

**Operating Systems Lab**  
**Momina Atif Dar**  
**P18-0030**  
**System Administration Lab Task 4**

**Screenshots:**

Checking mysql service and starting it if stopped:

```
momina@death-eater:~$ sudo docker exec -it mysql-container bash
root@84af871991e8:/# service mysql status
* MySQL is stopped.
```

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

Install *ifconfig* utility:

If not already installed, install using *apt install inetutils-ping net-tools -y* (I have already installed)

```
root@84af871991e8:/# 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 94  bytes 12155 (12.1 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
```

Sending packages to apache container from mysql container:  
(172.17.0.3 is apache, 172.17.0.2 is mysql)

```
momina@death-eater:~$ sudo docker exec -it mysql-container bash
root@84af871991e8:/# ping 172.17.0.3
PING 172.17.0.3 (172.17.0.3): 56 data bytes
64 bytes from 172.17.0.3: icmp_seq=0 ttl=64 time=0.552 ms
64 bytes from 172.17.0.3: icmp_seq=1 ttl=64 time=0.133 ms
64 bytes from 172.17.0.3: icmp_seq=2 ttl=64 time=0.164 ms
64 bytes from 172.17.0.3: icmp_seq=3 ttl=64 time=0.129 ms
64 bytes from 172.17.0.3: icmp_seq=4 ttl=64 time=0.105 ms
64 bytes from 172.17.0.3: icmp_seq=5 ttl=64 time=0.126 ms
64 bytes from 172.17.0.3: icmp_seq=6 ttl=64 time=0.124 ms
64 bytes from 172.17.0.3: icmp_seq=7 ttl=64 time=0.125 ms
64 bytes from 172.17.0.3: icmp_seq=8 ttl=64 time=0.124 ms
64 bytes from 172.17.0.3: icmp_seq=9 ttl=64 time=0.125 ms
```

Sending packages to mysql container from apache container:

```
momina@death-eater:~$ sudo docker exec -it apache-container bash
root@f7baef277386:/# ping 172.17.0.2
PING 172.17.0.2 (172.17.0.2): 56 data bytes
64 bytes from 172.17.0.2: icmp_seq=0 ttl=64 time=0.145 ms
64 bytes from 172.17.0.2: icmp_seq=1 ttl=64 time=0.115 ms
64 bytes from 172.17.0.2: icmp_seq=2 ttl=64 time=0.114 ms
64 bytes from 172.17.0.2: icmp_seq=3 ttl=64 time=0.115 ms
64 bytes from 172.17.0.2: icmp_seq=4 ttl=64 time=0.123 ms
64 bytes from 172.17.0.2: icmp_seq=5 ttl=64 time=0.038 ms
64 bytes from 172.17.0.2: icmp_seq=6 ttl=64 time=0.127 ms
64 bytes from 172.17.0.2: icmp_seq=7 ttl=64 time=0.125 ms
```

Editing index.php file in apache container:

```
root@f7baef277386:/ × momir
root@f7baef277386:/# vi /var/www/html/index.php
root@f7baef277386:/# _
```

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

$server = "172.17.0.2";
$username = "root";
$pass = "mona!123";
$dbname = "mysql";

$con = new MySQLi($server, $username, $pass, $dbname);

if ($con->connect_error)
    echo "Error: ".$con->connect_error;
else
    echo "Connected!";

"/var/www/html/index.php" 14L, 244C 1,5 All
```

Starting apache2 service if it's stopped:

```
root@f7baef277386: /# netstat -ntulp
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
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 172.17.0.3. Set the 'ServerName' directive globally to suppress this message
 *
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      48/apache2
root@f7baef277386: /# _
```

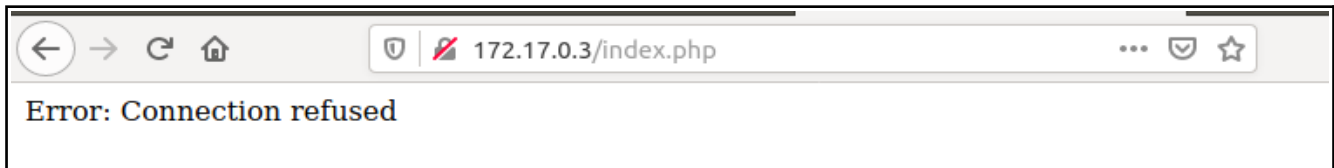
Checking if mysql container is listening and on what address:

```

root@84af871991e8:/# netstat -ntulp
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       P
ID/Program name
tcp        0      0 127.0.0.1:3306          0.0.0.0:*               LISTEN      -
tcp6       0      0 :::33060                :::*                     LISTEN      -

```

Listening but only on localhost



Looking up the file in which the address will be changed:

```

root@84af871991e8: /
momina@death-eater: ~
root@84af871991e8:/# grep -r "bind-address" /etc/mysql
/etc/mysql/mysql.conf.d/mysqld.cnf:bind-address = 127.0.0.1
root@84af871991e8:/# vi /etc/mysql/mysql.conf.d/mysqld.cnf
root@84af871991e8:/# _

```

Changing the address in mysql container so it can listen to data incoming from all the different address:

```

# Instead of skip-networking the default is now to listen only on
# localhost which is more compatible and is not less secure.
bind-address            = 127.0.0.1_
#
# * Fine Tuning

```

From 127.0.0.1 to 0.0.0.0

```

# Instead of skip-networking the default is now to listen only on
# localhost which is more compatible and is not less secure.
bind-address            = 0.0.0.0
#
# * Fine Tuning

```

Restarting service because we changed a config file:

```
root@84af871991e8: / x momina@death-eater: ~ x [ OK ]
root@84af871991e8: /# service mysql restart
* Stopping MySQL database server mysqld [ OK ]
* Starting MySQL database server mysqld
su: warning: cannot change directory to /nonexistent: No such file or directory [ OK ]
root@84af871991e8: /# _
```

NOW IT WILL GIVE 'ACCESS DENIED' ERROR BUT SINCE I HAVE ALREADY FOLLOWED THIS LECTURE SO I HAVE SOLVED THIS ERROR

To solve this ACCESS DENIED Error we create a user and grant privileges to it:

```
mysql> CREATE USER 'root'@'%' IDENTIFIED BY 'mona!123';
ERROR 1396 (HY000): Operation CREATE USER failed for 'root'@'%'
mysql> GRANT ALL ON *.* TO 'root'@'%' ;
Query OK, 0 rows affected (0.04 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.04 sec)
```

Now if you reload browser it will show:



.....



Create image of a running container:

```
momina@death-eater:~$ sudo docker images
[sudo] password for momina:
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
ubuntu              latest             1d622ef86b13       11 days ago       73.9MB
momina@death-eater:~$ sudo docker commit apache-container ubuntu-apache
sha256:0478ca480bfa83330c98ee0f9282616721480cbd7fa11c82b314be69b9cccd29
momina@death-eater:~$ sudo docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
ubuntu-apache       latest             0478ca480bfa       7 seconds ago      283MB
ubuntu              latest             1d622ef86b13       11 days ago       73.9MB
momina@death-eater:~$ _
```

```
momina@death-eater:~$ sudo docker commit mysql-container ubuntu-mysql
sha256:06f08f4ac3a917dc69ffae94a307af6a1a1d8a93a0dcfa516a09fb642e69633b
```

Saving images to a file:

```
momina@death-eater:~$ sudo docker save ubuntu-apache -o ubuntu-apache.tar
momina@death-eater:~$ ls | grep ubuntu-apache
ubuntu-apache.tar
```

```
momina@death-eater:~$ sudo docker save ubuntu-mysql -o ubuntu-mysql.tar
momina@death-eater:~$ ls -lh | grep ubuntu-mysql
-rw----- 1 root  root  695M May  5 17:35 ubuntu-mysql.tar
```

Stopping mysql and apache containers:

```
momina@death-eater: ~
momina@death-eater: ~
momina@death-eater:~$ sudo docker stop apache-container
[sudo] password for momina:
apache-container
momina@death-eater:~$ sudo docker stop mysql-container
mysql-container
momina@death-eater:~$ _
```

```
momina@death-eater: ~
momina@death-eater: ~
Every 2.0s: sudo docker ps -a
death-eater: Tue May  5 21:49:57 2020
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
f7baef277386	ubuntu	"/bin/bash"	4 days ago	Exited (0) 22 seconds ago	
84af871991e8	ubuntu	"/bin/bash"	4 days ago	Exited (0) 17 seconds ago	
apache-container					
mysql-container					

Two ways to remove containers:

```
momina@death-eater: ~  
momina@death-eater:~$ sudo docker container rm apache-container  
apache-container  
momina@death-eater:~$ sudo docker container ls -a  
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS  
84af871991e8        ubuntu             "/bin/bash"        4 days ago         Exit  
ed (0) 4 minutes ago  
mysql-container  
momina@death-eater:~$ sudo docker container rm mysql-container  
mysql-container  
momina@death-eater:~$ sudo docker container ls -a  
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS  
US  
momina@death-eater:~$ sudo docker container prune  
WARNING! This will remove all stopped containers.  
Are you sure you want to continue? [y/N] y  
Total reclaimed space: 0B  
momina@death-eater:~$ _
```

Remove images of apache and mysql containers:

```
momina@death-eater:~$ sudo docker images  
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE  
ubuntu-mysql        latest             06f08f4ac3a9       4 hours ago        722MB  
ubuntu-apache       latest             0478ca480bfa       4 hours ago        283MB  
ubuntu              latest            1d622ef86b13       11 days ago        73.9MB  
momina@death-eater:~$ sudo docker rmi ubuntu-apache  
Untagged: ubuntu-apache:latest  
Deleted: sha256:0478ca480bfa83330c98ee0f9282616721480cbd7fa11c82b314be69b9cccd29  
Deleted: sha256:74da25497a7419ac638a2a57a3341b5cc6d10793c9b31865e2126c693525a601  
momina@death-eater:~$ sudo docker rmi ubuntu-mysql  
Untagged: ubuntu-mysql:latest  
Deleted: sha256:06f08f4ac3a917dc69ffae94a307af6a1a1d8a93a0dcfa516a09fb642e69633b  
Deleted: sha256:a0a5da4ba15e7b08a88d21072e6f68eb08155a1b71d205420117f626a7f7f870  
momina@death-eater:~$ sudo docker images  
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE  
ubuntu              latest            1d622ef86b13       11 days ago        73.9MB  
momina@death-eater:~$ _
```

Load the images of mysql and apache containers from files:

```
momina@death-eater: ~ × momina@death-eater: ~
momina@death-eater:~$ sudo docker load < ubuntu-apache.tar
bash: ubuntu-apache.tar: Permission denied
momina@death-eater:~$ ls -lh | grep ubuntu
-rw----- 1 root root 280M May 5 17:33 ubuntu-apache.tar
-rw----- 1 root root 695M May 5 17:35 ubuntu-mysql.tar
momina@death-eater:~$ sudo chmod 666 ubuntu-apache.tar
momina@death-eater:~$ sudo chmod 666 ubuntu-mysql.tar
momina@death-eater:~$ ls -lh | grep ubuntu
-rw-rw-rw- 1 root root 280M May 5 17:33 ubuntu-apache.tar
-rw-rw-rw- 1 root root 695M May 5 17:35 ubuntu-mysql.tar
momina@death-eater:~$ sudo docker load < ubuntu-mysql.tar
c6ba80fd892b: Loading layer 652.2MB/652.2MB
Loaded image: ubuntu-mysql:latest
momina@death-eater:~$ sudo docker load < ubuntu-apache.tar
f67e39638c72: Loading layer 216.3MB/216.3MB
Loaded image: ubuntu-apache:latest
momina@death-eater:~$ _
```

Checking if everything is the same as that of our original apache container:



```
root@20036bb25f8e: / x momina@death-eater: ~ x
momina@death-eater:~$ sudo docker run -it ubuntu-apache
root@20036bb25f8e:/# 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 21 bytes 3124 (3.1 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@20036bb25f8e:/# cat < /var/www/html/index.php
<?php

    $server = "172.17.0.2";
    $username = "root";
    $pass = "mona!123";
    $dbname = "mysql";

    $con = new MySQLi($server, $username, $pass, $dbname);

    if ($con->connect_error)
        echo "Error: ".$con->connect_error;
    else
        echo "Connected!";
root@20036bb25f8e:/#
```

Everything is the same and working which shows whatever work we had done in apache container before creating its image is saved.

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