IT 640 PROJECT
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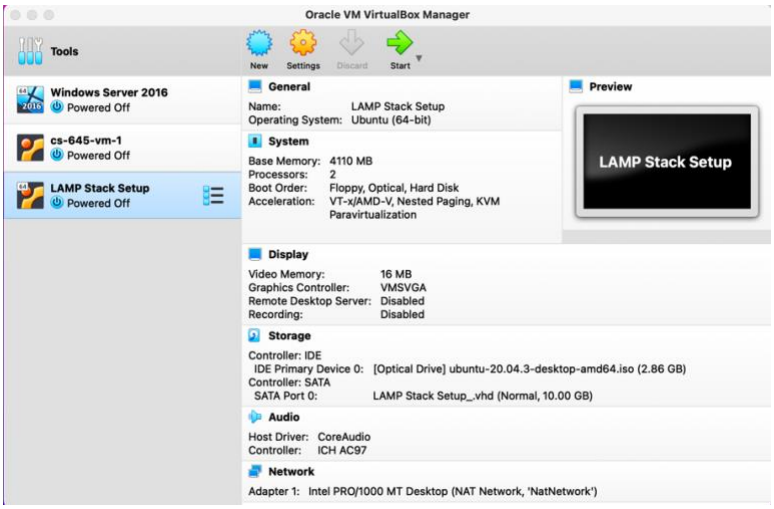
As part of this project, we implemented one of the most popular open-source web service and development stack know as “LAMP” stack. LAMP stack acronym represents the Linux operating system, Apache web server, MySQL database and dynamic content processed by PHP.

I will start with explaining why “LMAP” stack?
“LAMP” stack is entirely open-source, and its components are freely available to anyone who want to design, develop, and host a web application. Because of this, the stack has become popular in web development and hosting space.

Environment Setup

- Host OS; MacOS
- Guest OS: Ubuntu 20.04

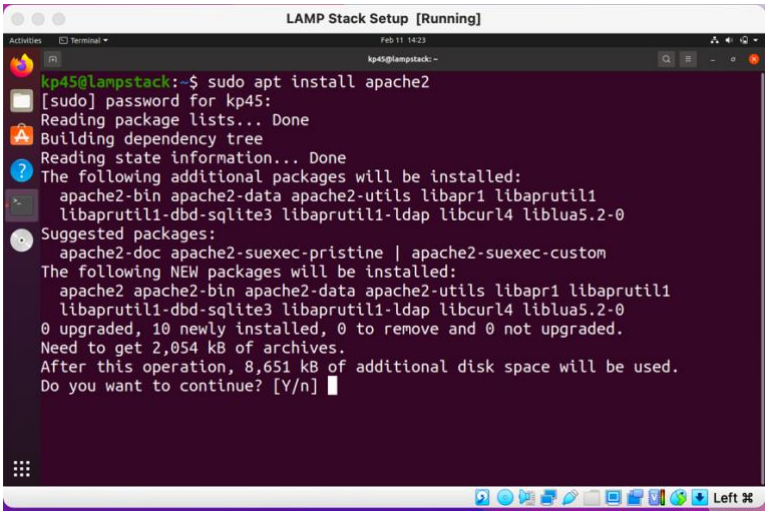
I used Virtual box to implement this project. As it shown in below SS I used, 4 GB of RAM, 2 processor, Ubuntu 20.04 and have 10 GB of virtual hard disk.



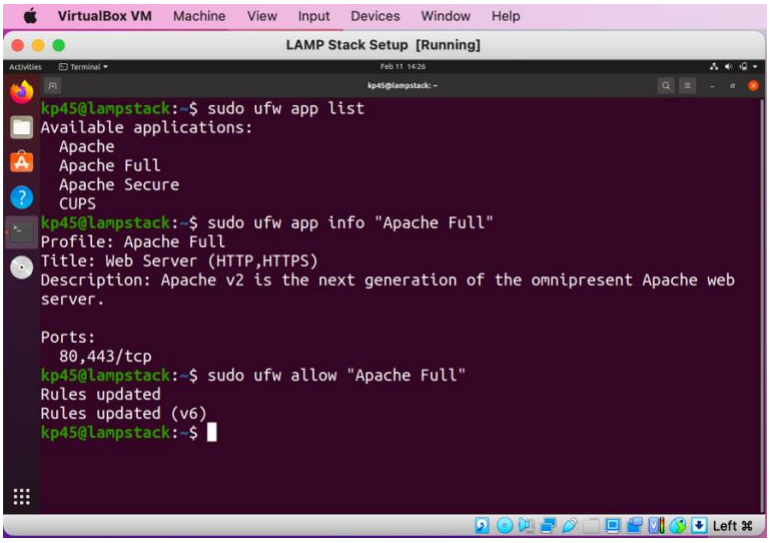
Configure and set up Apache Web Server

Apache web server is a popular open-source web server to host webpages. First step that I always take before installing any packages is to make sure that, my apt cache in OS is updated by executing “**`sudo apt update`**” command.

