FARMEASY ON AZURE

The implementation of a database application on a cloud using docker.

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As part of the Course **Operating Systems– CS52**

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RAMAIAH INSTITUTE OF TECHNOLOGY

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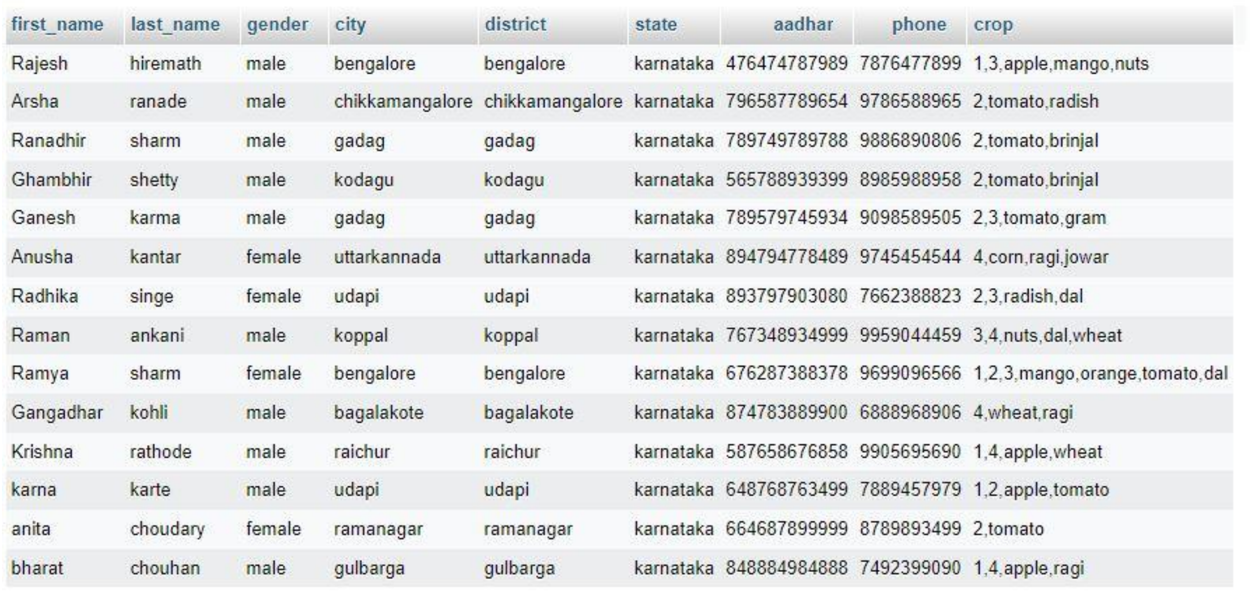
Objective:

The main objective of this document is to demonstrate the implementation of a database application on a public cloud using docker.

