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Task - Docker -

1. Create a Dockerfile to package below:
    a. Use ubuntu docker image
    b. Install apache2 inside it
    c. Mount any local html file from host to /var/www/html path of container
    d. Use below command as entrypoint:
    ENTRYPOINT apachectl -D FOREGROUND

2. Create a sample html file with some content in the same directory as dockerfile
3. Once above Dockerfile is ready, perform below tasks
    a. Build the dockerfile with name ubuntu_apache
    b. Spawn a new container using below params:
        i. Name: ‘myapache’
        ii. Host port: 81
        iii. Container port: 80
        iv. Should run in detach mode
    c. Check if apache is accessible on http://:<ip>:81 and you see the content of html file you created in step ‘b’.

Standard Operating Procedure (SOP) for Creating & Managing a Docker Container with Ubuntu & Apache

Objective:

Create a Docker container using Ubuntu image, install Apache inside it, and configure it to serve an HTML file. Manage the container by stopping and starting it as needed.

Steps:

1.Install necessary packages for Docker:

```
# Add Docker's official GPG key:
$sudo apt-get update

$sudo apt-get install ca-certificates curl

$sudo install -m 0755 -d /etc/apt/keyrings

$ sudo curl -fsSL https://download.docker.com/linux/ubuntu/gpg -o
/etc/apt/keyrings/docker.asc
```

```
$ sudo chmod a+r /etc/apt/keyrings/docker.asc
```

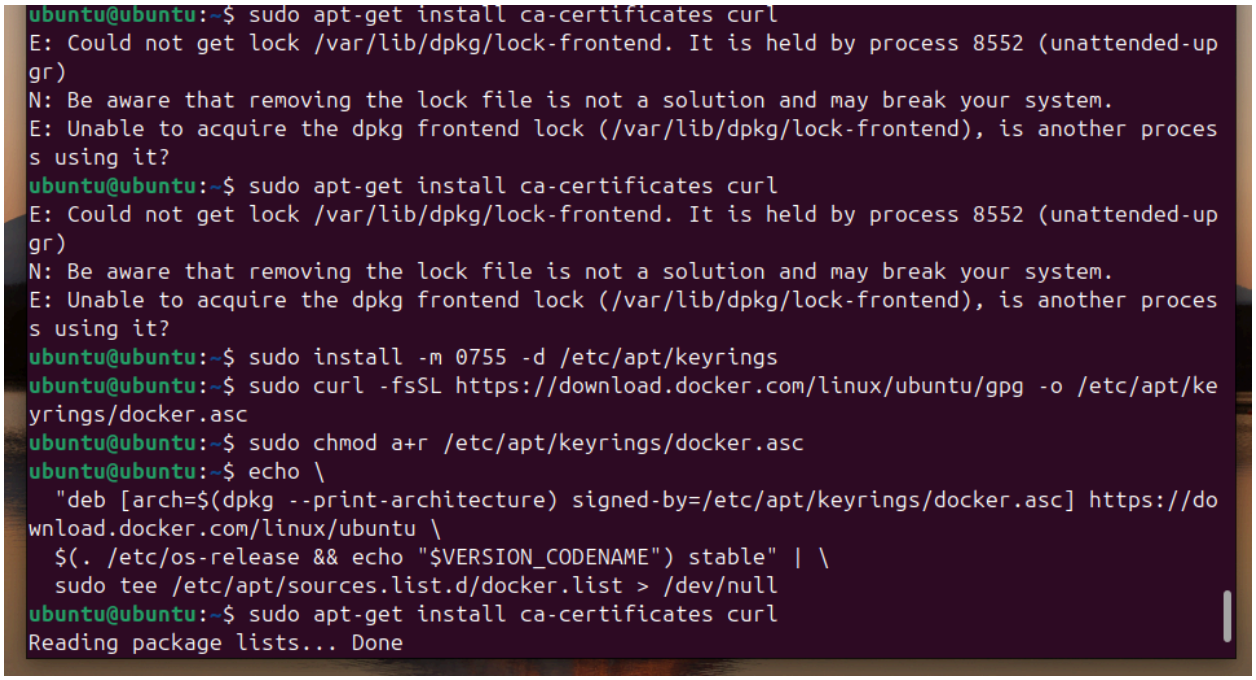
```
# Add the repository to Apt sources:

echo \
  "deb [arch=$(dpkg --print-architecture)
signed-by=/etc/apt/keyrings/docker.asc]
https://download.docker.com/linux/ubuntu \
  $(. /etc/os-release && echo "$VERSION_CODENAME") stable" | \
  sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
```