Installed Apache: sudo apt install apache2 and during the installation it will prompt you with information that how much space it will take and press Y after confirming that I have enough space to install Apache.

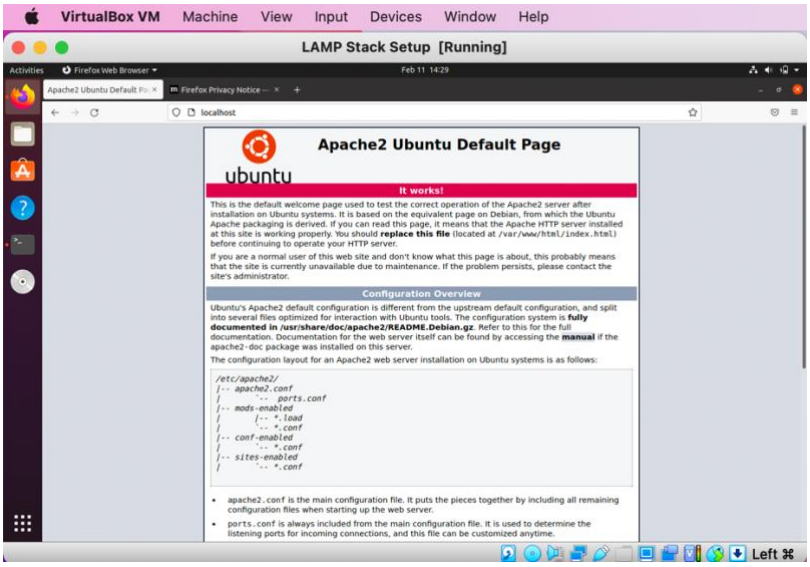


Once I installed Apache, next step would be to make sure that my firewall rules are setup correctly to allow HTTP and HTTPS traffic on port 80 and 443. For this, I used following command:
`sudo ufw app list` – List Allowed Application on Ubuntu Firewall (UFW)
`sudo ufw app info "Apache Full"` - to make sure firewall allows traffic on Apache Server.



After installing Apache and verifying firewall configuration, next I took was to check if Apache server is running or not by accessing the webpage wither by visiting server's IP (127.0.0.1) or hostname (http://localhost)

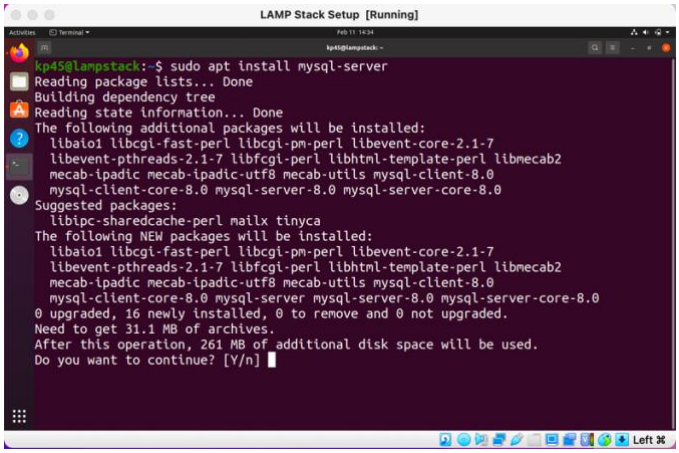
And, as seen in below SS, I can access default Apache web page on Ubuntu 20.04, which has some useful server information and used for testing purpose.



Configure and set up MySQL Database server

Now that I have my webserver up and running. Next step, I took to install and set up MySQL database. MySQL is mainly used to organize and access to databases where our site can store information.

Installed MySQL database server with: **`sudo apt install mysql-server`**

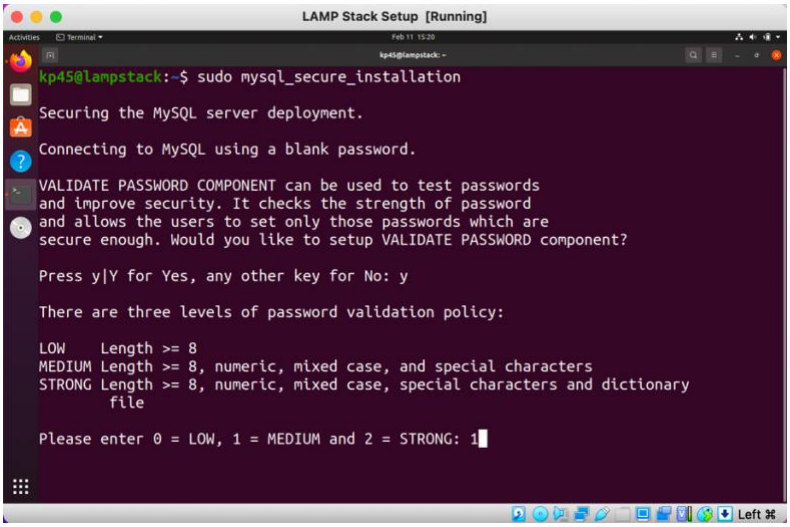


Now, database is perhaps the most and important and critical piece in IT, which needs to be secure and have control access. Once, installation has been complete, I took next to run some custom security script provided by MySQL to remove some dangerous defaults and lock down access to my database system and ensure only requires users have access to database. This way, I learnt good security practice which is an essential task for every IT personnel.

