

Operating Systems Lab
Momina Atif Dar
P18-0030
System Administration Task Part 3

SCREENSHOTS:

Installing Docker:

```
momina@death-eater: ~  
File Edit View Search Terminal Help  
momina@death-eater:~$ sudo apt install docker.io  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
docker.io is already the newest version (19.03.6-0ubuntu1~18.04.1).  
0 upgraded, 0 newly installed, 0 to remove and 198 not upgraded.  
momina@death-eater:~$ _
```

Start Docker and enabling it to start when you start your PC:

```
momina@death-eater: ~  
File Edit View Search Terminal Help  
momina@death-eater:~$ sudo systemctl start docker  
momina@death-eater:~$ sudo systemctl enable docker  
momina@death-eater:~$ _
```

Images: (I have already ubuntu image installed)

```
momina@death-eater:~$ sudo docker images  
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE  
ubuntu              latest          1d622ef86b13   6 days ago     73.9MB  
momina@death-eater:~$ _
```

If no image is downloaded (you can download any OS image):

```
momina@death-eater: ~  
File Edit View Search Terminal Help  
momina@death-eater:~$ sudo docker pull ubuntu_
```

Creating a container:

-i for interactive shell and -t for terminal

```
root@84af871991e8: /  
File Edit View Search Terminal Help  
momina@death-eater:~$ sudo docker run --name mysql-container -it ubuntu  
root@84af871991e8:/# _
```

Updating packages in mysql container and installing vim:

```
root@84af871991e8: /  
File Edit View Search Terminal Help  
momina@death-eater:~$ sudo docker run --name mysql-container -it ubuntu  
root@84af871991e8:/# apt update  
Get:1 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]  
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [107 kB]  
Get:3 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [3717 B]  
Get:4 http://archive.ubuntu.com/ubuntu focal-updates InRelease [106 kB]  
Get:5 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [30.8 kB]  
Get:6 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [3190 B]  
Get:7 http://archive.ubuntu.com/ubuntu focal-backports InRelease [89.2 kB]  
Get:8 http://archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [177 kB]  
Get:9 http://archive.ubuntu.com/ubuntu focal/main amd64 Packages [1275 kB]  
Get:10 http://archive.ubuntu.com/ubuntu focal/restricted amd64 Packages [33.4 kB]  
Get:11 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [11.3 MB]  
Get:12 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [3190 B]  
Get:13 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [14.2 kB]  
Get:14 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [38.2 kB]  
Fetched 13.5 MB in 16s (838 kB/s)  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
All packages are up to date.  
root@84af871991e8:/# apt install vim -y  
Reading package lists... Done
```

Listing all the containers using docker ps command after exiting docker:

```
momina@death-eater: ~  
root@84af871991e8:/# exit  
exit
```

```
momina@death-eater: ~  
File Edit View Search Terminal Tabs Help  
momina@death-eater: ~ x momina@death-eater: ~ x  
momina@death-eater:~$ sudo docker ps -a  
[sudo] password for momina:  
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES  
84af871991e8      ubuntu    "/bin/bash"  3 minutes ago  Exited (0) 22 seconds ago  
momina@death-eater:~$ _
```

Restarting docker (mysql container):

```
momina@death-eater: ~  
momina@death-eater:~$ sudo docker start mysql-container  
mysql-container  
momina@death-eater:~$ _
```

```
momina@death-eater:~$ sudo docker ps -a  
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES  
84af871991e8      ubuntu    "/bin/bash"  6 minutes ago  Up 12 seconds  
momina@death-eater:~$ _
```

Enabling sudo docker ps -a command to execute after intervals:

```
momina@death-eater:~$ watch sudo docker ps -a  
momina@death-eater:~$ _
```

```
momina@death-eater: ~ x momina@death-eater: ~ x  
Every 2.0s: sudo docker ps -a death-eater: Fri May 1 01:22:54 2020  
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS      PORTS      NAMES  
84af871991e8      ubuntu    "/bin/bash"  9 minutes ago  Up 3 minutes
```

To use container:

```
root@84af871991e8: /  
momina@death-eater: ~$ sudo docker exec -it mysql-container bash  
root@84af871991e8: /# _
```

Installing mysql-server in container:

```
root@84af871991e8: /# apt install mysql-server -y  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following additional packages will be installed:  
  libaio1 libbsd0 libcgi-fast-perl libcgi-pm-perl libedit2 libencode-locale  
  libfcgi-perl libgdbm-compat4 libgdbm6 libhtml-parser-perl libhtml-tag  
  libhtml-template-perl libhttp-date-perl libhttp-message-perl libio-ht  
  liblwp-mediatypes-perl libmecab2 libnuma1 libperl5.30 libtimedate-per  
  mecab-ipadic-utf8 mecab-utils mysql-client-8.0 mysql-client-core-8.0  
  mysql-server-core-8.0 netbase perl perl-modules-5.30 psmisc
```