2.Install Docker Engine:

```
$sudo apt-get update

$sudo apt-get install docker-ce docker-ce-cli containerd.io
docker-buildx-plugin docker-compose-plugin
```



```
ubuntu@ubuntu:~$ sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-pl
ugin docker-compose-plugin
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  docker-ce-rootless-extras git git-man liberror-perl
  libslirp0 pigz slirp4netns
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite git-daemon-run
  | git-daemon-sysvinit git-doc git-email git-gui gitk
  gitweb git-cvs git-mediawiki git-svn
The following NEW packages will be installed:
  containerd.io docker-buildx-plugin docker-ce
  docker-ce-cli docker-ce-rootless-extras
  docker-compose-plugin git git-man liberror-perl
  libslirp0 pigz slirp4netns
0 upgraded, 12 newly installed, 0 to remove and 60 not upgraded.
Need to get 127 MB of archives.
After this operation, 461 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

3.Verify Docker installation:

```
$ sudo docker --version
```

```
ubuntu@ubuntu:~$ docker -v
Docker version 27.0.2, build 912c1dd
ubuntu@ubuntu:~$ systemctl start docker.service
ubuntu@ubuntu:~$ systemctl status docker.service
● docker.service - Docker Application Container Engine
     Loaded: loaded (/usr/lib/systemd/system/docker.service>
     Active: active (running) since Sat 2024-06-29 18:33:13>
TriggeredBy: ● docker.socket
       Docs: https://docs.docker.com
   Main PID: 17744 (dockerd)
      Tasks: 11
     Memory: 27.7M (peak: 31.5M)
        CPU: 1.081s
     CGroup: /system.slice/docker.service
             └─17744 /usr/bin/dockerd -H fd:// --containerd>

Jun 29 18:33:12 ubuntu systemd[1]: Starting docker.service >
Jun 29 18:33:12 ubuntu dockerd[17744]: time="2024-06-29T18:>
Jun 29 18:33:12 ubuntu dockerd[17744]: time="2024-06-29T18:>
Jun 29 18:33:13 ubuntu dockerd[17744]: time="2024-06-29T18:>
Jun 29 18:33:13 ubuntu dockerd[17744]: time="2024-06-29T18:>
```

Create a project directory:

```
$ mkdir my-docker-apache
$ cd my-docker-apache
```

Create a Dockerfile:

```
$ vim Dockerfile
```

Add the following content in Dockerfile::

```
FROM ubuntu:latest
RUN apt-get update && apt-get install -y apache2
COPY index.html /var/www/html/
EXPOSE 80
ENTRYPOINT ["apachectl", "-D", "FOREGROUND"]
```

Create index.html:

```
vim index.html
```

Add the following content in html

```
<!DOCTYPE html>
<html>
<head>
    <title>My Apache Server</title>
</head>
<body>
    <h1>Welcome to my Apache Server!</h1>
</body>
</html>
```

3. Build and Run the Docker Image:

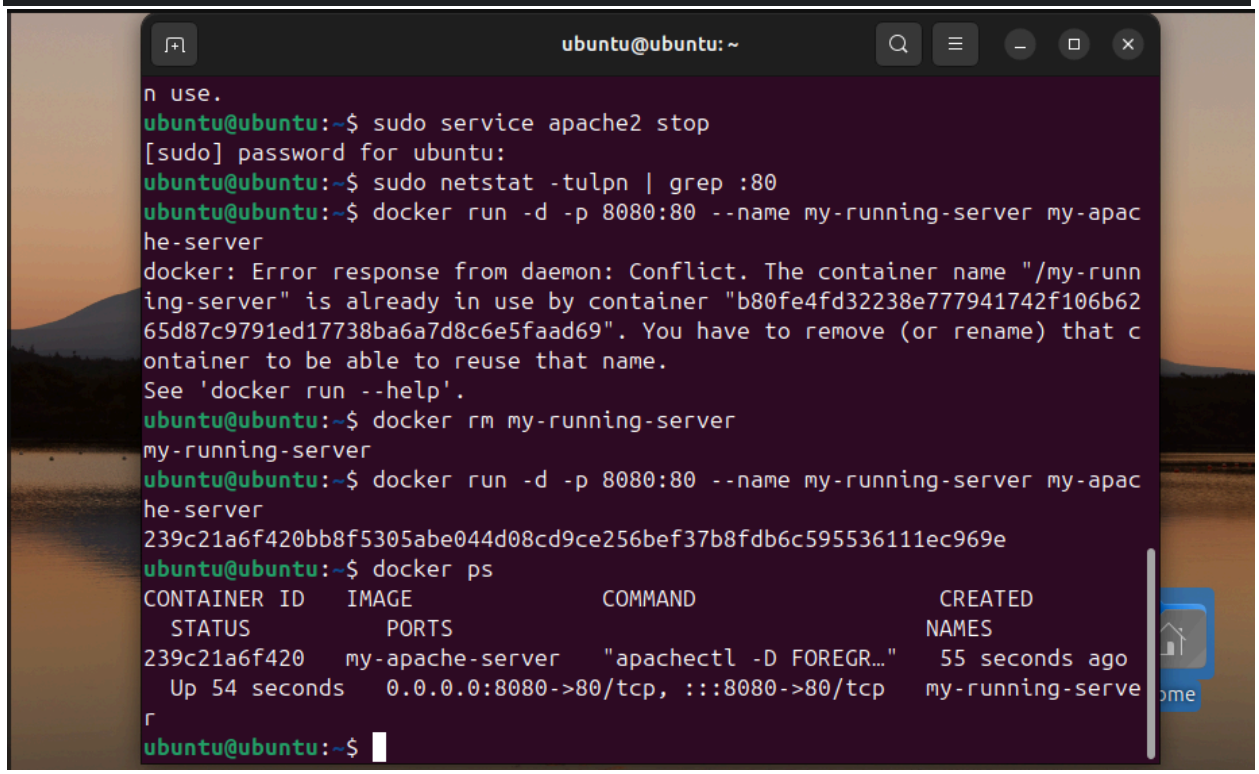
Build the Docker image:

```
docker build -t my-apache-server .
```

```
ubuntu@ubuntu:~/my-docker-apache$ ls
Dockerfile  index.html
ubuntu@ubuntu:~/my-docker-apache$ docker build -t my-apache-server .
[+] Building 24.5s (8/8) FINISHED                  docker:default
 => [internal] load build definition from Dockerfile   0.0s
 => => transferring dockerfile: 190B                   0.0s
 => [internal] load metadata for docker.io/library/ub  0.0s
 => [internal] load .dockerignore                      0.0s
 => => transferring context: 2B                        0.0s
 => [1/3] FROM docker.io/library/ubuntu:latest         0.0s
 => [internal] load build context                      0.0s
 => => transferring context: 179B                      0.0s
 => [2/3] RUN apt-get update && apt-get install -y a  23.3s
 => [3/3] COPY index.html /var/www/html                0.0s
 => exporting to image                                 1.1s
 => => exporting layers                                1.0s
 => => writing image sha256:271f01630d29b013f0246fe89  0.0s
 => => naming to docker.io/library/my-apache-server    0.0s
ubuntu@ubuntu:~/my-docker-apache$
```

Run the Docker container:

```
docker run -d -p 8080:80 --name my-running-server my-apache-server
```

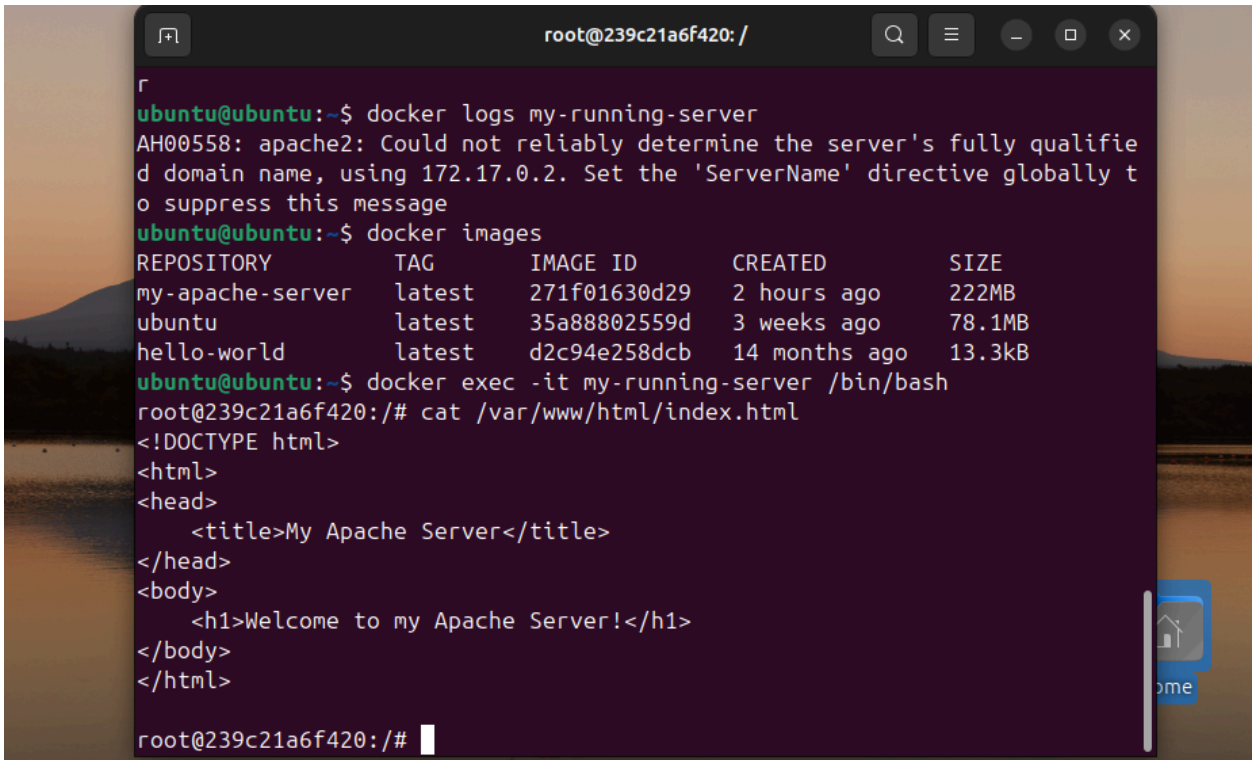


