IT 640 PROJECT

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Objective: Building a functional LAMP stack environment with docker.

Im using 64bit ubuntu in vmware. First I installed docker with the command “**apt-get install docker.io**”

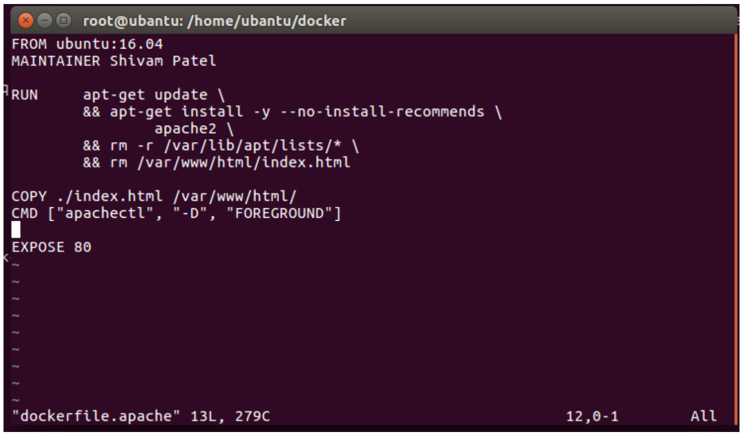
And checked that docker is running by “**docker ps**” which shows no container is running at the moment.

Made a new directory for the project “**mkdir docker**” at ubuntu user’s home directory.

In this directory first I made index.html file

Now I need to make image for apache container so we need to make a docker file that takes base image from docker registery (which is like repository for docker images maintainer by different peoples) and build new image as we instruct so in base image there will be no packages its just a linux os kernel now we need to add only what we need to run our application.

In this case we need to run apache and php to run from this image.



root@ubantu: /home/ubantu/docker

```
FROM ubuntu:16.04
MAINTAINER Shivam Patel

RUN     apt-get update \
        && apt-get install -y --no-install-recommends \
                apache2 \
        && rm -r /var/lib/apt/lists/* \
        && rm /var/www/html/index.html

COPY ./index.html /var/www/html/
CMD ["apachectl", "-D", "FOREGROUND"]

EXPOSE 80
~
~
~
~
~
~
~
~
~
"dockerfile.apache" 13L, 279C                             12,0-1        All
```

FROM command fetches base image if it is available locally it grabs from local storage of it goes to docker registry.

MAINTAINER is optional we can put our name in there or contact info.

RUN this runs a command in container while building the image so when we build image it creates temporary container and these commands runs in there

Here I run **apt-get update** and **apt-get install apache2** -y is a parameter is automate the installation when it ask for y/n it applys y automatically.

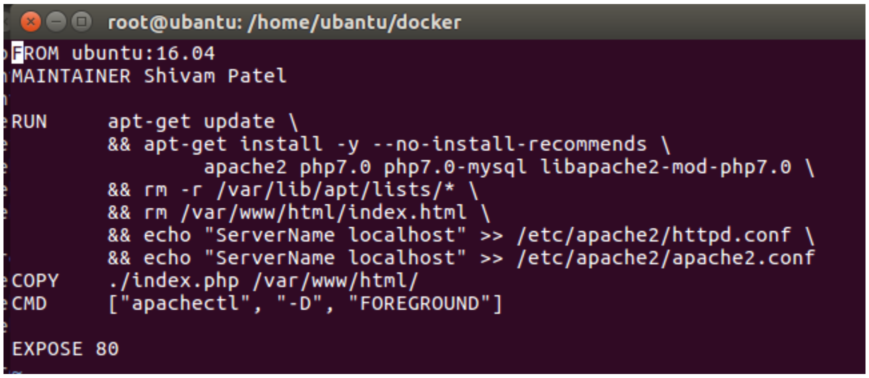
If I put COPY command in between two run commands it was not working because docker is build as layers on top of layers.

