Laboratory 2
MSK docker compose and Hello minikube
Elaborated by María Vázquez

Objective:
Install Docker compose and review how to make a yml file also we need to run our first hello minikube and run different commands.

Introduction:
Minikube is an open source tool that enables you to run Kubernetes on your laptop or other local machine. It can work with Linux, Mac, and Windows operating systems. It runs a single-node cluster inside a virtual machine on your local machine.
Docker is an open platform for developing, shipping, and running applications. Docker enables you to separate your applications from your infrastructure so you can deliver software quickly. With Docker, you can manage your infrastructure in the same ways you manage your applications.

1)We need to check we have Docker engine tool

2) We need to check we have docker-compose install and in the case of not we need to install

```
maria@maria-VirtualBox:~$ docker-compose --version

Command 'docker-compose' not found, but can be installed with:

sudo snap install docker          # version 19.03.11, or
sudo apt  install docker-compose  # version 1.25.0-1

See 'snap info docker' for additional versions.

maria@maria-VirtualBox:~$ sudo apt install docker-compose
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  python3-attr python3-cached-property python3-docker python3-dockerpty
  python3-docopt python3-jsonschema python3-pyrsistent python3-setuptools
  python3-texttable python3-websocket
Suggested packages:
  python-attr-doc python-jsonschema-doc python-setuptools-doc
Recommended packages:
  docker.io
The following NEW packages will be installed:
  docker-compose python3-attr python3-cached-property python3-docker
  python3-dockerpty python3-docopt python3-jsonschema python3-pyrsistent
  python3-setuptools python3-texttable python3-websocket

maria@maria-VirtualBox:~$ docker-compose --version
docker-compose version 1.25.0, build unknown
maria@maria-VirtualBox:~$
```