Starting mysql service (unprotected):

```
root@84af871991e8: /  
root@84af871991e8: /# service mysql start  
* Starting MySQL database server mysqld  
su: warning: cannot change directory to /nonexistent: No such file or directory  
root@84af871991e8: /# _
```

Making our server password protected:

```
mysql> ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'mona!123';  
Query OK, 0 rows affected (0.01 sec)  
mysql> _
```

```
mysql> FLUSH PRIVILEGES;  
Query OK, 0 rows affected (0.00 sec)  
mysql>
```

Starting mysql (password protected):

```
root@84af871991e8: / x momina@death-eater: ~
root@84af871991e8:/# mysql
ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: NO)
root@84af871991e8:/# mysql -uroot -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 12
Server version: 8.0.19-0ubuntu5 (Ubuntu)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> _
```

Creating apache container:

```
root@f7baef277386: / x
momina@death-eater:~$ sudo docker run --name apache-container -it ubuntu
root@f7baef277386:/# _
```

```
Every 2.0s: sudo docker ps -a death-eater: Fri May 1 01:35:57 2020
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
f7baef277386	ubuntu	"/bin/bash"	27 seconds ago	Up 25 seconds		apache-container
84af871991e8	ubuntu	"/bin/bash"	22 minutes ago	Up 16 minutes		mysql-container

Starting apache container:

```
momina@death-eater:~$ sudo docker start apache-container
apache-container
momina@death-eater:~$ _
```

```
momina@death-eater:~$ sudo docker exec -it apache-container bash
```


Updating packages in apache container:

```
root@f7baef277386:/# apt update
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [107 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:3 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [30.8 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal-updates InRelease [106 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [3190 B]
Get:6 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [3717 B]
Get:7 http://archive.ubuntu.com/ubuntu focal-backports InRelease [89.2 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal/restricted amd64 Packages [33.4 kB]
Get:9 http://archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [177 kB]
Get:10 http://archive.ubuntu.com/ubuntu focal/main amd64 Packages [1275 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [11.3 MB]
Get:12 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1
```

Installing apache2:

```
root@f7baef277386:/ x momina@death-eater: ~ x
root@f7baef277386:/# apt install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils ca-certificates file krb5-locales
  libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap
  libasn1-8-heimdal libbrotli1 libcurl4 libexpat1 libgdbm-compat4 libgdbm6
  libgssapi-krb5-2 libgssapi3-heimdal libhcrypto4-heimdal libheimbase1-heimdal
  libheimntlm0-heimdal libhx509-5-heimdal libicu66 libjansson4 libk5crypto3
  libkeyutils1 libkrb5-26-heimdal libkrb5-3 libkrb5support0 libldap-2.4-2
  libldap-common liblua5.2-0 libmagic-mgc libmagic1 libnghttp2-14 libperl5.30
  libpsl5 libroken18-heimdal librtmp1 libsasl2-2 libsasl2-modules
  libsasl2-modules-db libsasl2-modules-gssapi-mit libsasl2-modules-gssapi-heimdal
  libsasl2-modules-ldap libsasl2-modules-otp libsasl2-modules-sql libssh-4 libssl1.1 libwind0-heimdal libxml2
  mime-support netbase openssl perl perl-modules-5.30 publicsuffix ssl-cert
  tzdata xz-utils
```

Starting apache2 service:

```
root@f7baef277386:/ x momina@death-eater: ~ x [icon]
root@f7baef277386:/# service apache2 start
* Starting Apache httpd web server apache2
AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 172.17.0.2. Set the 'ServerName' directive globally to suppress this message
*
root@f7baef277386:/# _
```

Installing vim on apache2 container:

```
root@f7baef277386:/# apt install vim -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  alsa-topology-conf alsa-ucm-conf libasound2 libasound2-data libcanberra0
  libgpm2 libltdl7 libmpdec2 libogg0 libpython3.8 libpython3.8-minimal
  libpython3.8-stdlib libreadline8 libtcl8.6 libvorbis0a libvorbisfile3
  readline-common sound-theme-freedesktop vim-common vim-runtime xxd
Suggested packages:
  libasound2-plugins alsa-utils libcanberra-gtk0 libcanberra-pulse gpm
  readline-doc ctags vim-doc vim-scripts
The following NEW packages will be installed:
  alsa-topology-conf alsa-ucm-conf libasound2 libasound2-data libcanberra0
  libgpm2 libltdl7 libmpdec2 libogg0 libpython3.8 libpython3.8-minimal
```

Installing necessary packages for using apache2:

```
root@f7baef277386:/ x momina@death-eater: ~ x [icon]
root@f7baef277386:/# apt install php libapache2-mod-php php-cli php-mysql -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libapache2-mod-php7.4 libargon2-1 libbsd0 libedit2 libsodium23 php-common
  php7.4 php7.4-cli php7.4-common php7.4-json php7.4-mysql php7.4-opcache
  php7.4-readline psmisc ucf
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.4 libargon2-1 libbsd0 libedit2
```

To get ifconfig:

```
root@f7baef277386:/ x momina@death-eater: ~ x
root@f7baef277386:/# apt install inetutils-ping net-tools -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libidn11
The following NEW packages will be installed:
  inetutils-ping libidn11 net-tools
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 303 kB of archives.
After this operation, 1478 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu focal/main amd64 libidn11 amd64 1.33-2.2u
buntu2 [46.2 kB]
```

ifconfig:

```
root@f7baef277386:/# 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 38356 bytes 57768135 (57.7 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 29938 bytes 2563467 (2.5 MB)
    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
```

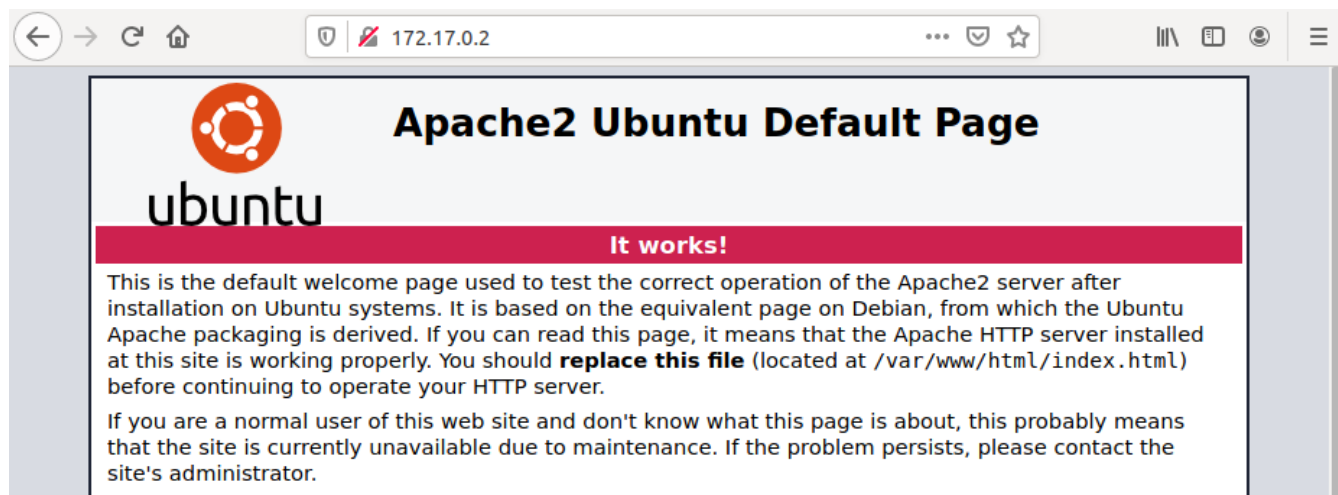
To check if apache is listening:

It's listening on every address (0.0.0.0) and port 80.

```
root@f7baef277386:/# netstat -ntulp
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 0.0.0.0:80              0.0.0.0:*               LISTEN      3399/apache2
root@f7baef277386:/# _
```


Checking if host machine's browser can access apache container:

by using the address of virtual network card i.e. 172.17.0.2





Writing a code in index file to execute:

```
root@f7baef277386: / x momina@death-eater: ~
root@f7baef277386: /# vi /var/www/html/index.php
root@f7baef277386: /# _
```

```
root@f7baef277386: / x
<?php
phpinfo();
```

because php was installed later but apache was running before it

```
root@f7baef277386:/ x momina@death-eater: ~ x  
```

```
root@f7baef277386:/# service apache2 restart
* Restarting Apache httpd web server apache2
AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 172.17.0.2. Set the 'ServerName' directive globally to suppress this message

[ OK ]

root@f7baef277386:/# _
```

Checking if index file code executes:

