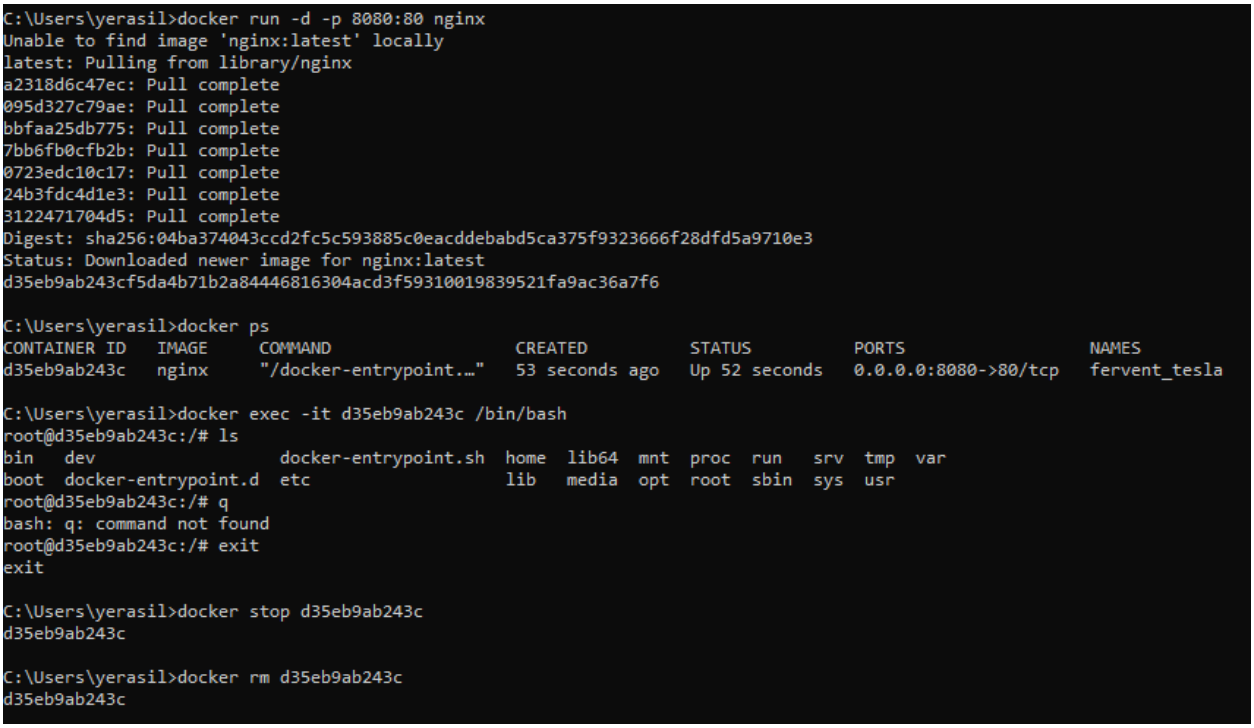
```
C:\Users\yerasil>docker pull alpine:latest
latest: Pulling from library/alpine
43c4264eed91: Pull complete
Digest: sha256:beefdbd8a1da6d2915566fde36db9db0b524eb737fc57cd1367effd16dc0d06d
Status: Downloaded newer image for alpine:latest
docker.io/library/alpine:latest

What's Next?
  View summary of image vulnerabilities and recommendations → docker scout quickview alpine:latest

C:\Users\yerasil>docker images
REPOSITORY                                TAG            IMAGE ID       CREATED         SIZE
alpine                                    latest         91ef0af61f39   2 weeks ago     7.8MB
mongo                                     latest         a31b196b207d   2 months ago    796MB
domake-myapp                              latest         dd2ede772389   4 months ago    16.8MB
<none>                                    <none>         744c7862cbe6   4 months ago    16.6MB
<none>                                    <none>         afba279a768a   4 months ago    16.6MB
<none>                                    <none>         a8742f7d969e   4 months ago    16.6MB
<none>                                    <none>         786fed929112   4 months ago    16.6MB
<none>                                    <none>         d1c272ae9992   4 months ago    16.6MB
<none>                                    <none>         a5e7b10349e7   4 months ago    16.6MB
<none>                                    <none>         2e8afb9499a6   4 months ago    16.6MB
<none>                                    <none>         1159145f7364   4 months ago    16.6MB
<none>                                    <none>         5a807474f689   4 months ago    16.6MB
<none>                                    <none>         b12053e827af   4 months ago    16.6MB
postgres                                  16             0e536f047d0f   4 months ago    447MB
golang-project-app                        latest         7fae9208e86e   4 months ago    16.6MB
<none>                                    <none>         200344db2803   4 months ago    16.6MB
<none>                                    <none>         0aadbf8b8efb   4 months ago    16.6MB
postgres                                  latest         b9390dd1ea18   7 months ago    431MB
migrate/migrate                           latest         34463ca35334   9 months ago    59.8MB
jaegertracing/all-in-one                  1.52.0         f54c2e9a1e62   9 months ago    74MB
otel/opentelemetry-collector              0.90.1         530437bc777a   9 months ago    102MB
grafana/grafana                           10.2.2         06e5d59b720d   10 months ago   399MB
prom/prometheus                           v2.48.0        620d5e2a39df   10 months ago   247MB
obsidiandynamics/kafdrop                  4.0.1          a4ab0ddeba31   10 months ago   611MB
confluentinc/cp-kafka                     7.4.3          788258c436f7   11 months ago   851MB
confluentinc/cp-zookeeper                 7.4.3          3df461e5e1f2   11 months ago   851MB
postgres                                  16.0           fbd1be2cbb1f   12 months ago   417MB
danielqsj/kafka-exporter                  v1.7.0         4289127a8da8   16 months ago   22MB
hello-world                               latest         d2c94e258dcb   16 months ago   13.3kB
confluentinc/cp-kafka                     7.3.3          9d780d4dee74   18 months ago   839MB
docker.redpanda.com/vectorized/console    v2.1.1         8d34e3f990cb   22 months ago   146MB
tchiotludo/akhq                           0.22.0         fc77462bc05c   2 years ago     523MB
vectorized/redpanda                       v21.11.4       6bb03e476029   2 years ago     302MB
postgres                                  14.1           da2cb49d7a8d   2 years ago     374MB
docker.vectorized.io/vectorized/redpanda  v21.9.3        3272ec2e7432   2 years ago     289MB
redis                                     6.0.9-alpine   c678242f9116   3 years ago     31.6MB
wurstmeister/zookeeper                    latest         3f43f72cb283   5 years ago     510MB
elevy/zookeeper                           latest         6b8df71ed13e   6 years ago     91.7MB

C:\Users\yerasil>docker run -d 91ef0af61f39
bbb7a7792aba2a215815044bfc16aa13647b6c623d54e3a8bf4200ea5346e42b

C:\Users\yerasil>docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES

C:\Users\yerasil>docker run -d a31b196b207d
4bea3927fbc7c452322a4b1f3c86f6d8ce4a41c4ae7448e3945b1f7f0f549d9f
```