1) We need to update the system

```
maria@maria-VirtualBox:~$ sudo apt-get install apt-transport-https
Reading package lists... Done
Building dependency tree
Reading state information... Done
apt-transport-https is already the newest version (2.0.2ubuntu0.1).
0 upgraded, 0 newly installed, 0 to remove and 137 not upgraded.
maria@maria-VirtualBox:~$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following package was automatically installed and is no longer required:
  libfprint-2-tod1
Use 'sudo apt autoremove' to remove it.
The following packages will be upgraded:
  accountsservice alsa-ucm-conf apport apport-gtk base-files bind9-dnsutils
  bind9-host bind9-libs bolt bsdutils cheese cheese-common command-not-found
  evolution-data-server evolution-data-server-common fdisk file-roller
  fonts-noto-mono fonts-opensymbol gdb gdbserver gdm3
  gir1.2-accountsservice-1.0 gir1.2-gdm-1.0 gir1.2-mutter-6
  gnome-shell-extension-desktop-icons im-config initramfs-tools
  initramfs-tools-bin initramfs-tools-core language-selector-common
  language-selector-gnome libaccountsservice0 libasound2 libasound2-data
  libatopology2 libblkid1 libc-bin libc6 libc6-dbg libcamel-1.2-62
  libcheese-gtk25 libcheese8 libcryptsetup12 libdns-export1109
  libebackend-1.2-10 libebook-1.2-20 libebook-contacts-1.2-3 libecal-2.0-1
```
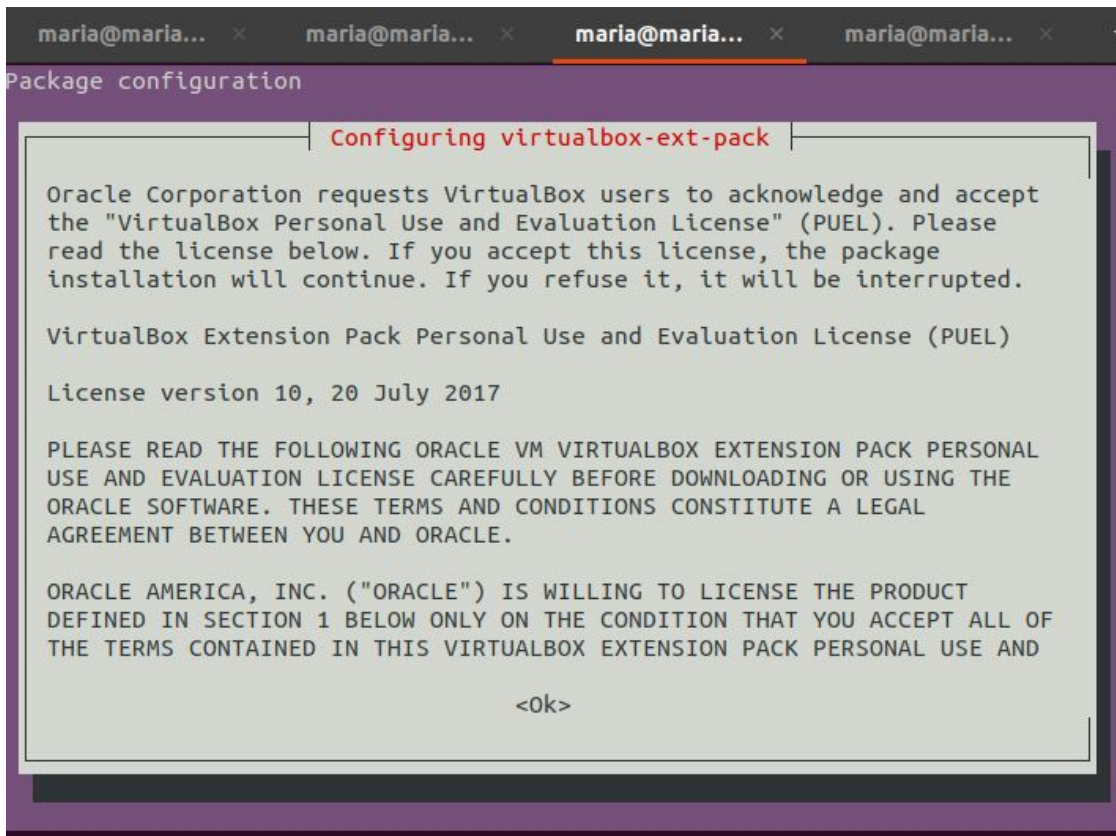
4) Install KVM or VirtualBox Hypervisor

```
maria@maria-VirtualBox:~$ sudo apt install virtualbox virtualbox-ext-pack
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  libfprint-2-tod1
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  binutils binutils-common binutils-x86-64-linux-gnu build-essential dkms
  dpkg-dev fakeroot g++ g++-9 gcc gcc-9 libalgorithm-diff-perl
  libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan5 libatomic1
  libbinutils libc-dev-bin libc6-dev libcrypt-dev libctf-nobfd0 libctf0
  libdouble-conversion3 libfakeroot libgcc-9-dev libgsoap-2.8.91 libitm1
  liblsan0 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5
  libqt5x11extras5 libquadmath0 libsdl1.2debian libstdc++-9-dev libtsan0
  libubsan1 libvncserver1 libxcb-xinerama0 libxcb-xinput0 linux-libc-dev make
  manpages-dev qt5-gtk-platformtheme qttranslations5-l10n virtualbox-dkms
  virtualbox-qt
Suggested packages:
  binutils-doc menu debian-keyring g++-multilib g++-9-multilib gcc-9-doc
  gcc-multilib autoconf automake libtool flex bison gcc-doc gcc-9-multilib
  gcc-9-locales glibc-doc qt5-image-formats-plugins qtwayland5
  libstdc++-9-doc make-doc vde2 virtualbox-guest-additions-iso
The following NEW packages will be installed:
  binutils binutils-common binutils-x86-64-linux-gnu build-essential dkms
  dpkg-dev fakeroot g++ g++-9 gcc gcc-9 libalgorithm-diff-perl
```

```
maria@maria...  ×    maria@maria...  ×    maria@maria...  ×    maria@maria...  ×    ▼
Package configuration
┌─────────────────────┤ Configuring virtualbox-ext-pack ├─────────────────────┐
│                                                                              │
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│                               <Ok>                                           │
│                                                                              │
└──────────────────────────────────────────────────────────────────────────┘
```