Verify the container is running:

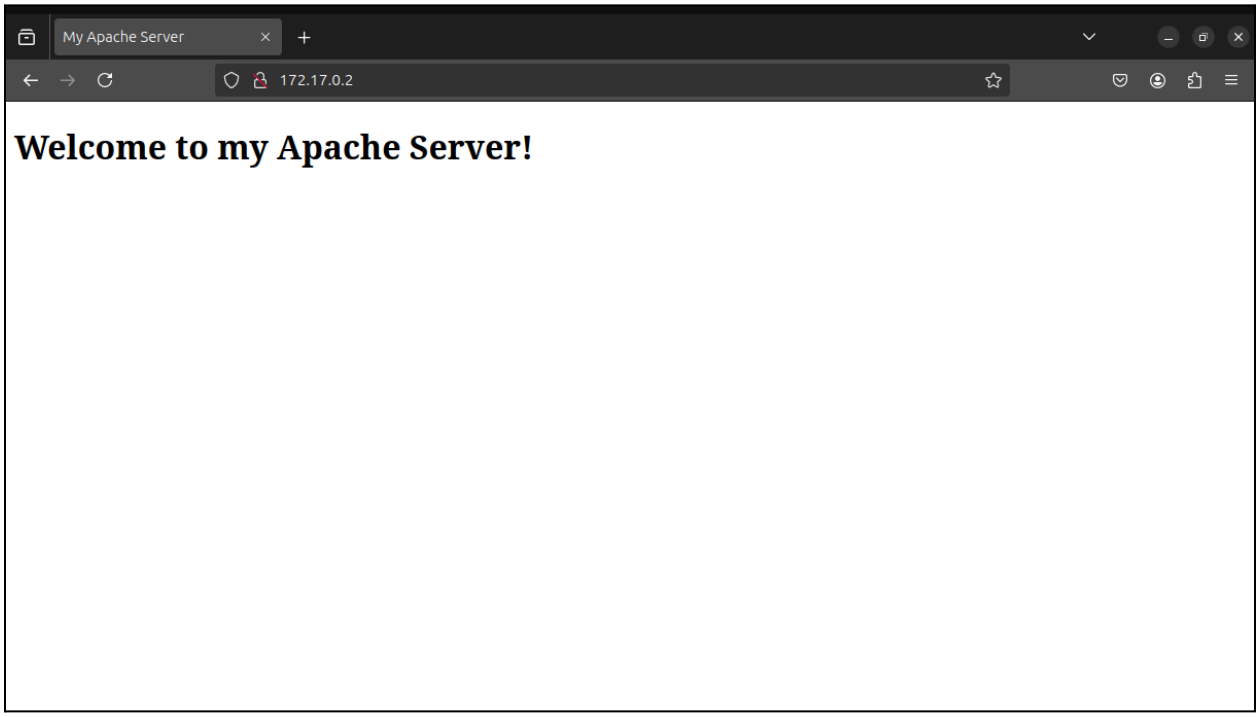
```
docker ps
```

```
ubuntu@ubuntu:~/my-docker-apache$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED         SIZE
ubuntu        latest    35a88802559d   3 weeks ago     78.1MB
hello-world   latest    d2c94e258dcb   14 months ago   13.3kB
ubuntu@ubuntu:~/my-docker-apache$ docker run -it 35a88802559ubuntu@ubuntu:~/my-d
ocker-apache$ docker run -it 35a88802559d /bin/bash
root@182ed323b96c:/# uname -a
Linux 182ed323b96c 6.8.0-36-generic #36-Ubuntu SMP PREEMPT_DYNAMIC Mon Jun 10 10
:49:14 UTC 2024 x86_64 x86_64 x86_64 GNU/Linux
root@182ed323b96c:/# ls
bin   dev  home  lib64  mnt  proc  run   srv  tmp  var
boot  etc  lib   media  opt  root  sbin  sys  usr
root@182ed323b96c:/#
```

Output:



```
                     PORTS     NAMES
239c21a6f420   my-apache-server   "apachectl -D FOREGR…"   12 hours ago   Exited
 (137) 12 hours ago             my-running-server
182ed323b96c   35a88802559d       "/bin/bash"              14 hours ago   Exited
 (0) 14 hours ago               admiring_joliot
ubuntu@ubuntu:~$ docker start my-running-server
my-running-server
ubuntu@ubuntu:~$ docker inspect my-running-server | grep IP
            "LinkLocalIPv6Address": "",
            "LinkLocalIPv6PrefixLen": 0,
            "SecondaryIPAddresses": null,
            "SecondaryIPv6Addresses": null,
            "GlobalIPv6Address": "",
            "GlobalIPv6PrefixLen": 0,
            "IPAddress": "172.17.0.2",
            "IPPrefixLen": 16,
            "IPv6Gateway": "",
                    "IPAMConfig": null,
                    "IPAddress": "172.17.0.2",
                    "IPPrefixLen": 16,
                    "IPv6Gateway": "",
                    "GlobalIPv6Address": "",
                    "GlobalIPv6PrefixLen": 0,
ubuntu@ubuntu:~$
```



Task 3: To Spawn new Container with Specific Constraints

Objective:

To deploy an Apache web server inside a Docker container, ensuring it is accessible on a specific port on the host machine.

Requirements:

- Use a Dockerfile to build an image that includes Ubuntu and installs Apache (apache2).
- Copy an index.html file into the Apache web root directory.

Container Creation:

- Map port 81 on the host machine to port 80 inside the container named myapache & Ensure the container runs in detached mode (-d).

```
docker build -t ubuntu_apache .
docker run -d -p 81:80 --name myapache ubuntu_apache
```

```
ubuntu@ubuntu:~/my-docker-apache$ docker build -t ubuntu_apache .
[+] Building 0.2s (8/8) FINISHED                docker:default
 => [internal] load build definition from Dockerfile   0.0s
 => => transferring dockerfile: 190B                   0.0s
 => [internal] load metadata for docker.io/library/ub  0.0s
 => [internal] load .dockerignore                      0.0s
 => => transferring context: 2B                        0.0s
 => [1/3] FROM docker.io/library/ubuntu:latest         0.0s
 => [internal] load build context                      0.0s
 => => transferring context: 32B                       0.0s
 => CACHED [2/3] RUN apt-get update && apt-get instal  0.0s
 => CACHED [3/3] COPY index.html /var/www/html         0.0s
 => exporting to image                                 0.0s
 => => exporting layers                                0.0s
 => => writing image sha256:271f01630d29b013f0246fe89  0.0s
 => => naming to docker.io/library/ubuntu_apache       0.0s
ubuntu@ubuntu:~/my-docker-apache$ docker run -d -p 81:80 --name myapache ubuntu_apache
b08d5268e5e0fc6c1e3e10c4c3fd272c47fe64af87a69b0f32d1da9bdfec81bb
ubuntu@ubuntu:~/my-docker-apache$ docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED         STATUS         PORTS
                              NAMES
b08d5268e5e0   ubuntu_apache  "apachectl -D FOREGR…"   9 seconds ago   Up 8 seconds   0.0.0
.0:81->80/tcp, :::81->80/tcp  myapache
ubuntu@ubuntu:~/my-docker-apache$
```

Verification:

- Confirm that Apache is accessible on http://<host-machine-ip>:81.
- Check the status of the container to ensure it is running.

```
docker ps
```

```
ubuntu@ubuntu:~/my-docker-apache$ docker ps -a
CONTAINER ID   IMAGE              COMMAND                  CREATED         STATUS
            PORTS                                   NAMES
b08d5268e5e0   ubuntu_apache      "apachectl -D FOREGR…"   7 minutes ago   Up 7 minutes
            0.0.0.0:81->80/tcp, :::81->80/tcp       myapache
239c21a6f420   my-apache-server   "apachectl -D FOREGR…"   13 hours ago    Exited (137) 21 m
inutes ago                                          my-running-server
182ed323b96c   35a88802559d       "/bin/bash"              15 hours ago    Exited (0) 15 hou
rs ago                                              admiring_joliot
ubuntu@ubuntu:~/my-docker-apache$ docker ps
CONTAINER ID   IMAGE           COMMAND                  CREATED         STATUS         PORTS
                               NAMES
b08d5268e5e0   ubuntu_apache   "apachectl -D FOREGR…"   8 minutes ago   Up 8 minutes   0.0.0
.0:81->80/tcp, :::81->80/tcp   myapache
```

- Open a web browser and navigate to http://<host-machine-ip>:81 to verify Apache serves the content of index.html.