Then I removed the original index.html and copy the one that is in our host machine

COPY ./index.html /var/www/html

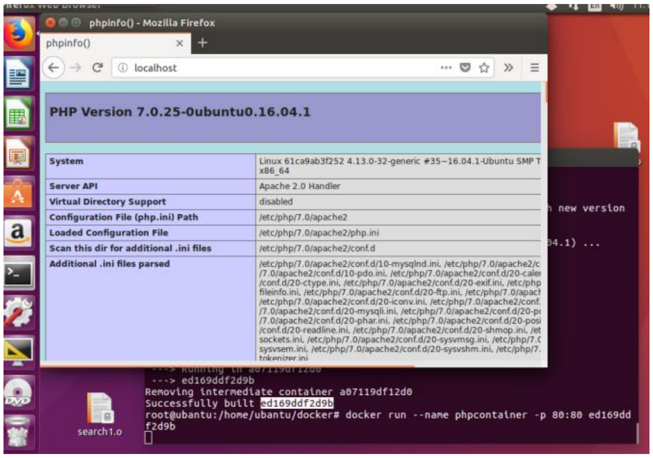
EXPOSE 80 opens port 80 of the container.

For testing php is working or not I have modified dockerfile a little and build the image again and run the container out of it the dockerfile that I made is as below.I also added server name in the conf file because it was giving me error and stoping the building process.



```
FROM ubuntu:16.04
MAINTAINER Shivam Patel

RUN      apt-get update \
         && apt-get install -y --no-install-recommends \
                apache2 php7.0 php7.0-mysql libapache2-mod-php7.0 \
         && rm -r /var/lib/apt/lists/* \
         && rm /var/www/html/index.html \
         && echo "ServerName localhost" >> /etc/apache2/httpd.conf \
         && echo "ServerName localhost" >> /etc/apache2/apache2.conf
COPY     ./index.php /var/www/html/
CMD      ["apachectl", "-D", "FOREGROUND"]

EXPOSE 80
```

And we have php7 and apache2 up and running now just using this docker file we can build the container anywhere. result=>



PHP Version 7.0.25-0ubuntu0.16.04.1

System	Linux 61ca9ab3f252 4.13.0-32-generic #35~16.04.1-Ubuntu SMP T x86_64
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.0/apache2
Loaded Configuration File	/etc/php/7.0/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.0/apache2/conf.d
Additional .ini files parsed	/etc/php/7.0/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.0/apache2/c /7.0/apache2/conf.d/10-pdo.ini, /etc/php/7.0/apache2/conf.d/20-cale /conf.d/20-ctype.ini, /etc/php/7.0/apache2/conf.d/20-exif.ini, /etc/php fileinfo.ini, /etc/php/7.0/apache2/conf.d/20-ftp.ini, /etc/php/7.0/apacl /etc/php/7.0/apache2/conf.d/20-iconv.ini, /etc/php/7.0/apache2/conf. /7.0/apache2/conf.d/20-mysqli.ini, /etc/php/7.0/apache2/conf.d/20-p /7.0/apache2/conf.d/20-phar.ini, /etc/php/7.0/apache2/conf.d/20-posi /conf.d/20-readline.ini, /etc/php/7.0/apache2/conf.d/20-shmop.ini, /et sockets.ini, /etc/php/7.0/apache2/conf.d/20-sysvmsg.ini, /etc/php/7.(sysvsem.ini, /etc/php/7.0/apache2/conf.d/20-sysvshm.ini, /etc/php/7. tokenizer.ini

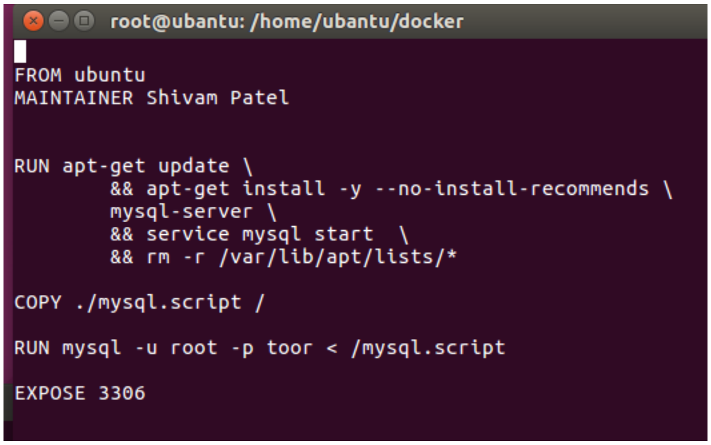
```
h new version
34.1) ...
 ---> ed169ddf2d9b
Removing intermediate container a07119df12d0
Successfully built ed169ddf2d9b
root@ubantu:/home/ubantu/docker# docker run --name phpcontainer -p 80:80 ed169dd
f2d9b
```

We can also mount our project directory itself into container which is more convenient for development. What ever changes we make to our project files on host machine will be refleted right away in to container. But for now we are making static images which will copy the files not mounting volumes.