Create Docker compose

Prerequisites

We need to make sure we have already installed Docker Engine and Docker Compose.
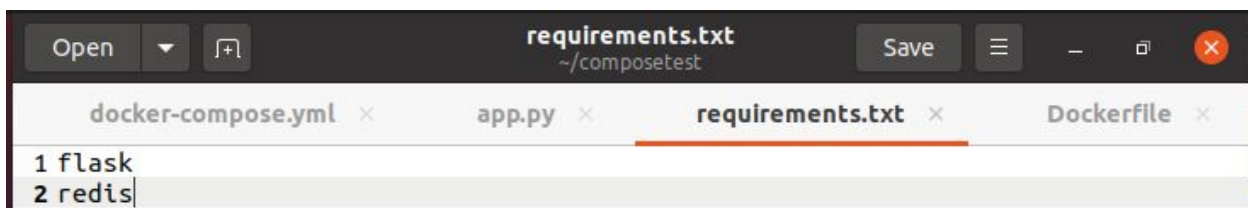
1) Create a directory for the project

```
maria@maria-VirtualBox:~$ mkdir composetest
maria@maria-VirtualBox:~$ cd composetest/
maria@maria-VirtualBox:~/composetest$ gedit app.py
maria@maria-VirtualBox:~/composetest$
```

2)   Create a app.py file

```
Open    ▼    [+]                          app.py                      Save   ≡   _   ▢   ✕
                                        ~/composetest

              app.py                    ×                    app.py                    ×

 1 import time
 2 import redis
 3
 4 from flask import Flask
 5
 6 app = Flask(__name__)
 7 cache = redis.Redis(host ='redis', port=6379)
 8
 9 def get_hit_count():
10         retires = 5
11         while True:
12             try:
13                     return cache.incr('hits')
14                     except redis.exceptions.ConnectionError as exc:
15                         if retires == 0:
16                                 reaise exc
17                         retries -= 1
18                         time.sleep(0.5)
19 @app.route('/')
20 def hello():
21         count = get_hit_count()
22         return 'Hello World! I have beedn seen {} times. \n'.format(count)
```

3) Create file called requirements.txt

```
Open    ▼    [+]                     requirements.txt                 Save   ≡   _   ▢   ✕
                                        ~/composetest

   docker-compose.yml ×     app.py ×     requirements.txt ×      Dockerfile ×

 1 flask
 2 redis
```

4) Create create a file named Dockerfile

```
                app.py          ×              app.py          ×              Dockerfile        ×
1 FROM python:3.7-alpine
2 WORKDIR /code
3 ENV FLASK_APP=app.py
4 ENV FLASK_RUN_HOST=0.0.0.0
5 RUN apk add --no-cache gcc musl-dev linux-headers
6 COPY requirements.txt requirements.txt
7 EXPOSE 5000
8 COPY . .
9 CMD ["flask", "run"]
```
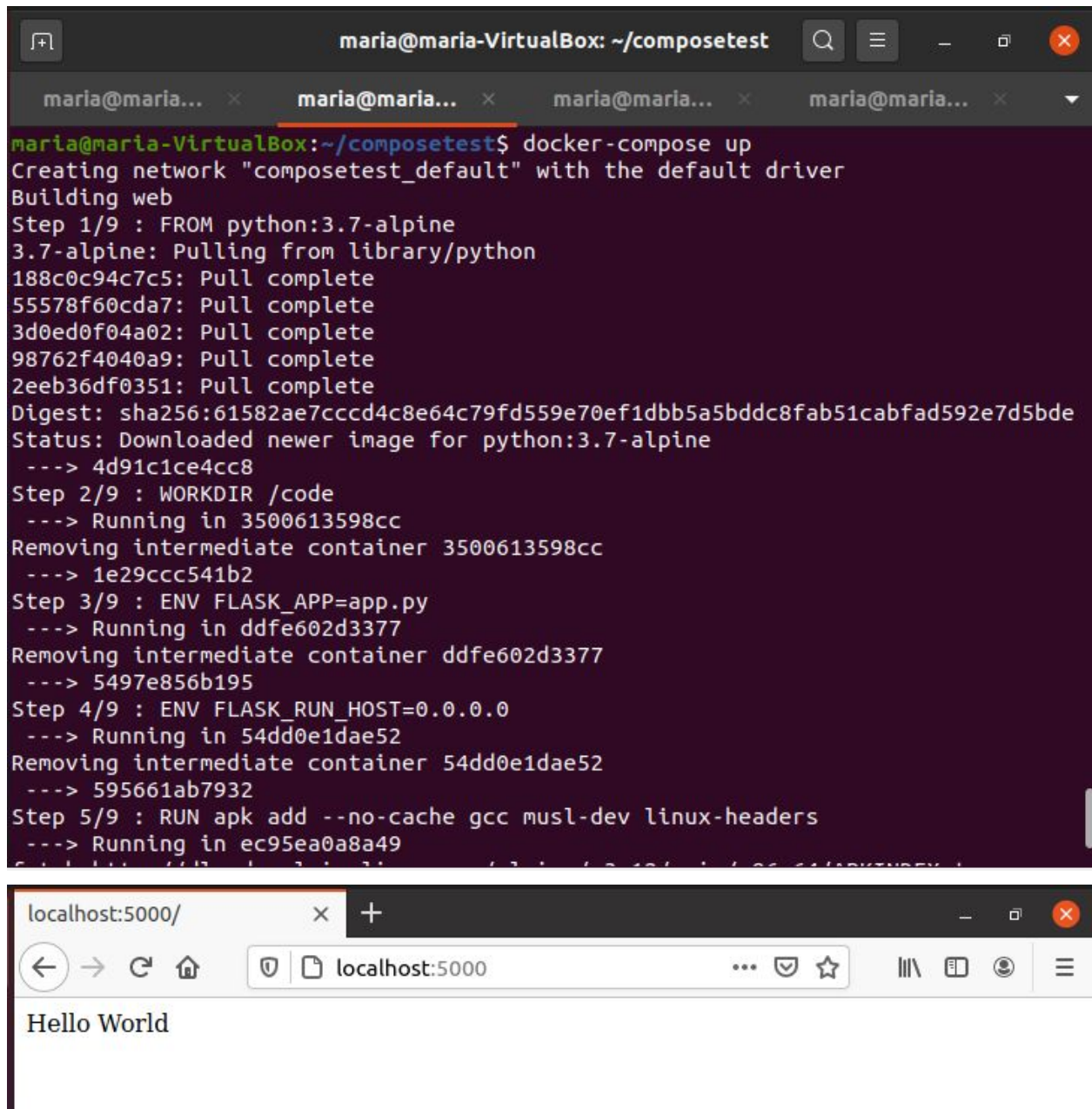
5) Create the file docker-compose.yml

```
 Open    ▼    ⨤              docker-compose.yml           Save    ≡    _    ⬚    ⊗
                               ~/composetest
      docker-compose.yml  ×       app.py  ×      requirements.txt  ×        Dockerfile  ×
1 version: "3.3"
2 services:
3   web:
4     build: .
5     ports:
6       - "5000:5000"
7   redis:
8     image: "redis:alpine"
9
```

