Practical – 7

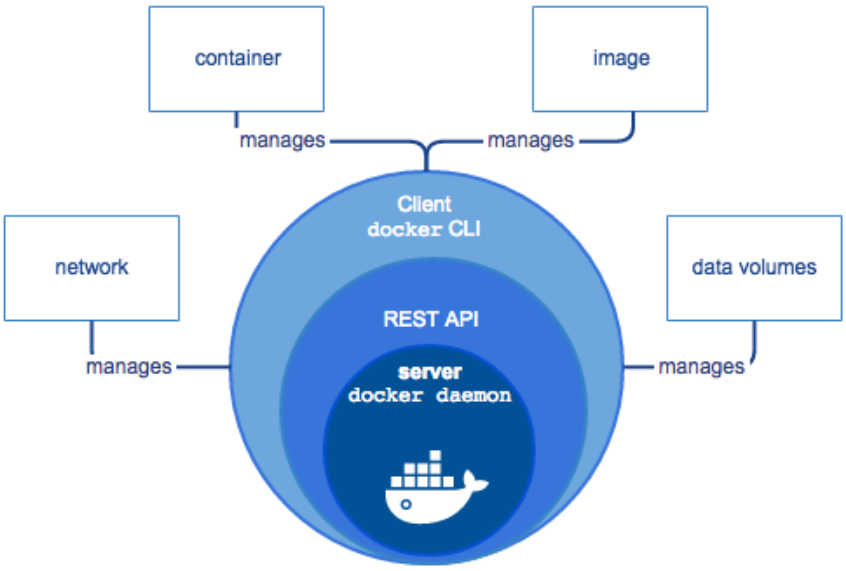
Aim: Implement Docker Containers.

Theory:

A container is a standard unit of software that packages up code and all its dependencies so the application runs quickly and reliably from one computing environment to another. Docker is an open platform for developing, shipping, and running applications. With Docker, you can separate your applications from your infrastructure and treat your infrastructure like a managed application. Docker helps you ship code faster, test faster, deploy faster, and shorten the cycle between writing code and running code.

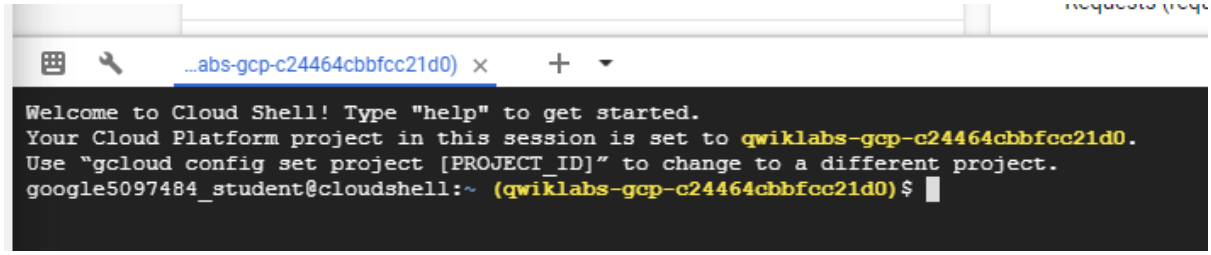
Docker does this by combining kernel containerization features with workflows and tooling that helps you manage and deploy your applications.

Docker containers can be directly used in Kubernetes, which allows them to be run in the Kubernetes Engine with ease. After learning the essentials of Docker, you will have the skillset to start developing Kubernetes and containerized applications.