1. Docker pull pulls up needed image from Docker Hub
   Docker run checks if we have the image locally, if not, it goes to Docker hub

and pull it. After that it creates container from this image and start it

2. By command docker ps we can see running containers, also it has info about container id, used image, status, port etc.
3. After the container stops, Docker saves information about the container so it can be restarted it in the future by command docker start <cont_id>

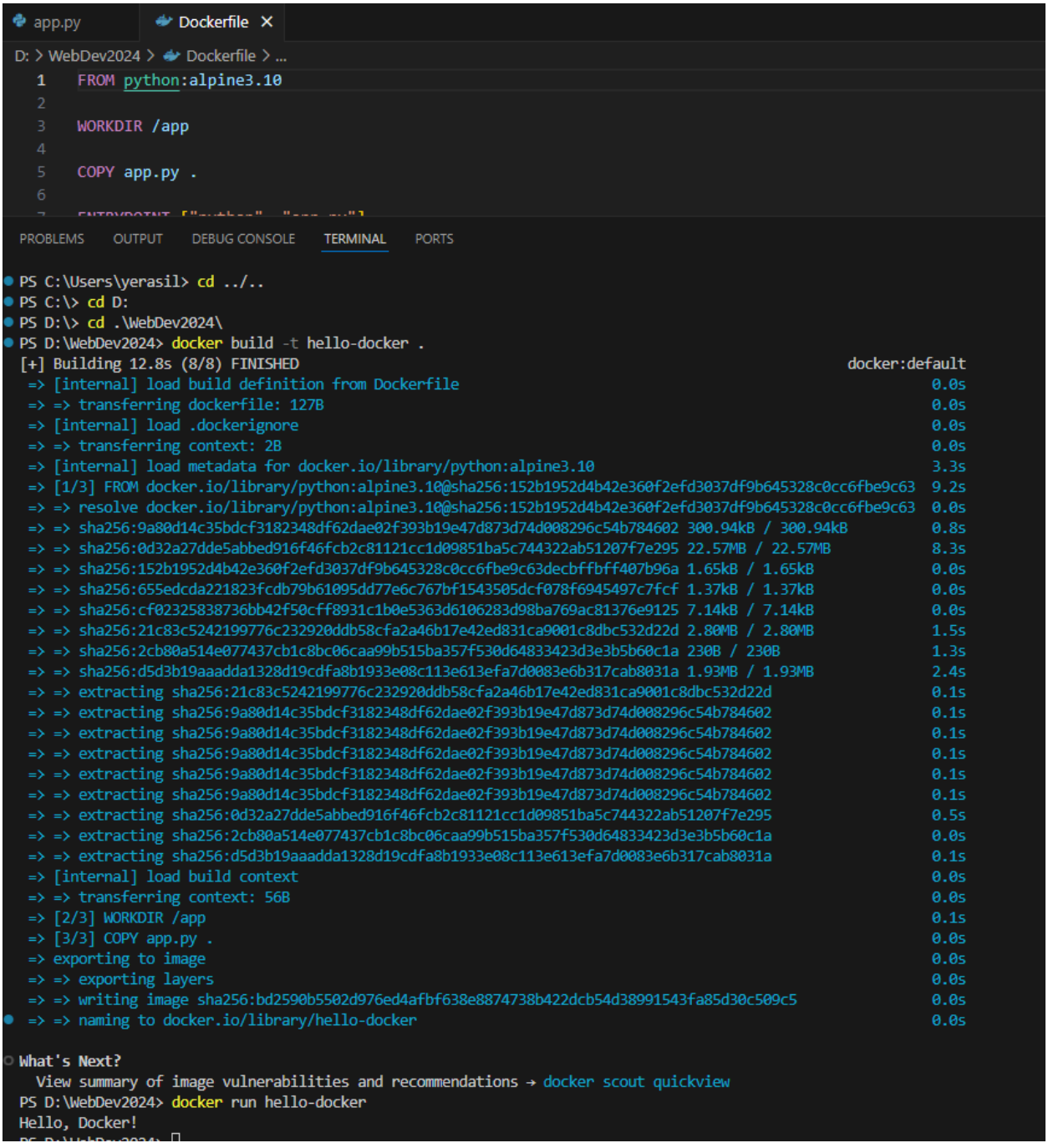
Exercise 3: Working with Docker Containers



1. Port mapping is the connection between a docker container and the outside world. Thus, we can work with the container application through the port to which we mapped. For example, if an application is running on port 80 in a container, and we want to map it to server port 8000, it will be 8000:80
2. The docker exec command allows to execute commands in running container. For example, we have container with Postgesql. We can connect by docker exec -it postgres_container psql -U postgres and work with database
3. A stopped container does not consume system resources because its processes are terminated.

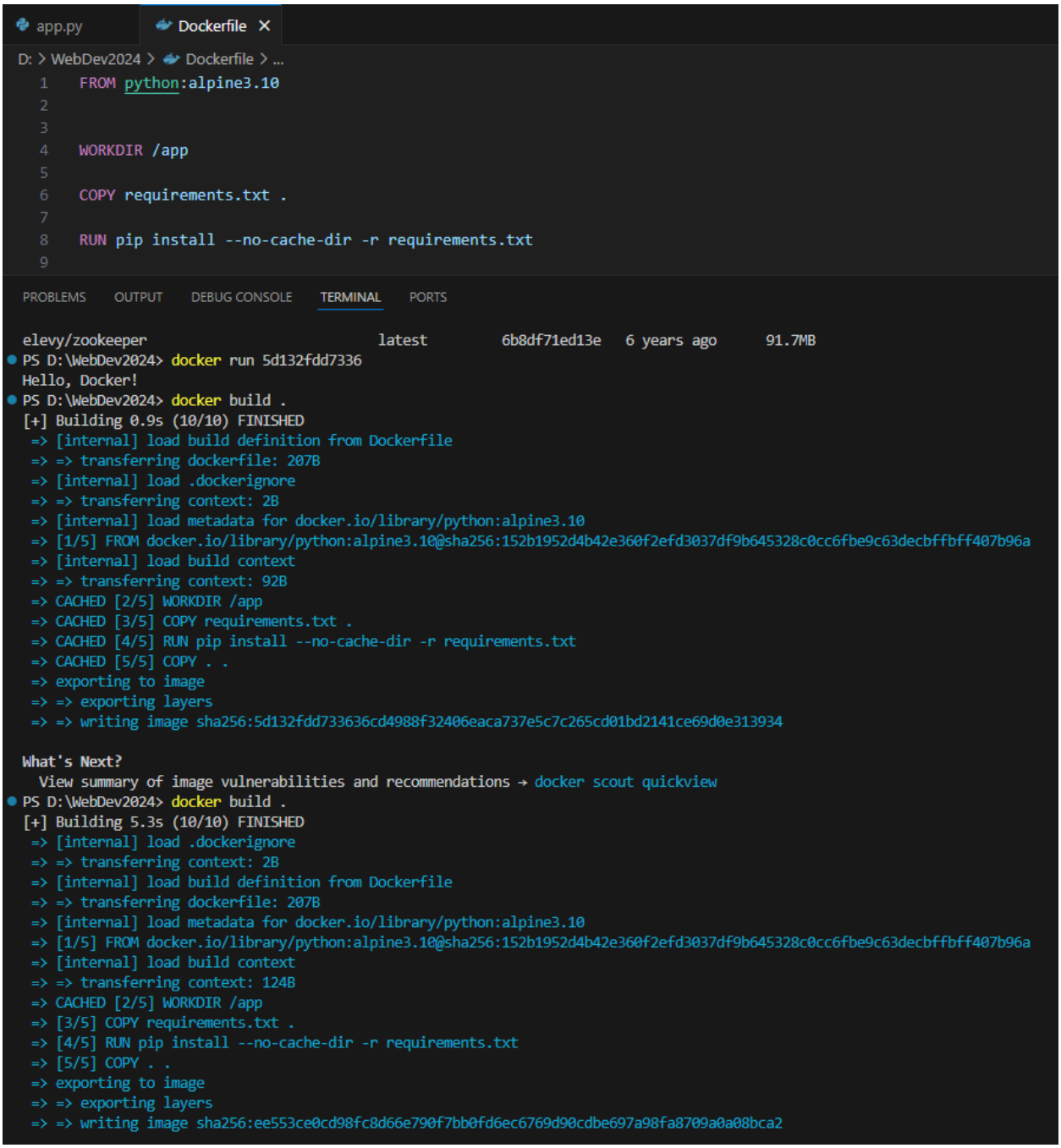
But still continues to take up space. To completely clean up the resource container, you need to delete the container and volumes

Exercise 1: Creating a Simple Dockerfile



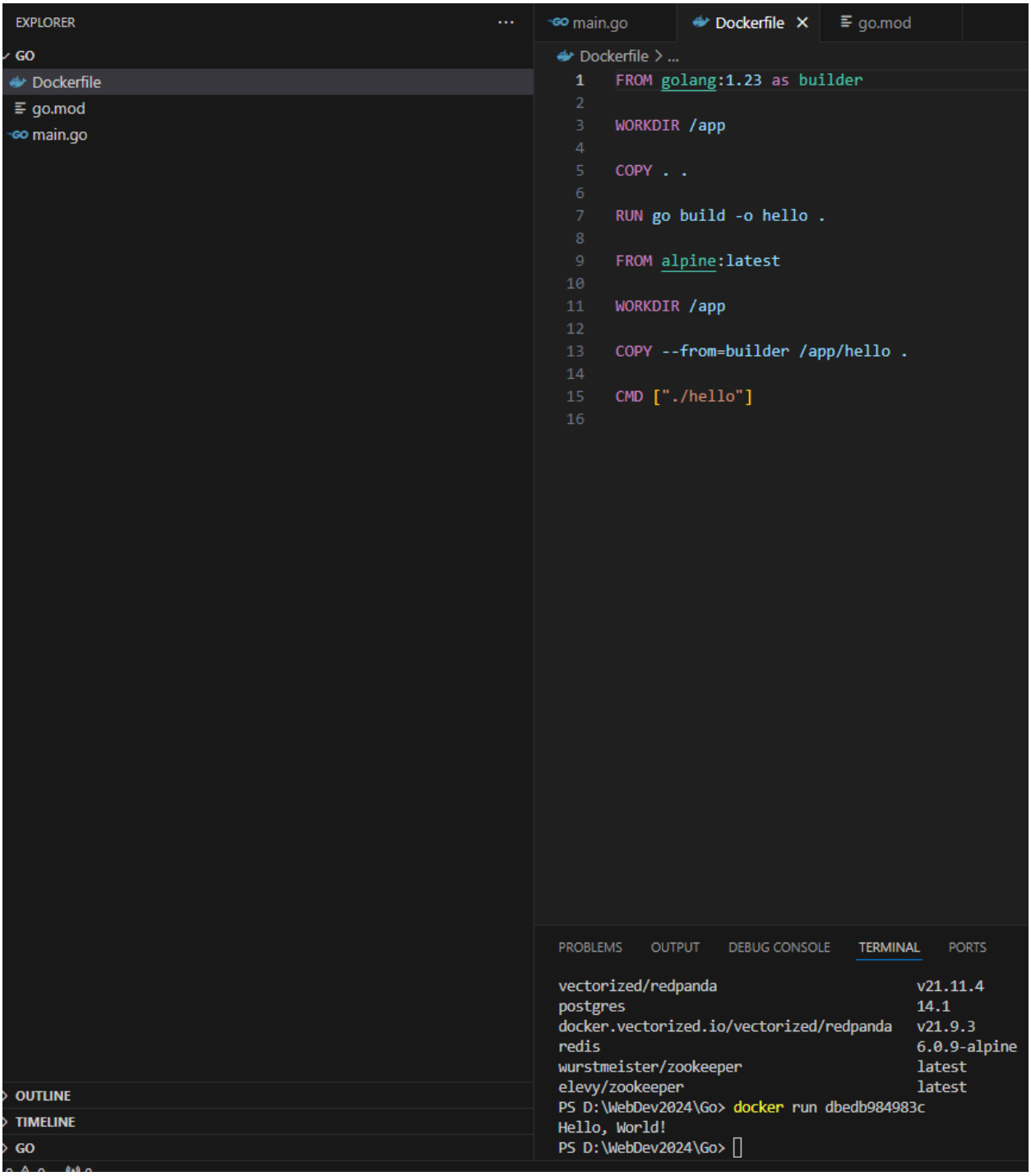
1. From means on the basis of which image the container will work. For example, if you select the image FROM python:alpine3.10, a container will be created based on the Alpine distribution, this OS will contain only the necessary components to run a Python application
2. COPY copies files or folders from the local environment to the container's working directory.
3. CMD can be overridden, while ENTRYPOINT can not. For example, if you use cmd and run through docker, run <im_name> python main.go and the command that was passed through the console will take precedence. And at the entry point it will be launched with what is written in the dockerfile