6) Run our application with compose

```
maria@maria-VirtualBox:~/composetest$ docker-compose up
Creating network "composetest_default" with the default driver
Building web
Step 1/9 : FROM python:3.7-alpine
3.7-alpine: Pulling from library/python
188c0c94c7c5: Pull complete
55578f60cda7: Pull complete
3d0ed0f04a02: Pull complete
98762f4040a9: Pull complete
2eeb36df0351: Pull complete
Digest: sha256:61582ae7cccd4c8e64c79fd559e70ef1dbb5a5bddc8fab51cabfad592e7d5bde
Status: Downloaded newer image for python:3.7-alpine
 ---> 4d91c1ce4cc8
Step 2/9 : WORKDIR /code
 ---> Running in 3500613598cc
Removing intermediate container 3500613598cc
 ---> 1e29ccc541b2
Step 3/9 : ENV FLASK_APP=app.py
 ---> Running in ddfe602d3377
Removing intermediate container ddfe602d3377
 ---> 5497e856b195
Step 4/9 : ENV FLASK_RUN_HOST=0.0.0.0
 ---> Running in 54dd0e1dae52
Removing intermediate container 54dd0e1dae52
 ---> 595661ab7932
Step 5/9 : RUN apk add --no-cache gcc musl-dev linux-headers
 ---> Running in ec95ea0a8a49
```

localhost:5000/

localhost:5000

Hello World

7) Play with other commands

```
maria@maria-VirtualBox:~/composetest$ docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED
     STATUS              PORTS               NAMES
540816cc7159        redis:alpine        "docker-entrypoint.s…"   2 minutes ago
     Up 2 minutes        6379/tcp            composetest_redis_1
maria@maria-VirtualBox:~/composetest$ docker images
REPOSITORY          TAG                 IMAGE ID            CREATED
 SIZE
composetest_web     latest              31b0e87c73b3        2 minutes ago
 184MB
redis               alpine              c1949ec48c51        5 days ago
 31.2MB
python              3.7-alpine          4d91c1ce4cc8        10 days ago
 41.1MB
maria@maria-VirtualBox:~/composetest$ ▮
```

