

**TO
THE
NEW™**



Assessment -14

DOCKER

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College: UPES

1. Set the base image to Ubuntu

- Add File Author / Maintainer
- Install Nginx
- Install necessary tools: vim wget curl net-tools
- Remove the default Nginx configuration file
- Copy a configuration file from the current directory
- Expose ports (80)
- Set the default command to execute Nginx when creating a new container

```
Activities Terminal Mon 15:41
Terminal
File Edit View Search Terminal Help
FROM ubuntu:latest
LABEL maintainer="Nginx Docker Maintainer <arun.parmar@tothenew.com>"
RUN apt-get update
RUN apt-get install nginx -y
RUN apt-get install vim -y
RUN apt-get install wget -y
RUN apt-get install curl -y
RUN apt-get install net-tools -y
RUN rm /etc/nginx/sites-enabled/default
COPY default /etc/nginx/sites-enabled
RUN cd /etc/nginx/sites-enabled
RUN ln -s /etc/nginx/sites-available/default
CMD ["nginx", "-g", "daemon off;"]
EXPOSE 80

"Dockerfile" 14L, 453C 2,69 All
```

```
Activities Terminal Mon 15:42
Terminal
File Edit View Search Terminal Help
arun@Arun-Parmar:exercise $ sudo vi Dockerfile
arun@Arun-Parmar:exercise $ sudo docker build -t docker .
Sending build context to Docker daemon 2.048kB
Step 1/14 : FROM ubuntu:latest
----> 72300a873c2c
Step 2/14 : LABEL maintainer="Nginx Docker Maintainer <arun.parmar@tothenew.com>"
----> Running in 86e79f77392d
Removing intermediate container 86e79f77392d
----> d8997e184409
Step 3/14 : RUN apt-get update
----> Running in e841be17a2ae
Get:1 http://archive.ubuntu.com/ubuntu bionic InRelease [242 kB]
Get:2 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:4 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [31.0 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic/restricted amd64 Packages [13.5 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [11.3 MB]
Get:8 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [836 kB]
Get:9 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [824 kB]
Get:10 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 Packages [7641 B]
Get:11 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [186 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic/main amd64 Packages [1344 kB]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [1351 kB]
Get:14 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [44.7 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [1128 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [11.7 kB]
Get:17 http://archive.ubuntu.com/ubuntu bionic-backports/main amd64 Packages [2496 B]
Get:18 http://archive.ubuntu.com/ubuntu bionic-backports/universe amd64 Packages [4247 B]
Fetched 17.6 MB in 27s (655 kB/s)
Reading package lists...
Removing intermediate container e841be17a2ae
----> a8789a54804f
Step 4/14 : RUN apt-get install nginx -y
----> Running in d84f24d972ea
Reading package lists...
Building dependency tree...
Reading state information...
```

```
Activities  Terminal  Mon 15:47
Terminal
File Edit View Search Terminal Help
----> Using cache
----> a06846e80459
Step 5/14 : RUN apt-get install vim -y
----> Using cache
----> 4cfa1af87d6b
Step 6/14 : RUN apt-get install wget -y
----> Using cache
----> bdab097da9a8
Step 7/14 : RUN apt-get install curl -y
----> Using cache
----> 9ccae22c6a0
Step 8/14 : RUN apt-get install net-tools -y
----> Using cache
----> bf2c428fb19c
Step 9/14 : RUN rm /etc/nginx/sites-enabled/default
----> Using cache
----> 7f203b3b1bd
Step 10/14 : COPY arun.com /etc/nginx/sites-enabled/default
----> c809aa09ff84
Step 11/14 : RUN cd /etc/nginx/sites-enabled
----> Running in 8126f95d35ff
Removing intermediate container 8126f95d35ff
----> 59b3002605d6
Step 12/14 : RUN ln -s /etc/nginx/sites-available/default
----> Running in 6cdf6fa6a58
Removing intermediate container 6cdf6fa6a58
----> e27c5257b22b
Step 13/14 : CMD ["nginx", "-g", "daemon off;"]
----> Running in f2b2b512f0a7
Removing intermediate container f2b2b512f0a7
----> dbf6709f6d60
Step 14/14 : EXPOSE 80
----> Running in a7053d028519
Removing intermediate container a7053d028519
----> fc43bebe64be
Successfully built fc43bebe64be
Successfully tagged docker:latest
arun@Arun-Parmar:exercise $
```

```
Activities Terminal Mon 15:52
Terminal
File Edit View Search Terminal Help
---> Running in f2b2b512f0a7
Removing intermediate container f2b2b512f0a7
---> dbf6709f6d60
Step 14/14 : EXPOSE 80
---> Running in a7053d028519
Removing intermediate container a7053d028519
---> fc43bebe64be
Successfully built fc43bebe64be
Successfully tagged docker:latest
arun@Arun-Parmar:exercise $ sudo docker run .
docker: invalid reference format.
See 'docker run --help'.
arun@Arun-Parmar:exercise $ sudo docker run docker
^Carun@Arun-Parmar:exercise $ sudo docker run Dockerfile
docker: invalid reference format: repository name must be lowercase.
See 'docker run --help'.
arun@Arun-Parmar:exercise $ sudo docker im
image images import
arun@Arun-Parmar:exercise $ sudo docker images
table
  REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
  docker        latest    fc43bebe64be   About a minute ago  221MB
  ubuntu        latest    72300a873c2c   9 days ago     64.2MB
arun@Arun-Parmar:exercise $ sudo docker run -itd --name nginx fc43bebe64be
26906e476e03a7693698e9d69c189c0c15f83135b22e2583912748486cc4c7fe
arun@Arun-Parmar:exercise $ sudo docker inspect
"docker inspect" requires at least 1 argument.
See 'docker inspect --help'.

Usage:  docker inspect [OPTIONS] NAME|ID [NAME|ID...]

Return low-level information on Docker objects
arun@Arun-Parmar:exercise $ sudo docker inspect fc43bebe64be
[
  {
    "Id": "sha256:fc43bebe64be0b0e48e67f23ee92cf5d270d5f6e62d8aa537d7d8435fd73a04b",
    "RepoTags": [
      "docker:latest"
    ]
  }
]
```

```
Activities Terminal Mon 15:57
root@26906e476e03: /
File Edit View Search Terminal Help
"Metadata": {
  "LastTagTime": "2020-03-02T15:47:35.608508218+05:30"
}
]
arun@Arun-Parmar:exercise $ sudo docker inspect fc43bebe64be | grep ip
arun@Arun-Parmar:exercise $ sudo docker exec -it nginx bash
root@26906e476e03:/# ipconfig
bash: ipconfig: command not found
root@26906e476e03:/# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.17.0.2 netmask 255.255.0.0 broadcast 172.17.255.255
    ether 02:42:ac:11:00:02 txqueuelen 0 (Ethernet)
    RX packets 32 bytes 3692 (3.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    loop txqueuelen 1000 (Local Loopback)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@26906e476e03:/# ^C
root@26906e476e03:/# exit
exit
arun@Arun-Parmar:exercise $ curl 172.17.0.2
<html>
<head><title>502 Bad Gateway</title></head>
<body bgcolor="white">
<center><h1>502 Bad Gateway</h1></center>
<hr><center>nginx/1.14.0 (Ubuntu)</center>
</body>
</html>
arun@Arun-Parmar:exercise $
```