Output:

Activate Google cloud Shell:




```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ gcloud auth list
          Credentialed Accounts
ACTIVE  ACCOUNT
*       google5097484_student@qwiklabs.net

To set the active account, run:
    $ gcloud config set account `ACCOUNT`

google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ gcloud config list project
[core]
project = qwiklabs-gcp-c24464cbbfcc21d0

Your active configuration is: [cloudshell-7655]
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$
```

Hello World:

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
1b930d010525: Pull complete
Digest: sha256:451ce787d12369c5df2a32c85e5a03d52cbcef6eb3586dd03075f3034f10adcd
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://hub.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/get-started/

google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS                      PORTS               NAMES
d0c90cfdf42e        hello-world         "/hello"            38 seconds ago      Exited (0) 37 seconds ago                       kind_colden
db4d90572fbd        hello-world         "/hello"            2 minutes ago       Exited (0) 2 minutes ago                        heuristic_wilbur
```

Build:

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ cd test
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ cat > Dockerfile <<EOF
> # Use an official Node runtime as the parent image
> FROM node:6
>
> # Set the working directory in the container to /app
> WORKDIR /app
>
> # Copy the current directory contents into the container at /app
> ADD . /app
>
> # Make the container's port 80 available to the outside world
> EXPOSE 80
>
> # Run app.js using node when the container launches
> CMD ["node", "app.js"]
> EOF
ell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$
1&project=qwiklabs-gcp-c24464cbbfcc21d0
```

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ cat > app.js <<EOF
> const http = require('http');
>
> const hostname = '0.0.0.0';
> const port = 80;
>
> const server = http.createServer((req, res) => {
>     res.statusCode = 200;
>       res.setHeader('Content-Type', 'text/plain');
>         res.end('Hello World\n');
> });
>
> server.listen(port, hostname, () => {
>     console.log('Server running at http://%s:%s/', hostname, port);
> });
>
> process.on('SIGINT', function() {
>     console.log('Caught interrupt signal and will exit');
>     process.exit();
> });
> EOF
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ ls
app.js  Dockerfile
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker build -t node-app:0.1 .
Sending build context to Docker daemon  3.072kB
Step 1/5 : FROM node:6
6: Pulling from library/node
c5e155d5a1d1: Pull complete
221d80d00ae9: Pull complete
4250b3117dca: Pull complete
3b7ca19181b2: Pull complete
425d7b2a5bcc: Pull complete
69df12c70287: Pull complete
ea2f5386a42d: Pull complete
d421d2b3c5eb: Pull complete
Digest: sha256:e133e66ec3bfc98da0440e552f452e5cdf6413319d27a2db3b01ac4b319759b3
Status: Downloaded newer image for node:6
 ---> ab290b853066
Step 2/5 : WORKDIR /app
 ---> Running in bfe326268bb1
Removing intermediate container bfe326268bb1
 ---> 9bab801d8f08
Step 3/5 : ADD . /app
 ---> b8ba777cab70
Step 4/5 : EXPOSE 80
 ---> Running in 59def6efb0d6
Removing intermediate container 59def6efb0d6
 ---> e7e9ef32ba18
Step 5/5 : CMD ["node", "app.js"]
 ---> Running in 08bfd1561286
Removing intermediate container 08bfd1561286
 ---> 7248591da1c6
Successfully built 7248591da1c6
Successfully tagged node-app:0.1
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker images
REPOSITORY          TAG                 IMAGE ID            CREATED              SIZE
node-app            0.1                 7248591da1c6        About a minute ago   884MB
node                6                   ab290b853066        4 months ago         884MB
hello-world         latest              fce289e99eb9        8 months ago         1.84kB
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$
```

Run:

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker run -p 4000:80 --name my-app node-app:0.1
Server running at http://0.0.0.0:80/
```

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ curl http://localhost:4000
Hello World
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker stop my-app && docker rm my-app
my-app
my-app
```

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker stop my-app
my-app
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker rm my-app
my-app
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker run -p 4000:80 --name my-app -d node-app:0.1
a2da5ae29bec518e5e3cc56d5128389ae5a6c6bd26c6494ad41972fd58ff4dc7
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS                    NAMES
a2da5ae29bec        node-app:0.1        "node app.js"       7 seconds ago       Up 5 seconds        0.0.0.0:4000->80/tcp     my-app
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker logs my-app
Server running at http://0.0.0.0:80/
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ nano app.js
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker build -t node-app:0.2 .
Sending build context to Docker daemon  3.072kB
Step 1/5 : FROM node:6
 ---> ab290b853066
Step 2/5 : WORKDIR /app
 ---> Using cache
 ---> 9bab801d8f08
Step 3/5 : ADD . /app
 ---> 8fe0a0d63d85
Step 4/5 : EXPOSE 80
 ---> Running in 5129f0b94dcf
Removing intermediate container 5129f0b94dcf
 ---> 1ab689383b5f
Step 5/5 : CMD ["node", "app.js"]
 ---> Running in 4f3a99896525
Removing intermediate container 4f3a99896525
 ---> 7e077ae1307d
Successfully built 7e077ae1307d
Successfully tagged node-app:0.2
dshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker run -p 8080:80 --name my-app-2 -d node-app:0.2
0ff17e16504f48318920c2129020c983eb19b1b64450be262c3ef5eaed46ded7
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$ docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS                    NAMES
0ff17e16504f        node-app:0.2        "node app.js"       19 seconds ago      Up 18 seconds       0.0.0.0:8080->80/tcp     my-app-2
a2da5ae29bec        node-app:0.1        "node app.js"       5 minutes ago       Up 5 minutes        0.0.0.0:4000->80/tcp     my-app
google5097484_student@cloudshell:~/test (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5235399_student@cloudshell:~/test (qwiklabs-gcp-2d24c29c705685c6)$ curl http://localhost:8080
Welcome to cloud Krupa!!!
google5235399_student@cloudshell:~/test (qwiklabs-gcp-2d24c29c705685c6)$ curl http://localhost:4000
Hello World
google5235399_student@cloudshell:~/test (qwiklabs-gcp-2d24c29c705685c6)$
```

Debug:

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker inspect my-app-2
[
    {
        "Id": "0ff17e16504f48318920c2129020c983eb19b1b64450be262c3ef5eaed46ded7",
        "Created": "2019-09-10T09:51:19.860161457Z",
        "Path": "node",
        "Args": [
            "app.js"
        ],
        "State": {
            "Status": "running",
            "Running": true,
            "Paused": false,
            "Restarting": false,
            "OOMKilled": false,
            "Dead": false,
            "Pid": 1737,
            "ExitCode": 0,
            "Error": "",
            "StartedAt": "2019-09-10T09:51:20.452314609Z",
            "FinishedAt": "0001-01-01T00:00:00Z"
        },
        "Image": "sha256:7e077ae1307d6995411f5884a59f4ad6cb4801c7e2b8269e9a82338b9e048b3c",
        "ResolvConfPath": "/var/lib/docker/containers/0ff17e16504f48318920c2129020c983eb19b1b64450
```

Publish:

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ gcloud config list project
[core]
project = qwiklabs-gcp-c24464cbbfcc21d0

Your active configuration is: [cloudshell-12265]
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker tag node-app:0.2 gcr.io/qwiklabs-gcp-c24464cbbfcc21d0/node-app:0.2
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker images
REPOSITORY                                        TAG                 IMAGE ID            CREATED             SIZE
node-app                                          0.2                 7e077ae1307d        14 minutes ago      884MB
gcr.io/qwiklabs-gcp-c24464cbbfcc21d0/node-app     0.2                 7e077ae1307d        14 minutes ago      884MB
node-app                                          0.1                 7248591da1c6        31 minutes ago      884MB
node                                              6                   ab290b853066        4 months ago        884MB
hello-world                                       latest              fce289e99eb9        8 months ago        1.84kB
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker push gcr.io/qwiklabs-gcp-c24464cbbfcc21d0/node-app:0.2
The push refers to repository [gcr.io/qwiklabs-gcp-c24464cbbfcc21d0/node-app]
b88b0548966a: Pushed
e105a01c8b46: Pushed
f39151891503: Pushed
f1965d3c206f: Pushed
a27518e43e49: Pushed
910d7fd9e23e: Pushed
4230ff7f2288: Pushed
2c719774c1e1: Pushed
ec62f19bb3aa: Pushed
f94641f1fe1f: Layer already exists
0.2: digest: sha256:0bd98eb62331baa79cf33419f6a45ff02f2eb2d466e192b3f3de133b10129a74 size: 2422
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$
```