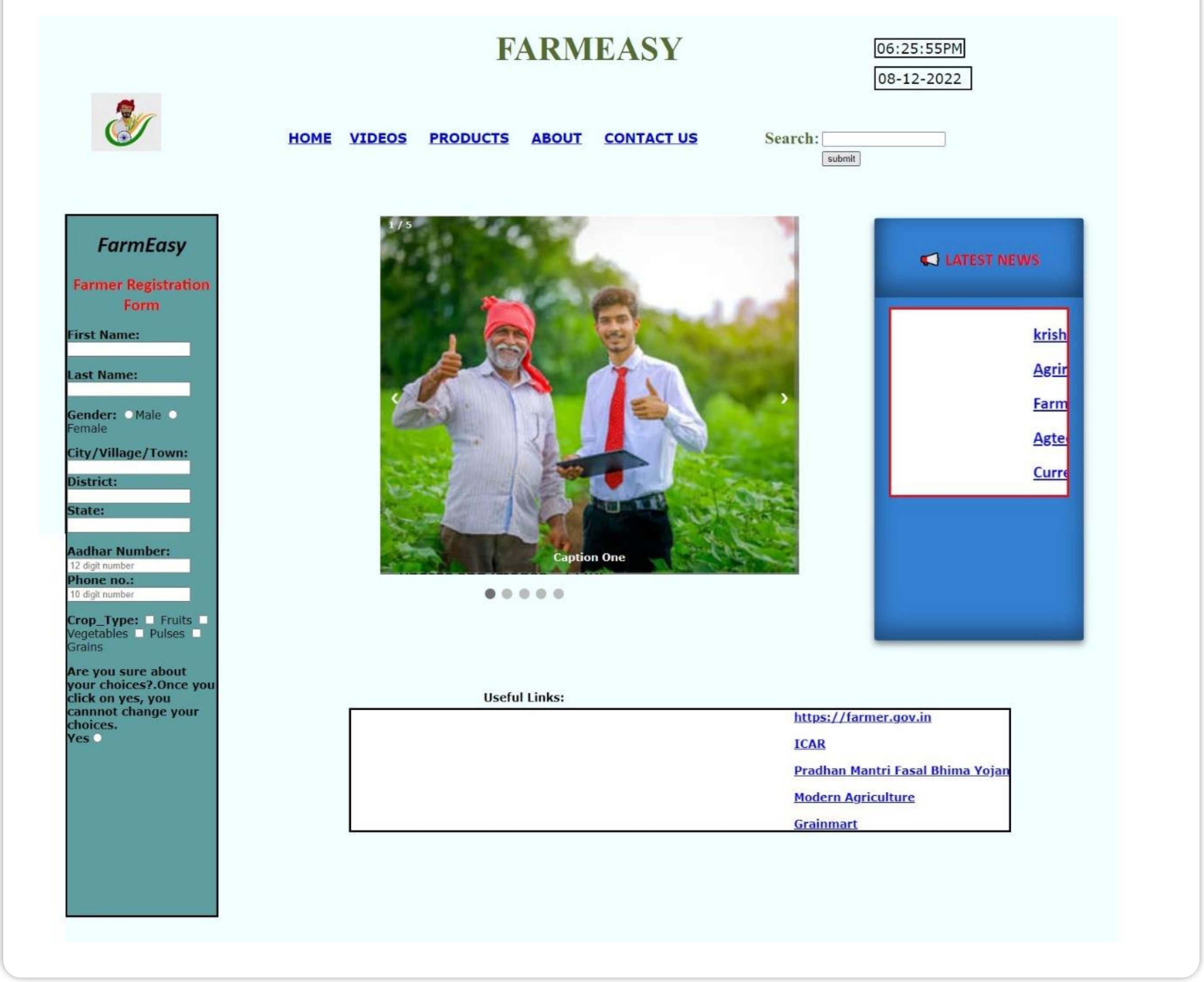
Background:

Farmeasy is the name of our database application. The name has been kept keeping in mind the users of this application; Farmers and Researchers. Basically, Farmers upload data regarding themselves and the crops which they want to sell. This data is stored in a database which is then accessed for displaying available products to buyers. Besides we also have useful links for farmers in the homepage, a scroller image widget, a clock, a link to videos and miscellaneous. We have used JavaScript, HTML and CSS for the front end and PHP for the back-end connectivity. MariaDB(MySQL) is used as back-end database.



first_name	last_name	gender	city	district	state	aadhar	phone	crop
Rajesh	hiremath	male	bengalore	bengalore	karnataka	476474787989	7876477899	1,3,apple,mango,nuts
Arsha	ranade	male	chikkamangalore	chikkamangalore	karnataka	796587789654	9786588965	2,tomato,radish
Ranadhir	sharm	male	gadag	gadag	karnataka	789749789788	9886890806	2,tomato,brinjal
Ghambhir	shetty	male	kodagu	kodagu	karnataka	565788939399	8985988958	2,tomato,brinjal
Ganesh	karma	male	gadag	gadag	karnataka	789579745934	9098589505	2,3,tomato,gram
Anusha	kantar	female	uttarkannada	uttarkannada	karnataka	894794778489	9745454544	4,corn,ragi,jowar
Radhika	singe	female	udapi	udapi	karnataka	893797903080	7662388823	2,3,radish,dal
Raman	ankani	male	koppal	koppal	karnataka	767348934999	9959044459	3,4,nuts,dal,wheat
Ramya	sharm	female	bengalore	bengalore	karnataka	676287388378	9699096566	1,2,3,mango,orange,tomato,dal
Gangadhar	kohli	male	bagalakote	bagalakote	karnataka	874783889900	6888968906	4,wheat,ragi
Krishna	rathode	male	raichur	raichur	karnataka	587658676858	9905695690	1,4,apple,wheat
karna	karte	male	udapi	udapi	karnataka	648768763499	7889457979	1,2,apple,tomato
anita	choudary	female	ramanagar	ramanagar	karnataka	664687899999	8789893499	2,tomato
bharat	chouhan	male	gulbarga	gulbarga	karnataka	848884984888	7492399090	1,4,apple,ragi

Fig. 1: Sample Of the Data In Database



FARMEASY

06:25:55PM

08-12-2022

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FarmEasy

Farmer Registration Form

First Name:

Last Name:

Gender: ○ Male ○ Female

City/Village/Town:

District:

State:

Aadhar Number: 12 digit number

Phone no.: 10 digit number

Crop_Type: ☐ Fruits ☐ Vegetables ☐ Pulses ☐ Grains

Are you sure about your choices?.Once you click on yes, you cannnot change your choices.