Now lets focus on mysql.

I have made sql database in another virtual machine which has simple firstname and lastname and took mysqldump **mysqldump -u root -p –databases new > mysql.script**

And copied that file to our docker directory so that we can restore the same database every time we roll new container and for that I have made docker file that is below.



root@ubantu: /home/ubantu/docker

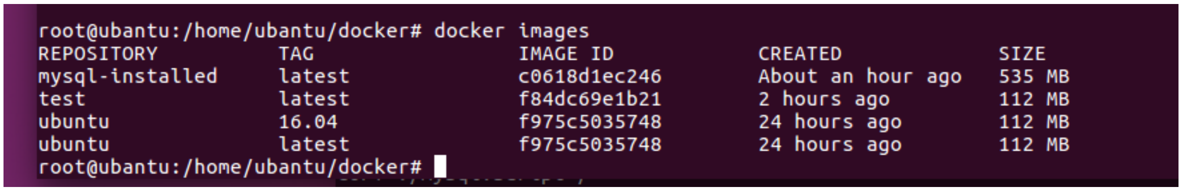
```
FROM ubuntu
MAINTAINER Shivam Patel


RUN apt-get update \
        && apt-get install -y --no-install-recommends \
        mysql-server \
        && service mysql start  \
        && rm -r /var/lib/apt/lists/*

COPY ./mysql.script /

RUN mysql -u root -p toor < /mysql.script

EXPOSE 3306
```

For Building mysql image I used above docker file but during the installation it asks for root password and when supply the password building process stucks there.

So I changed my plan a little which is actually more faster but mysql image file increased because im including mysql preinstalled in the image.

We can run the the base container and the get shell of the container by "**docker -it exec <containerID> /bin/bash**" now we are in container then I install mysql-server.now if I restart the container mysql will no longer be available so I made image out of that container

docker commit fh2hsfjnd24 mysql-installed   now mysql-installed is image that we will use



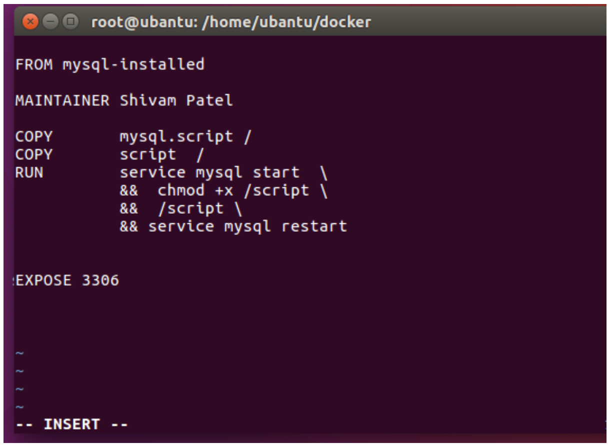
```
root@ubantu:/home/ubantu/docker# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mysql-installed     latest              c0618d1ec246        About an hour ago   535 MB
test                latest              f84dc69e1b21        2 hours ago         112 MB
ubuntu              16.04               f975c5035748        24 hours ago        112 MB
ubuntu              latest              f975c5035748        24 hours ago        112 MB
root@ubantu:/home/ubantu/docker# 
```

I need to make new dockerfile because I have image that contains mysql now I need to restore my database only.

For this purpose in dockerfile I copied mysql dump file which is "mysql.script" and also made little bash script that will restore the database

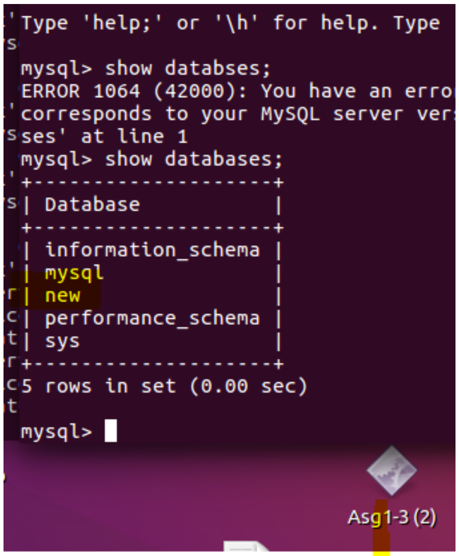
#!/bin/bash

mysql -u root --password=toor < mysql.script

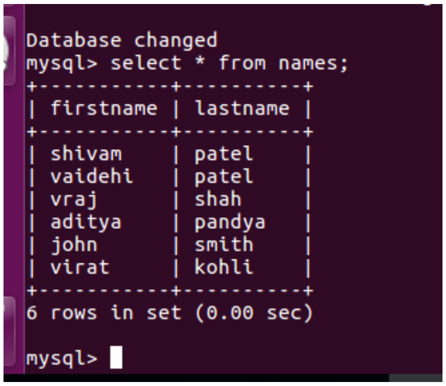


```
FROM mysql-installed

MAINTAINER Shivam Patel

COPY       mysql.script /
COPY       script  /
RUN        service mysql start  \
           &&  chmod +x /script \
           &&  /script \
           && service mysql restart


EXPOSE 3306



~
~
~
~
-- INSERT --
```

Now if I make container out of image made from this docker file I will get the my database inside the container .



```
Type 'help;' or '\h' for help. Type

mysql> show databses;
ERROR 1064 (42000): You have an erro
corresponds to your MySQL server ver
ses' at line 1
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| new                |
| performance_schema |
| sys                |
+--------------------+
5 rows in set (0.00 sec)

mysql> 
```



```
Database changed
mysql> select * from names;
+-----------+----------+
| firstname | lastname |
+-----------+----------+
| shivam    | patel    |
| vaidehi   | patel    |
| vraj      | shah     |
| aditya    | pandya   |
| john      | smith    |
| virat     | kohli    |
+-----------+----------+
6 rows in set (0.00 sec)

mysql> 
```

Now time to run full LAMP stack all together .

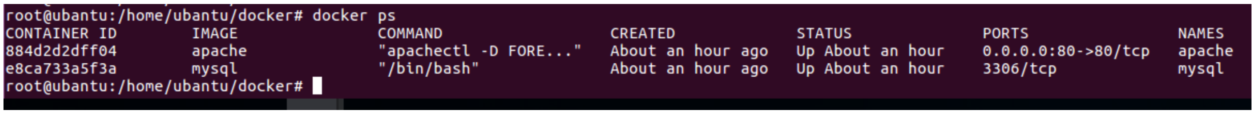
We already made image files from our docker file

First I run mysql container with   **docker run -– name mysql -p 3306:3306 mysql**

And I I have to manually comment ipbind 127.0.0.1 for remote access in the container but we can also do this automatically by including this in docker file

We need connectivity between mysql and apache container so we will run apache lill differently.

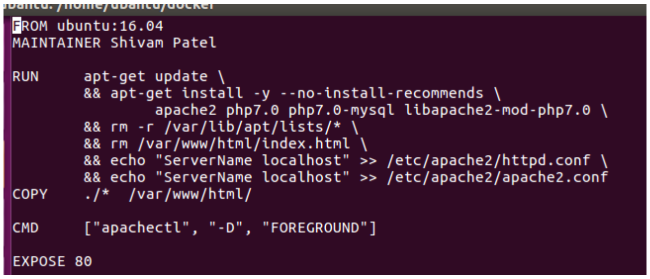
Docker run –-name apache -p 80:80 –-link mysql:mysql apache



```
root@ubantu:/home/ubantu/docker# docker ps
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS                NAMES
884d2d2dff04        apache              "apachectl -D FORE..."   About an hour ago   Up About an hour    0.0.0.0:80->80/tcp   apache
e8ca733a5f3a        mysql               "/bin/bash"              About an hour ago   Up About an hour    3306/tcp             mysql
root@ubantu:/home/ubantu/docker# 
```