Hello Minikube

1) Download minikube

```
maria@maria-VirtualBox:~$ wget https://storage.googleapis.com/minikube/releases
/latest/minikube-linux-amd64
--2020-10-26 20:14:00--  https://storage.googleapis.com/minikube/releases/lates
t/minikube-linux-amd64
Resolving storage.googleapis.com (storage.googleapis.com)... 172.217.17.48, 216
.58.208.112, 172.217.168.240, ...
Connecting to storage.googleapis.com (storage.googleapis.com)|172.217.17.48|:44
3... connected.
HTTP request sent, awaiting response... 200 OK
Length: 55969072 (53M) [application/octet-stream]
Saving to: 'minikube-linux-amd64'

minikube-linux-amd6 100%[===================>]  53,38M  8,49MB/s    in 6,4s

2020-10-26 20:14:07 (8,32 MB/s) - 'minikube-linux-amd64' saved [55969072/559690
72]

maria@maria-VirtualBox:~$ ▮
```

```
maria@maria-VirtualBox:~$ chmod +x minikube-linux-amd64
maria@maria-VirtualBox:~$ ls -l
total 54736
-rwxrwxrwx 1 maria maria        168 paź 24 08:59 app.py
drwxr-xr-x 2 maria maria       4096 paź 21 23:46 Desktop
-rw-rw-r-- 1 maria maria        192 paź 23 17:39 Dockerfile
drwxr-xr-x 2 maria maria       4096 paź 21 23:46 Documents
drwxr-xr-x 2 maria maria       4096 paź 21 23:46 Downloads
-rw-rw-r-- 1 maria maria      13857 paź 26 15:31 get-docker.sh
-rw-rw-r-- 1 maria maria        143 paź 23 23:19 hello.py
-rw-rw-r-- 1 maria maria        362 paź 23 23:00 layout.html
-rw-rw-r-- 1 maria docker        214 paź 26 16:06 minikube-latest.x86_64.rpm
-rwxrwxr-x 1 maria docker   55969072 paź 24 02:02 minikube-linux-amd64
-rw-rw-r-- 1 maria docker        208 paź 26 16:00 minikube_linux_amd64
drwxr-xr-x 2 maria maria       4096 paź 21 23:46 Music
drwxr-xr-x 2 maria maria       4096 paź 21 23:46 Pictures
drwxr-xr-x 2 maria maria       4096 paź 21 23:46 Public
drwxr-xr-x 2 maria maria       4096 paź 21 23:46 Templates
-rw-rw-r-- 1 maria maria        277 paź 23 22:56 test.html
drwxr-xr-x 2 maria maria       4096 paź 21 23:46 Videos
```

```
maria@maria-VirtualBox:~$ sudo mv minikube-linux-amd64
[sudo] password for maria:
maria@maria-VirtualBox:~$ ls
app.py       Downloads       minikube-latest.x86_64.rpm   Pictures    Videos
Desktop      get-docker.sh   minikube-linux-amd64         Public
Dockerfile   hello.py        minikube_linux_amd64         Templates
Documents    layout.html     Music                        test.html
maria@maria-VirtualBox:~$ sudo mv minikube-linux-amd64 /usr/local/bin/minikube
[sudo] password for maria:
maria@maria-VirtualBox:~$ ls
app.py       Downloads       minikube-latest.x86_64.rpm   Public
Desktop      get-docker.sh   minikube_linux_amd64         Templates
Dockerfile   hello.py        Music                        test.html
Documents    layout.html     Pictures                     Videos
maria@maria-VirtualBox:~$ ls -l /usr/local/bin/minikube
-rwxrwxr-x 1 maria docker 55969072 paź 24 02:02 /usr/local/bin/minikube
maria@maria-VirtualBox:~$
```

2) Confirm version installed

```
maria@maria-VirtualBox:~$ minikube version
minikube version: v1.14.1
commit: b0389943568c59c1d5a35f739c02f5127eee6e56
maria@maria-VirtualBox:~$
```

3) Install kubectl on Ubuntu

```
maria@maria-VirtualBox:~$ curl -LO https://storage.googleapis.com/kubernetes-re
lease/release/`curl -s https://storage.googleapis.com/kubernetes-release/releas
e/stable.txt` /bin/linux/amd64/kubectl
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   196  100   196    0     0    560      0 --:--:-- --:--:-- --:--:--   558
curl: (3) URL using bad/illegal format or missing URL
```

4) Review the Kubectl version

```
maria@maria-VirtualBox:~$ sudo snap install kubectl --classic
kubectl 1.19.3 from Canonical✓ installed
maria@maria-VirtualBox:~$
```

5) Run the minikube start

```
maria@maria-VirtualBox:~$ minikube start --extra-config=kubeadm.ignore-prefligh
t-errors=NumCPU --force --cpus 1
😄  minikube v1.14.1 on Ubuntu 20.04
❗  minikube skips various validations when --force is supplied; this may lead
to unexpected behavior
✨  Automatically selected the docker driver

⛔  Requested cpu count 1 is less than the minimum allowed of 2


⛔   has less than 2 CPUs available, but Kubernetes requires at least 2 to be a
vailable

👍  Starting control plane node minikube in cluster minikube
🚜  Pulling base image ...
💾  Downloading Kubernetes v1.19.2 preload ...
    > preloaded-images-k8s-v6-v1.19.2-docker-overlay2-amd64.tar.lz4: 486.33 MiB
🔥  Creating docker container (CPUs=1, Memory=2200MB) ...
🐳  Preparing Kubernetes v1.19.2 on Docker 19.03.8 ...
    ▪ kubeadm.ignore-preflight-errors=NumCPU
```
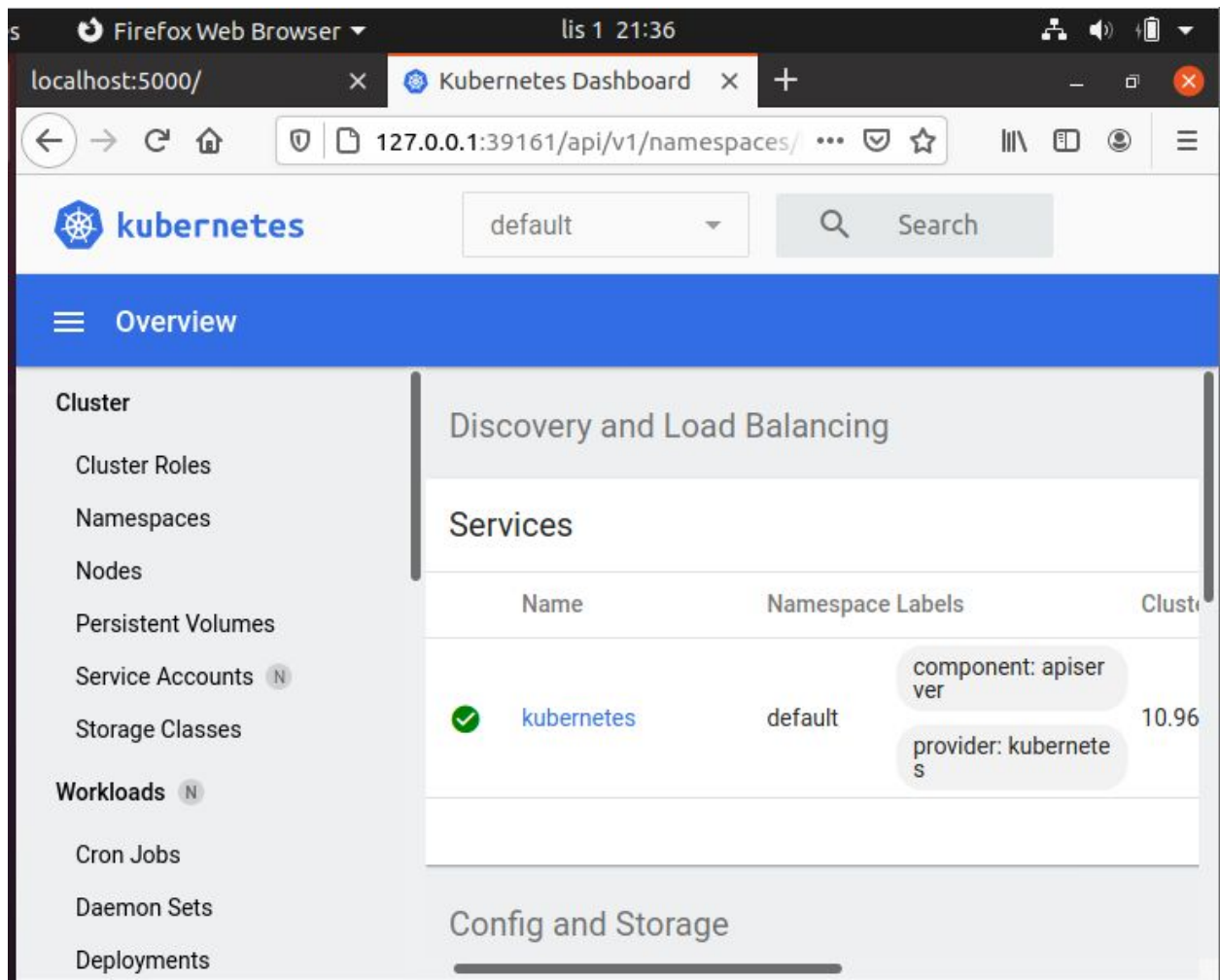
6) Run minikube dashboard

```
maria@maria-VirtualBox:~$ minikube dashboard
🔌  Enabling dashboard ...
🤔  Verifying dashboard health ...
🚀  Launching proxy ...
🤔  Verifying proxy health ...
🤔  Opening http://127.0.0.1:39161/api/v1/namespaces/kubernetes-dashboard/servi
ces/http:kubernetes-dashboard:/proxy/ in your default browser...
```

7) Run the command kubectl create

```
maria@maria-VirtualBox:~$ kubectl create deployment hello-node --image=k8s.gcr.
io/echoserver:1.4
deployment.apps/hello-node created
```

8) View the deployment

```
maria@maria-VirtualBox:~$ kubectl get deployments
NAME         READY   UP-TO-DATE   AVAILABLE   AGE
hello-node   1/1     1            1           57s
```

9) View the pod

```
maria@maria-VirtualBox:~$ kubectl get pods
NAME                          READY   STATUS    RESTARTS   AGE
hello-node-7567d9fdc9-tjd7j   1/1     Running   0          112s
```

10) View the cluster events

```
maria@maria-VirtualBox:~$ kubectl get events
LAST SEEN    TYPE      REASON                    OBJECT
    MESSAGE
2m42s        Normal    Scheduled                 pod/hello-node-7567d9fdc9-tjd7j
    Successfully assigned default/hello-node-7567d9fdc9-tjd7j to minikube
2m42s        Normal    Pulling                   pod/hello-node-7567d9fdc9-tjd7j
    Pulling image "k8s.gcr.io/echoserver:1.4"
2m27s        Normal    Pulled                    pod/hello-node-7567d9fdc9-tjd7j
    Successfully pulled image "k8s.gcr.io/echoserver:1.4" in 14.526405909s
2m27s        Normal    Created                   pod/hello-node-7567d9fdc9-tjd7j
    Created container echoserver
2m26s        Normal    Started                   pod/hello-node-7567d9fdc9-tjd7j
    Started container echoserver
2m43s        Normal    SuccessfulCreate          replicaset/hello-node-7567d9fdc
9   Created pod: hello-node-7567d9fdc9-tjd7j
2m43s        Normal    ScalingReplicaSet         deployment/hello-node
    Scaled up replica set hello-node-7567d9fdc9 to 1
8m28s        Normal    NodeHasSufficientMemory   node/minikube
    Node minikube status is now: NodeHasSufficientMemory
8m28s        Normal    NodeHasNoDiskPressure     node/minikube
    Node minikube status is now: NodeHasNoDiskPressure
8m29s        Normal    NodeHasSufficientPID      node/minikube
    Node minikube status is now: NodeHasSufficientPID
8m8s         Normal    RegisteredNode            node/minikube
    Node minikube event: Registered Node minikube in Controller
```

11)View the kubectl config view

```
maria@maria-VirtualBox:~$ kubectl config view
apiVersion: v1
clusters:
- cluster:
    certificate-authority: /home/maria/.minikube/ca.crt
    server: https://192.168.49.2:8443
  name: minikube
contexts:
- context:
    cluster: minikube
    user: minikube
  name: minikube
current-context: minikube
kind: Config
preferences: {}
users:
- name: minikube
  user:
    client-certificate: /home/maria/.minikube/profiles/minikube/client.crt
    client-key: /home/maria/.minikube/profiles/minikube/client.key
```

12)Create a service

```
maria@maria-VirtualBox:~$ kubectl expose deployment hello-node --type=LoadBalan
cer --port=8080
service/hello-node exposed
```