Yes ○

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https://farmer.gov.in

ICAR

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Fig. 2: The homepage of our website

Docker:

Our database application is executed using XAMPP server, which loads PHP scripts using Apache web server and MySQL server. This works fine for our local computers. The aim is to make our application platform independent. There are varieties of operating systems or runtime environments in which we may have to run our application and there is no guarantee that it will work there. Docker is treated as the solution for such situation. It is similar to virtual machines, the difference being that it virtualizes the operating system, while Virtual Machine virtualizes hardware. Using Docker containers, we can run a container in virtually any platform.

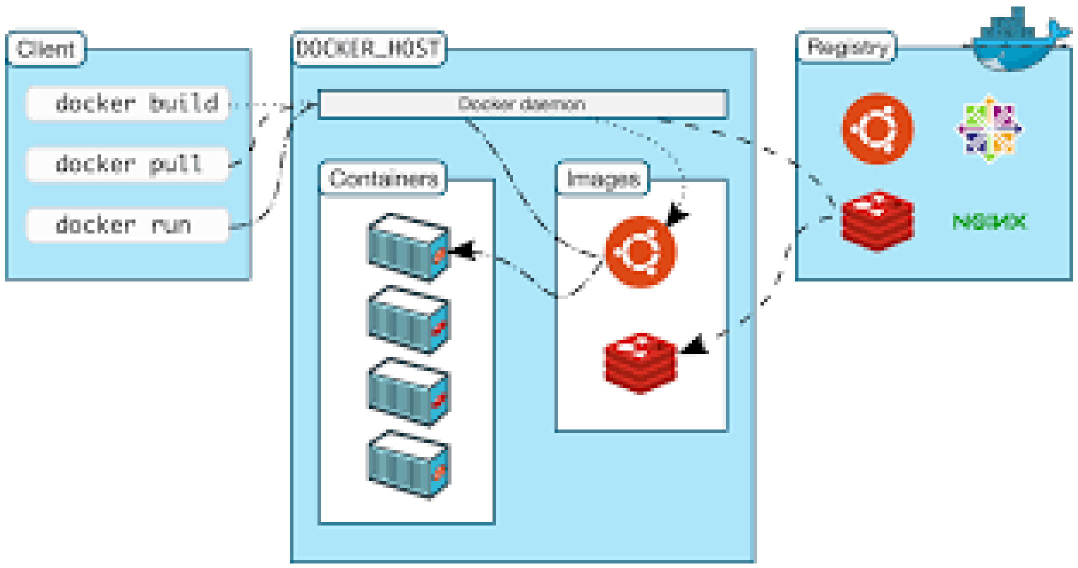


Fig. 3: Docker

Dockerizing the Database Application:

To dockerize our database application, we must have docker installed in our local system. Dockerizing process was tested with with an Ubuntu:bionic Debian image, since docker is originally built for linux systems.

Here are the set of commands that we used in order to dockerize our database application. The following are the steps to dockerize.

1. Sudo apt install docker.io (Install Docker on the Local System)

2. sudo docker pull ubuntu:bionic (Pull the ubuntu/; bionic image)

3. sudo docker images (Check the images available in the Local System)

4. sudo docker run -idt --name os-project -p 8080:80 ubuntu:bionic /bin/bash (create a docker container in an interactive, detached, terminal mode with name “os-project”. Route requests to port 8080 on host machine through port 80 on the container.