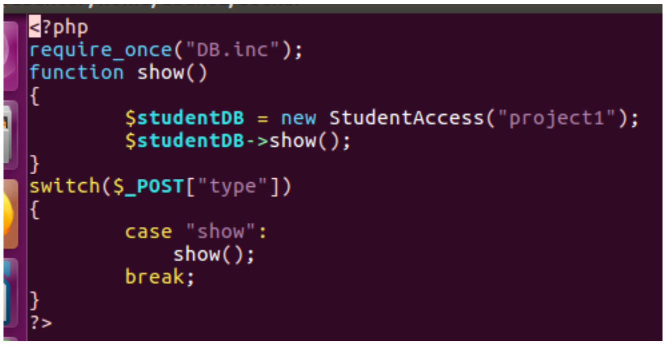
I have developed php file to interface with database im including all the code pics and also modified dockerfiles,

New dockerfile for apache



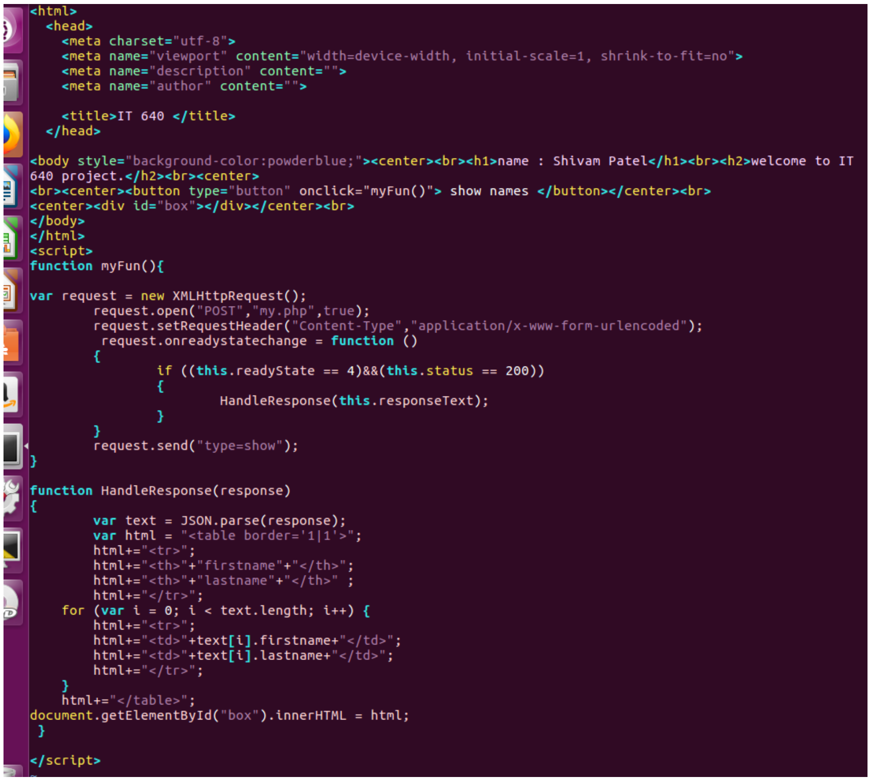
```
FROM ubuntu:16.04
MAINTAINER Shivam Patel

RUN     apt-get update \
        && apt-get install -y --no-install-recommends \
                apache2 php7.0 php7.0-mysql libapache2-mod-php7.0 \
        && rm -r /var/lib/apt/lists/* \
        && rm /var/www/html/index.html \
        && echo "ServerName localhost" >> /etc/apache2/httpd.conf \
        && echo "ServerName localhost" >> /etc/apache2/apache2.conf
COPY    ./*  /var/www/html/

CMD     ["apachectl", "-D", "FOREGROUND"]

EXPOSE 80
```