2. What is the difference between 'RUN', 'CMD', & 'ENTRYPOINT' in dockerfile?

RUN executes the command(s) that you give in a new layer and creates a new image. This is mainly used for installing a new package.

CMD is the default command to be run by the entrypoint. It sets default command and/or parameters, however, we can overwrite those commands or pass in and bypass the default parameters from the command line when docker runs

ENTRYPOINT is the program to run the given command. It is used when you want to run a container as an executable.

3. How to connect docker client to docker daemon running on other host?

1. Launch an ubuntu instance
2. ssh into the instance and install docker
3. Create a directory to store the configuration file: `sudo mkdir -p /etc/systemd/system/docker.service.d`
4. Now create a new file to store daemon options: `sudo vim /etc/systemd/system/docker.service.d/options.conf`
5. Now paste the following configuration ,save and exit:
[Service]
ExecStart=
ExecStart=/usr/bin/dockerd -H unix:// -H tcp://0.0.0.0:2375
6. Now reload the docker daemon: `sudo systemctl daemon-reload`
7. Now restart docker: `sudo systemctl restart docker`
8. Now open the port 2375 in the security group of the instance and allow the same port in ufw firewall also. Once done execute the following command from the localhost.
`DOCKER_HOST=tcp://(public ip of instance):2375 docker info.`
This will list the docker daemon information of the remote instances.

```
Activities Terminal Tue 15:33
Terminal
File Edit View Search Terminal Tabs Help
ubuntu@ip-172-31-33-248: ~

Server:
ERROR: Cannot connect to the Docker daemon at tcp://54.173.180.48:2375. Is the docker daemon running?
errors pretty printing info
arun@Arun-Parnar:~$ DOCKER_HOST=tcp://54.173.180.48:2375 docker info
Client:
  Debug Mode: false

Server:
  Containers: 0
  Running: 0
  Paused: 0
  Stopped: 0
  Images: 0
  Server Version: 18.09.7
  Storage Driver: overlay2
  Backing Filesystem: extfs
  Supports d_type: true
  Native Overlay Diff: true
  Logging Driver: json-file
  Cgroup Driver: cgroupfs
  Plugins:
    Volume: local
    Network: bridge host macvlan null overlay
    Log: awslogs fluentd gcplogs gelf journald json-file local logentries splunk syslog
  Swarm: inactive
  Runtimes: runc
  Default Runtime: runc
  Init Binary: docker-init
  containerd version:
  runc version: N/A
  init version: v0.18.0 (expected: fec3683b971d9c3ef73f284f176672c44b448662)
  Security Options:
    apparmor
    seccomp
  Profile: default
  Kernel Version: 4.15.0-1057-aws
```

```
Activities Terminal Tue 15:38
Terminal
File Edit View Search Terminal Tabs Help
ubuntu@ip-172-31-33-248: ~

Use "aws-iam-authenticator [command] --help" for more information about a command.
arun@Arun-Parnar:~$ kubectl version --short --client
Client Version: v1.14.7-eks-1861c5
arun@Arun-Parnar:~$ sudo ssh -i /home/arun/Downloads/'ttnaccount.pem' ubuntu@54.173.180.48
[sudo] password for arun:
The authenticity of host '54.173.180.48 (54.173.180.48)' can't be established.
ECDSA key fingerprint is SHA256:aMEqoFF/25uHFK7VKLGUFHult6Pz5S02uxSEelJnEY0.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '54.173.180.48' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 18.04.3 LTS (GNU/Linux 4.15.0-1057-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Tue Mar  3 09:45:15 UTC 2020

System load:  0.34           Processes:      89
Usage of /:   13.6% of 7.69GB Users logged in:  0
Memory usage: 14%          IP address for eth0: 172.31.33.248
Swap usage:   0%

0 packages can be updated.
0 updates are security updates.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```



```
Activities Terminal Tue 15:38
ubuntu@ip-172-31-33-248: ~

Get:28 http://security.ubuntu.com/ubuntu bionic-security/multiverse Translation-en [2700 B]
Fetched 18.4 MB in 4s (4771 kB/s)
Reading package lists... Done
ubuntu@ip-172-31-33-248:~$ sudo apt-get install docker.io
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  bridge-utils cgroupfs-mount containerd pigz runc ubuntu-fan
Suggested packages:
  ifupdown aufs-tools debootstrap docker-doc rinse zfs-fuse | zfsutils
The following NEW packages will be installed:
  bridge-utils cgroupfs-mount containerd docker.io pigz runc ubuntu-fan
0 upgraded, 7 newly installed, 0 to remove and 53 not upgraded.
Need to get 54.4 MB of archives.
After this operation, 275 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic/universe amd64 pigz amd64 2.4-1 [57.4 kB]
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic/main amd64 bridge-utils amd64 1.5-15ubuntu1 [30.1 kB]
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic/universe amd64 cgroupfs-mount all 1.4 [6320 B]
Get:4 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic-updates/universe amd64 runc amd64 1.0.0-rc7+git20190403.029124da-0ubuntu1-18.04.2 [1903 kB]
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic-updates/universe amd64 containerd amd64 1.3.3-0ubuntu1-18.04.1 [21.7 MB]
Get:6 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic-updates/universe amd64 docker.io amd64 18.09.7-0ubuntu1-18.04.4 [30.7 MB]
Get:7 http://us-east-1.ec2.archive.ubuntu.com/ubuntu bionic/main amd64 ubuntu-fan all 0.12.10 [34.7 kB]
Fetched 54.4 MB in 1s (60.4 MB/s)
Preconfiguring packages ...
Selecting previously unselected package pigz.
(Reading database ... 56554 files and directories currently installed.)
Preparing to unpack .../0-pigz_2.4-1_amd64.deb ...
Unpacking pigz (2.4-1) ...
Selecting previously unselected package bridge-utils.
Preparing to unpack .../1-bridge-utils_1.5-15ubuntu1_amd64.deb ...
Unpacking bridge-utils (1.5-15ubuntu1) ...
Selecting previously unselected package cgroupfs-mount.
Preparing to unpack .../2-cgroupfs-mount_1.4_all.deb ...
Unpacking cgroupfs-mount (1.4) ...
```