5. sudo docker container ls -a (Display the containers created)

6. sudo docker exec it os-project bash (Execute the container in bash shell)

7. Some of the net tools and other required tools are installed using the following commands

- apt update && apt upgrade
- apt install sudo
- sudo apt-get install iputils-ping
- sudo apt-get install net-tools

8. sudo docker cp /home/downloads/xampp-linux-x64-7.1.32-0-installer.run os-

project:/opt/ (Copy the xampp installer to the newly created container)

9. chmod +x xampp-linux-x64-7.1.32-0-installer.run (Give permission to installer file for execution)

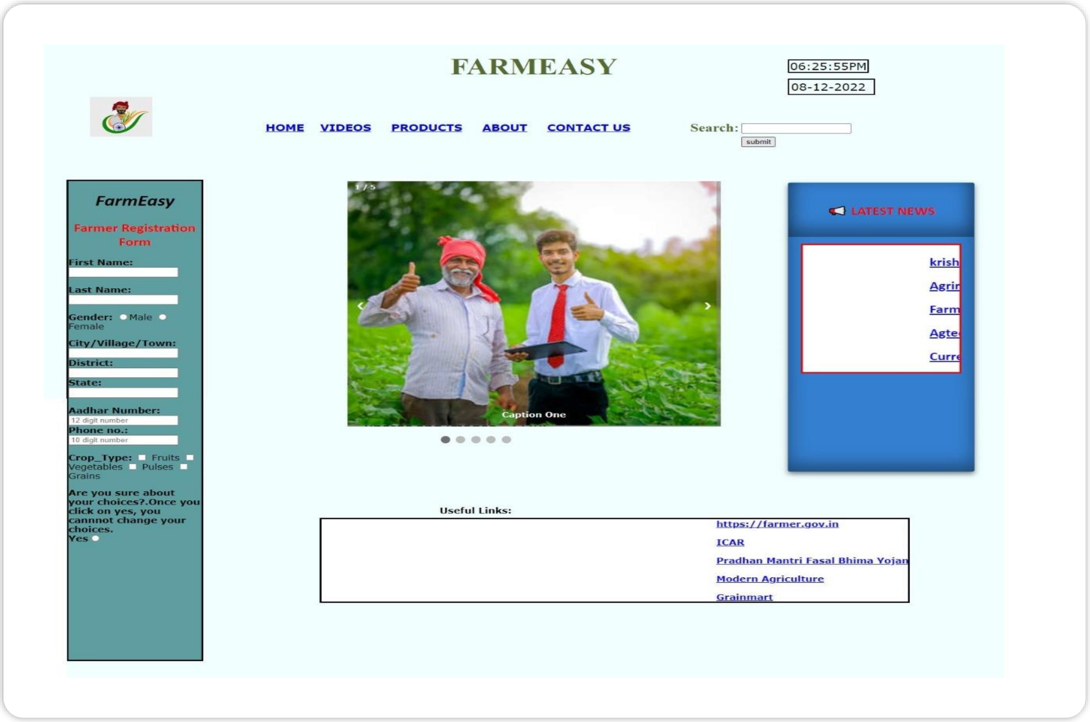
10. ./xampp-linux-x64-7.1.32-0-installer.run (Install xampp)

11. #cd lampp (Change to Xampp directory)

12. #./lampp start (Start Tomcat and mySql servers in Xampp)

13. sudo docker cp /home/downloads/FarmEasy os-project:/opt/lampp/htdocs/FarmEasy (Copy the webpages to xampp directory)

14. Check the website running using the container.



FARMEASY

06:25:55PM
08-12-2022

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Search: submit

FarmEasy

Farmer Registration Form

First Name:
Last Name:
Gender: ○ Male ○ Female
City/Village/Town:
District:
State:
Aadhar Number: 12 digit number
Phone no.: 10 digit number
Crop_Type: ☐ Fruits ☐ Vegetables ☐ Pulses ☐ Grains

Are you sure about your choices?.Once you click on yes, you cannnot change your choices.
Yes ○

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Caption One

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15. sudo docker commit 21804891926d os-project-final (Commit the changes to the image with a new name)

We have configured a running XAMPP server on an Ubuntu container. This container can now be deployed in any environment.

Azure:

Azure is a popular public cloud, managed by the Microsoft Corporation. We chose Azure because of its ease of usage compared to other cloud platforms. It provides several free services for the first 12 months and also offers $200 credit to be used in the first twelve months. Azure offers a broad variety of services like Web Apps, Virtual Machines, SQL storage and so on. For our project, we use the Web App service of Azure.