My.php file which processes inputs from javascript



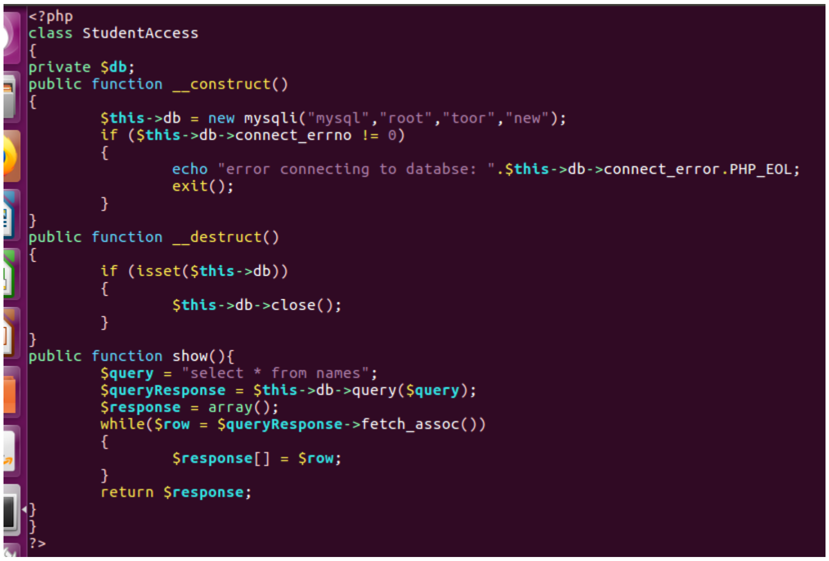
```
<?php
require_once("DB.inc");
function show()
{
        $studentDB = new StudentAccess("project1");
        $studentDB->show();
}
switch($_POST["type"])
{
        case "show":
            show();
        break;
}
?>
```

Index.html file



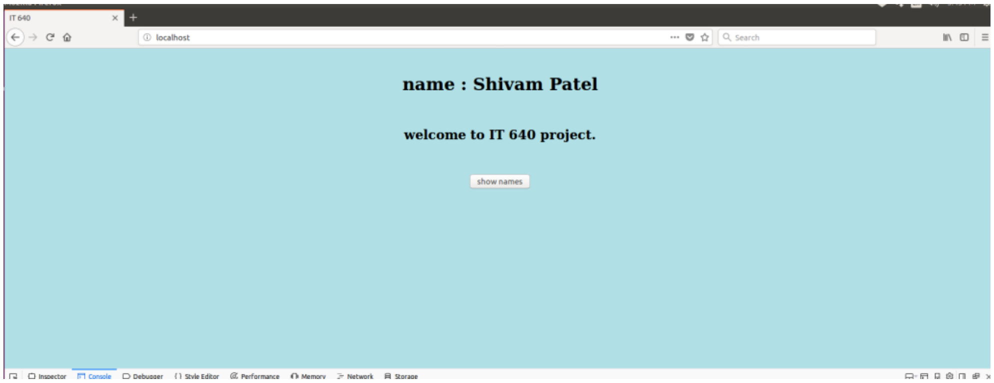
```
<html>
  <head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
    <meta name="description" content="">
    <meta name="author" content="">

    <title>IT 640 </title>
  </head>

<body style="background-color:powderblue;"><center><br><h1>name : Shivam Patel</h1><br><h2>welcome to IT
640 project.</h2><br><center>
<br><center><button type="button" onclick="myFun()"> show names </button></center><br>
<center><div id="box"></div></center><br>
</body>
</html>
<script>
function myFun(){

var request = new XMLHttpRequest();
        request.open("POST","my.php",true);
        request.setRequestHeader("Content-Type","application/x-www-form-urlencoded");
         request.onreadystatechange = function ()
        {
                if ((this.readyState == 4)&&(this.status == 200))
                {
                        HandleResponse(this.responseText);
                }
        }
        request.send("type=show");
}

function HandleResponse(response)
{
        var text = JSON.parse(response);
        var html = "<table border='1|1'>";
        html+="<tr>";
        html+="<th>"+"firstname"+"</th>";
        html+="<th>"+"lastname"+"</th" ;
        html+="</tr>";
    for (var i = 0; i < text.length; i++) {
        html+="<tr>";
        html+="<td>"+text[i].firstname+"</td>";
        html+="<td>"+text[i].lastname+"</td>";
        html+="</tr>";
    }
    html+="</table>";
document.getElementById("box").innerHTML = html;
 }

</script>
```

DB.inc file which interfaces with database container



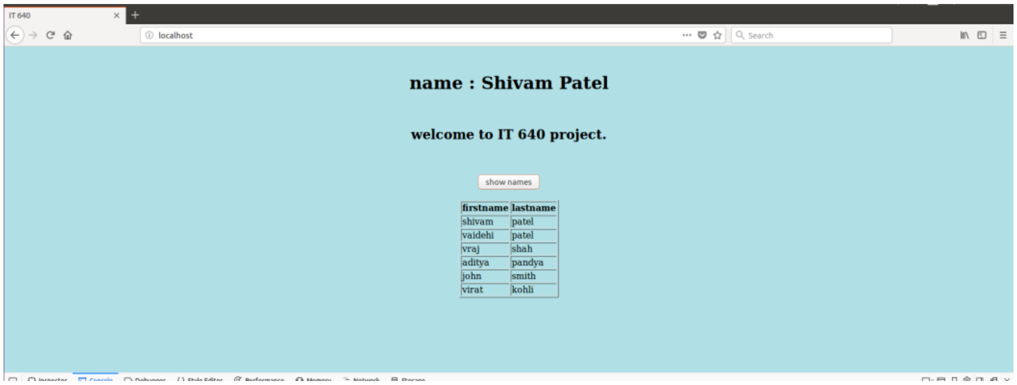
```
<?php
class StudentAccess
{
private $db;
public function __construct()
{
        $this->db = new mysqli("mysql","root","toor","new");
        if ($this->db->connect_errno != 0)
        {
                echo "error connecting to databse: ".$this->db->connect_error.PHP_EOL;
                exit();
        }
}
public function __destruct()
{
        if (isset($this->db))
        {
                $this->db->close();
        }
}
public function show(){
        $query = "select * from names";
        $queryResponse = $this->db->query($query);
        $response = array();
        while($row = $queryResponse->fetch_assoc())
        {
                $response[] = $row;
        }
        return $response;
}
}
?>
```

Output :



name : Shivam Patel

welcome to IT 640 project.



name : Shivam Patel

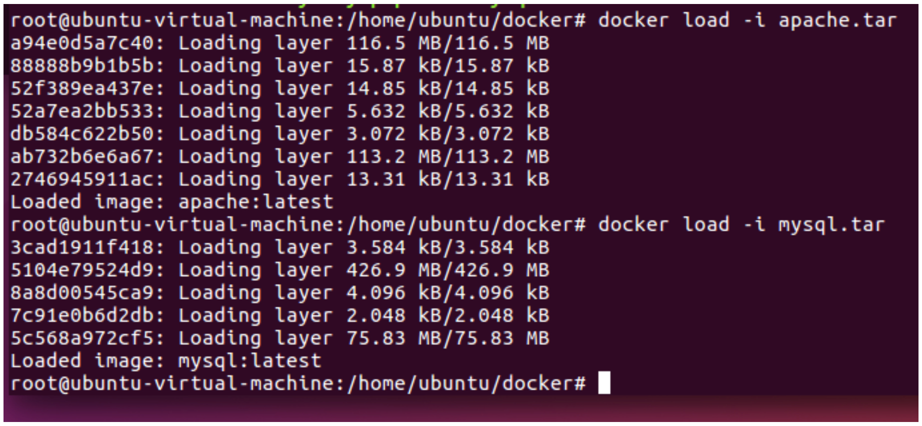
welcome to IT 640 project.

firstname	lastname
shivam	patel
vaidehi	patel
vraj	shah
aditya	pandya
john	smith
virat	kohli

In the image above firstname and lastname are coming from mysql databse which is running on separate container so our full LAMP stack is functional.