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker pull gcr.io/qwiklabs-gcp-c24464cbbfcc21d0/node-app:0.2
0.2: Pulling from qwiklabs-gcp-c24464cbbfcc21d0/node-app
c5e155d5a1d1: Pull complete
221d80d00ae9: Pull complete
4250b3117dca: Pull complete
425d7b2a5bcc: Downloading [========================>                          ]  108.6MB/215.1MB
69df12c70287: Download complete
ea2f5386a42d: Download complete
d421d2b3c5eb: Download complete
d9171e5f5440: Download complete
5e5a3eaf3bf7: Download complete
```

```
google5097484_student@cloudshell:~ (qwiklabs-gcp-c24464cbbfcc21d0)$ docker push gcr.io/qwiklabs-gcp-c24464cbbfcc21d0/node-app:0.2
The push refers to repository [gcr.io/qwiklabs-gcp-c24464cbbfcc21d0/node-app]
b88b0548966a: Layer already exists
e105a01c8b46: Layer already exists
f39151891503: Layer already exists
f1965d3c206f: Layer already exists
a27518e43e49: Layer already exists
910d7fd9e23e: Layer already exists
4230ff7f2288: Layer already exists
2c719774c1e1: Layer already exists
ec62f19bb3aa: Layer already exists
f94641f1fe1f: Layer already exists
```

```
google5098332_student@cloudshell:~/test (qwiklabs-gcp-2fdb87eeace5287a)$ docker pull gcr.io/qwiklabs-gcp-2fdb87eeace5287a/node-app:0.2
0.2: Pulling from qwiklabs-gcp-2fdb87eeace5287a/node-app
c5e155d5a1d1: Pull complete
221d80d00ae9: Pull complete
4250b3117dca: Pull complete
3b7ca19181b2: Pull complete
425d7b2a5bcc: Pull complete
69df12c70287: Pull complete
ea2f5386a42d: Pull complete
d421d2b3c5eb: Pull complete
22f8f3363cdb: Pull complete
5220a0c4b991: Pull complete
Digest: sha256:b99a11741fbdf3b657e6ddba78a0fc70479d38c17f047b4da6ad7108c2a8f40a
Status: Downloaded newer image for gcr.io/qwiklabs-gcp-2fdb87eeace5287a/node-app:0.2
gcr.io/qwiklabs-gcp-2fdb87eeace5287a/node-app:0.2
google5098332_student@cloudshell:~/test (qwiklabs-gcp-2fdb87eeace5287a)$
```

```
google5098332_student@cloudshell:~/test (qwiklabs-gcp-2fdb87eeace5287a)$ docker run -p 4000:80 -d gcr.io/[project-id]/node-app:0.2
docker: invalid reference format.
See 'docker run --help'.
google5098332_student@cloudshell:~/test (qwiklabs-gcp-2fdb87eeace5287a)$ docker run -p 4000:80 -d gcr.io/qwiklabs-gcp-2fdb87eeace5287a/node-app:0.2
9a7f6bc6b7d8b7bfb6f01483a315436e9ff064f968ffbb52ccf9e8de1dca8780
google5098332_student@cloudshell:~/test (qwiklabs-gcp-2fdb87eeace5287a)$ docker pull gcr.io/qwiklabs-gcp-2fdb87eeace5287a/node-app:0.2curl http://localhost:4000
"docker pull" requires exactly 1 argument.
See 'docker pull --help'.

Usage:  docker pull [OPTIONS] NAME[:TAG|@DIGEST]

Pull an image or a repository from a registry
google5098332_student@cloudshell:~/test (qwiklabs-gcp-2fdb87eeace5287a)$
google5098332_student@cloudshell:~/test (qwiklabs-gcp-2fdb87eeace5287a)$ curl http://localhost:4000
Hello World
google5098332_student@cloudshell:~/test (qwiklabs-gcp-2fdb87eeace5287a)$
```

Conclusion:

We have learned the concept of Docker and implemented on Google Cloud Platform with Qwiklab.