Exercise 2: Optimizing Dockerfile with Layers and Caching



1. Docker layers are instructions that are executed sequentially. It has a useful property like caching.
2. If the file or folder has not changed since the previous time, docker will take it from the cache
3. Dockerignore is a file that will exclude files or folders for building the image

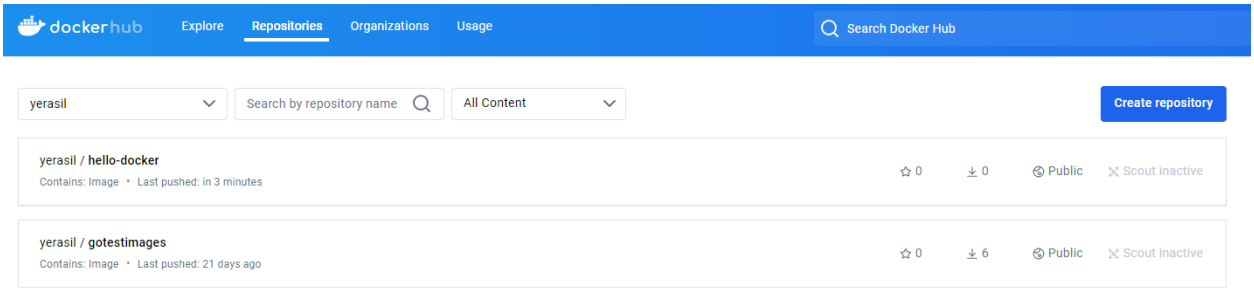
Exercise 3: Multi-Stage Builds



1. The benefit of multi-assembly is that we will not store the Go compiler in the final image, but simply a binary. Thus, we reduce the weight of the final image
2. The final image uses intermediate instructions to use useful values

Exercise 4: Pushing Docker Images to Docker Hub

```
PS D:\WebDev2024\Go> docker tag dbedb984983c yerasil/hello-docker
PS D:\WebDev2024\Go> docker push yerasil/hello-docker
Using default tag: latest
The push refers to repository [docker.io/yerasil/hello-docker]
049f775d4c90: Pushed
36e27e339f40: Pushed
63ca1fbb43ae: Pushed
latest: digest: sha256:ebda30cc3e5ff04d688f3d022ac3cb13255038193fa722d5b41dab0a8ab77b79 size: 945
```



1. Docker-hub is needed to store images; for example, you can develop a useful image and upload it to the docker hub. Other people may use your image
2. I tagged with command docker tag hello-docker <your-username>/hello-docker
3. Create account in Docker hub, tag the image and push it by docker push <your-username>/hello-docker