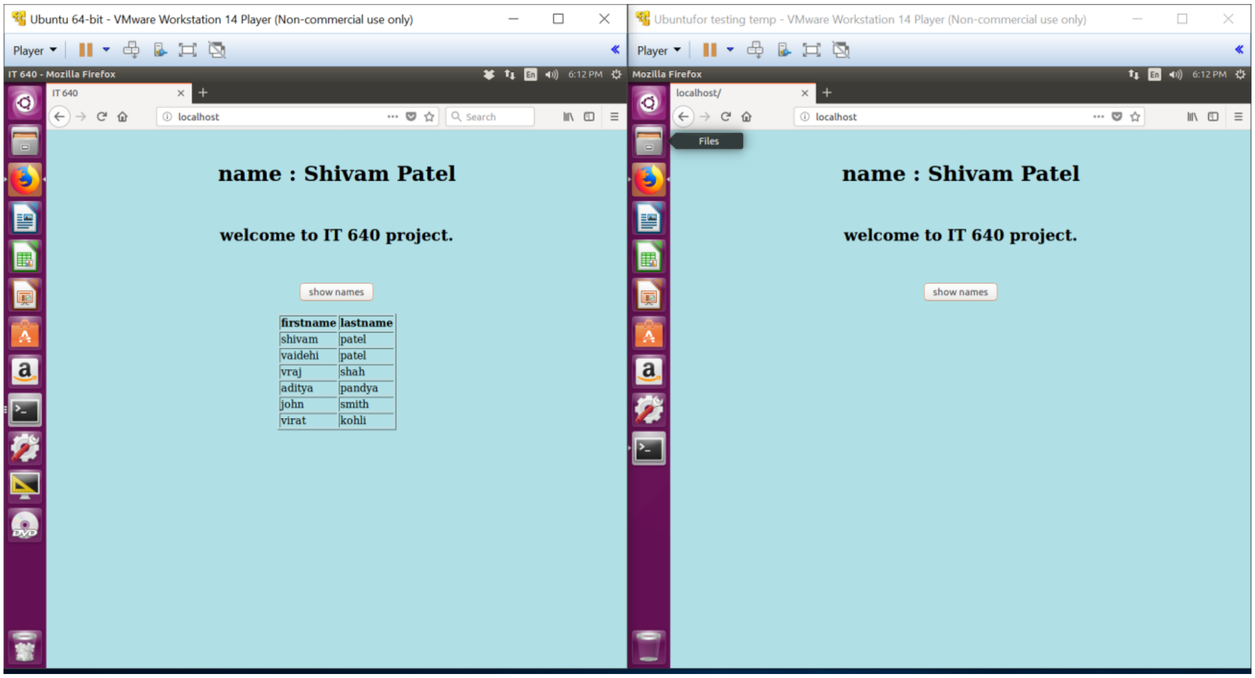
Now I save the images and transferred to another ubuntu machine and run the container from it

I works and I just takes about 15 min to transfer and make it working 2 containers which is the purpose of docker .



```
root@ubuntu-virtual-machine:/home/ubuntu/docker# docker load -i apache.tar
a94e0d5a7c40: Loading layer 116.5 MB/116.5 MB
88888b9b1b5b: Loading layer 15.87 kB/15.87 kB
52f389ea437e: Loading layer 14.85 kB/14.85 kB
52a7ea2bb533: Loading layer 5.632 kB/5.632 kB
db584c622b50: Loading layer 3.072 kB/3.072 kB
ab732b6e6a67: Loading layer 113.2 MB/113.2 MB
2746945911ac: Loading layer 13.31 kB/13.31 kB
Loaded image: apache:latest
root@ubuntu-virtual-machine:/home/ubuntu/docker# docker load -i mysql.tar
3cad1911f418: Loading layer 3.584 kB/3.584 kB
5104e79524d9: Loading layer 426.9 MB/426.9 MB
8a8d00545ca9: Loading layer 4.096 kB/4.096 kB
7c91e0b6d2db: Loading layer 2.048 kB/2.048 kB
5c568a972cf5: Loading layer 75.83 MB/75.83 MB
Loaded image: mysql:latest
root@ubuntu-virtual-machine:/home/ubuntu/docker# 
```

This screen shot shows side by side VMs running our website


Ubuntu 64-bit - VMware Workstation 14 Player (Non-commercial use only)
Player
IT 640 - Mozilla Firefox
6:12 PM
IT 640
localhost
Search
Ubuntufor testing temp - VMware Workstation 14 Player (Non-commercial use only)
Player
Mozilla Firefox
6:12 PM
localhost/
localhost
Files

name : Shivam Patel

welcome to IT 640 project.

show names

firstname	lastname
shivam	patel
vaidehi	patel
vraj	shah
aditya	pandya
john	smith
virat	kohli

name : Shivam Patel

welcome to IT 640 project.

show names

THANK YOU,

SHIVAM PATEL