Fig. 5: Azure Cloud

Deploying Container To Azure:

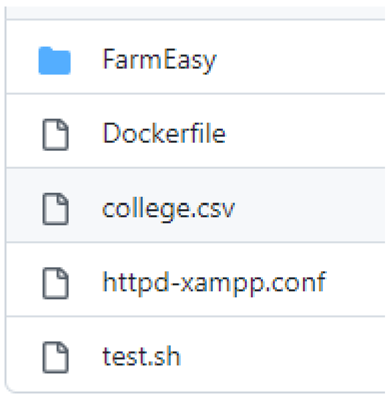
Now comes the hard part. If we are to load our container in our local system to azure, we require login to azure through command line and then upload the image to Azure, which is time consuming(and bandwidth consuming) since our “os-project” is around 1.3 GB in size. If we want to make any change, then we have to upload to azure again. Instead, we use another technique which is a standard and portable way of creating images: Dockerfile. Dockerfile contains instructions which Docker understands and hence creates an image. For our project the Dockerfile is as follows:

```
FROM ubuntu:bionic

COPY xampp-linux-x64-7.1.32-0-installer.run /opt

WORKDIR /opt

RUN apt-get update

RUN apt-get install net-tools

RUN chmod +x xampp-linux-x64-7.1.32-0-installer.run

RUN ./xampp-linux-x64-7.1.32-0-installer.run

WORKDIR lampp/htdocs

RUN mkdir FarmEasy

COPY FarmEasy /opt/lampp/htdocs/FarmEasy

WORKDIR /opt

RUN rm lampp/etc/extra/httpd-xampp.conf

COPY httpd-xampp.conf /opt/lampp/etc/extra

EXPOSE 80

COPY test.sh /usr/local/bin/

RUN chmod u+x /usr/local/bin/test.sh

ENTRYPOINT ["test.sh"]
```

The httpd-conf is used to configure phpmyadmin for public access.

The test.sh has a very important function to perform. The XAMPP server, unlike other servers like nginx, does not run in the foreground. To keep the server running in foreground(otherwise the container exits immediately after run), we need something that runs forever. test.sh does exactly this. It runs an infinite while loop.

To run the program on azure or any platform, we simply create a project folder whose contents are in the manner as follows:

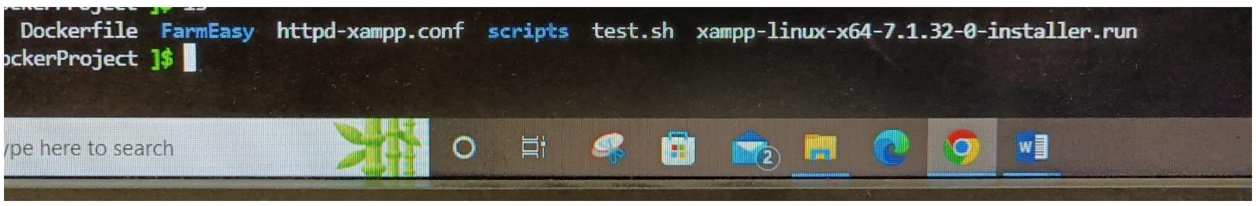


```
FarmEasy
Dockerfile
college.csv
httpd-xampp.conf
test.sh
```

Note that I haven't included the xampp installation file here because it is too large (152MB) to fit in a normal GitHub repository. In Azure I dealt with the problem using wget:

wget ***https://sourceforge.net/projects/xampp/files/XAMPP%20Linux/7.1.32/xampp-linux-x64-7.1.32-0-installer.run/download***

and then I renamed the file as xampp-linux-x64-7.1.32-0-installer.run and moved it to the project folder. Basically, our project folder contents should be as follows:



```
 Dockerfile  FarmEasy  httpd-xampp.conf  scripts  test.sh  xampp-linux-x64-7.1.32-0-installer.run
ckerProject ]$
```

To import data into the project folder, we can simply use:

git clone ***https://github.com/txh2020/DockerProject***

Azure does not implement docker directly. It uses Azure Container Registry which is similar to docker registry but specialized for Azure.

Now, the steps to deploy the webapp are as follows.

i. Create an Azure Container Registry in the Azure Portal. Before this, make sure you have created a resource group.

ii. Open cloud terminal. Set up project directory as shown in above figure. Then in that directory issue the following command.

    az acr build --registry <registry-name> image <give_your_name> .

iii. Create a web app. While creating, choose docker container. Then in docker section choose the registry and the image created (this is done automatically)

iv. Then, after creating the webapp, go to configuration. Edit the WEBSITES_ENABLE_APP_SERVICE_STORAGE parameter to true.

    The app is now good to go. The URL for our app is:

    https://finalosproject4.azurewebsites.net/FarmEasy/proj.php