13) Review the service we create

```
maria@maria-VirtualBox:~$ kubectl get services
NAME         TYPE           CLUSTER-IP      EXTERNAL-IP    PORT(S)          AGE
hello-node   LoadBalancer   10.107.31.192   <pending>      8080:31550/TCP   48s
kubernetes   ClusterIP      10.96.0.1       <none>         443/TCP          11m
```

14) Run the command minikube service hello-node

```
maria@maria-VirtualBox:~$ minikube service hello-node
|-----------|------------|-------------|------------------------------|
| NAMESPACE |    NAME    | TARGET PORT |             URL              |
|-----------|------------|-------------|------------------------------|
| default   | hello-node |        8080  | http://192.168.49.2:31550    |
|-----------|------------|-------------|------------------------------|
🎉  Opening service default/hello-node in default browser...
maria@maria-VirtualBox:~$
```

localhost:5000/   Kubernetes Da   Hello Minikube   192.168.49.2:3 ✕   +

← → C ⌂   🛇 ✎ 192.168.49.2:31550   ··· ☑ ☆   ∥\ ▣ ◉

```
CLIENT VALUES:
client_address=172.17.0.1
command=GET
real path=/
query=nil
request_version=1.1
request_uri=http://192.168.49.2:8080/

SERVER VALUES:
server_version=nginx: 1.10.0 - lua: 10001

HEADERS RECEIVED:
accept=text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
accept-encoding=gzip, deflate
accept-language=en-US,en;q=0.5
connection=keep-alive
host=192.168.49.2:31550
upgrade-insecure-requests=1
user-agent=Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:82.0) Gecko/20100101 Firefox/82.0
BODY:
-no body in request-
```

15) Enable addons

```
maria@maria-VirtualBox:~$ minikube addons list
|-----------------------------|-----------|------------|
|          ADDON NAME         |  PROFILE  |   STATUS   |
|-----------------------------|-----------|------------|
| ambassador                  | minikube  | disabled   |
| csi-hostpath-driver         | minikube  | disabled   |
| dashboard                   | minikube  | enabled ✅ |
| default-storageclass        | minikube  | enabled ✅ |
| efk                         | minikube  | disabled   |
| freshpod                    | minikube  | disabled   |
| gcp-auth                    | minikube  | disabled   |
| gvisor                      | minikube  | disabled   |
| helm-tiller                 | minikube  | disabled   |
| ingress                     | minikube  | disabled   |
| ingress-dns                 | minikube  | disabled   |
| istio                       | minikube  | disabled   |
| istio-provisioner           | minikube  | disabled   |
| kubevirt                    | minikube  | disabled   |
| logviewer                   | minikube  | disabled   |
| metallb                     | minikube  | disabled   |
| metrics-server              | minikube  | disabled   |
| nvidia-driver-installer     | minikube  | disabled   |
| nvidia-gpu-device-plugin    | minikube  | disabled   |
| olm                         | minikube  | disabled   |
| pod-security-policy         | minikube  | disabled   |
| registry                    | minikube  | disabled   |
| registry-aliases            | minikube  | disabled   |
```

17) Enable metrics


```
maria@maria-VirtualBox:~$ minikube addons enable metrics-server
🌟  The 'metrics-server' addon is enabled
```

18) View the pod we created

```
maria@maria-VirtualBox:~$ kubectl get pod,svc -n kube-system
NAME                                        READY   STATUS    RESTARTS   AGE
pod/coredns-f9fd979d6-xq9xt                 1/1     Running   0          16m
pod/etcd-minikube                          1/1     Running   0          16m
p     be-apiserver-minikube                1/1     Running   0          16m
p Help be-controller-manager-minikube      1/1     Running   0          16m
pod/kube-proxy-c6k22                       1/1     Running   0          16m
pod/kube-scheduler-minikube                1/1     Running   0          16m
pod/metrics-server-d9b576748-x4fhm         1/1     Running   0          49s
pod/storage-provisioner                    1/1     Running   0          16m

NAME                    TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)
             AGE
service/kube-dns        ClusterIP   10.96.0.10       <none>        53/UDP,53/T
CP,9153/TCP    16m
service/metrics-server  ClusterIP   10.100.254.163   <none>        443/TCP
             49s
```

Conclusion:

This laboratory allowed me to better understand the working of kubernetes and run
some pods, and also review important aspects about how to make minikube run
applications and make docker compose. The objectives of the laboratory are
satisfactory because I deployed my hello kubernetes into the minikube and run different
commands related.