```
Activities Terminal Tue 15:39
ubuntu@ip-172-31-33-248: ~

Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /lib/systemd/system/docker.socket.
Processing triggers for systemd (237-3ubuntu10.33) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ureadahead (0.100.0-21) ...
ubuntu@ip-172-31-33-248:~$ sudo mkdir -p /etc/systemd/system/docker.service.d
ubuntu@ip-172-31-33-248:~$ sudo vim /etc/systemd/system/docker.service.d/options.conf
ubuntu@ip-172-31-33-248:~$ sudo systemctl daemon-reload
ubuntu@ip-172-31-33-248:~$ sudo systemctl restart docker
ubuntu@ip-172-31-33-248:~$ sudo systemctl daemon-reload
ubuntu@ip-172-31-33-248:~$ sudo systemctl restart docker
ubuntu@ip-172-31-33-248:~$ docker ps
Got permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get http://%2Fvar%2Frun%2Fdocker.sock/k/v1.39/containers/json: dial unix /var/run/docker.sock: connect: permission denied
ubuntu@ip-172-31-33-248:~$ sudo docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS              NAMES
ubuntu@ip-172-31-33-248:~$ sudo ufw allow 2375
Rules updated
Rules updated (v6)
ubuntu@ip-172-31-33-248:~$ sudo ufw status
Status: inactive
ubuntu@ip-172-31-33-248:~$ sudo ufw enable
Command may disrupt existing ssh connections. Proceed with operation (y|n)? y
Firewall is active and enabled on system startup
ubuntu@ip-172-31-33-248:~$ ufw status
ERROR: You need to be root to run this script
ubuntu@ip-172-31-33-248:~$ sudo ufw status
Status: active

To Action From
--
2375 ALLOW Anywhere
2375 (v6) ALLOW Anywhere (v6)

ubuntu@ip-172-31-33-248:~$ sudo systemctl daemon-reload
ubuntu@ip-172-31-33-248:~$ sudo systemctl restart docker
ubuntu@ip-172-31-33-248:~$
```



```
Activities  Terminal  Tue 15:40
Terminal
File Edit View Search Terminal Tabs Help
ubuntu@ip-172-31-33-248: ~
arun@Arun-Parmar:~ $ DOCKER_HOST=tcp://54.173.180.48:2375 docker info
Client:
 Debug Mode: false

Server:
 Containers: 0
  Running: 0
  Paused: 0
  Stopped: 0
 Images: 0
 Server Version: 18.09.7
 Storage Driver: overlay2
  Backing Filesystem: extfs
  Supports d_type: true
  Native Overlay Diff: true
 Logging Driver: json-file
 Cgroup Driver: cgroupfs
 Plugins:
  Volume: local
  Network: bridge host macvlan null overlay
  Log: awslogs fluentd gcplogs gelf journald json-file local logentries splunk syslog
 Swarm: inactive
 Runtimes: runc
 Default Runtime: runc
 Init Binary: docker-init
 containerd version:
  runc version: N/A
  init version: v0.18.0 (expected: fec3683b971d9c3ef73f284f176672c44b448662)
 Security Options:
  apparmor
  seccomp
   Profile: default
 Kernel Version: 4.15.0-1057-aws
 Operating System: Ubuntu 18.04.3 LTS
 OStype: linux
 Architecture: x86_64
```