I ran the script using following command: **`sudo mysql_secure_installation`**

As it shown in above SS, after running the script it will ask me to configure the “VALIDATE PASSWORD PLUGIN” which allows administrator to set strong password policy. Hence, using this plugin user must require creating a strong password as per the MySQL password policy and it will reject if it founds any weak password, this way it makes more secure authentication process.

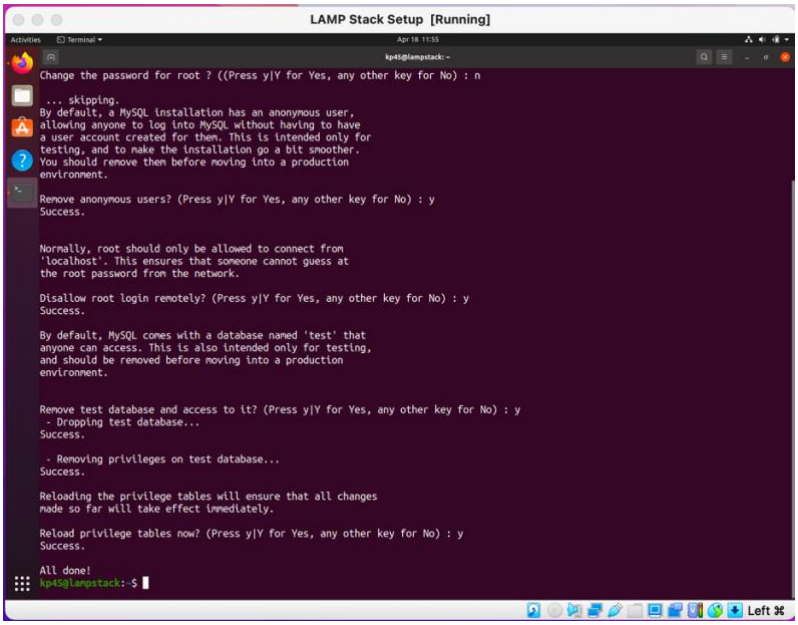
Once I selected YES or y it asked me to select level of password validation. I selected 1 and set medium level for my database. However, I found that if I select 2 (Strong level) then I cannot create a password from any common dictionary words and password should contain numbers, lowercase, uppercase and special characters. This created a strong security layer on our database.



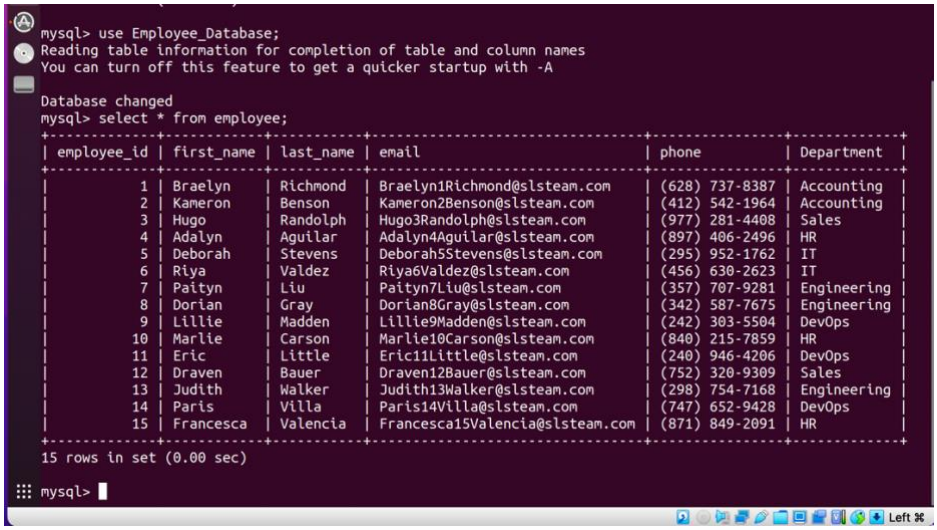
Next, it will ask to set password for database root user which is an admin user with full privileges over the database system. Now, I have enabled password validation to medium hence it shows “100” as strength for root password and I do not want to change it so I have select NO or n.

Next, it asked few security and access related questions:

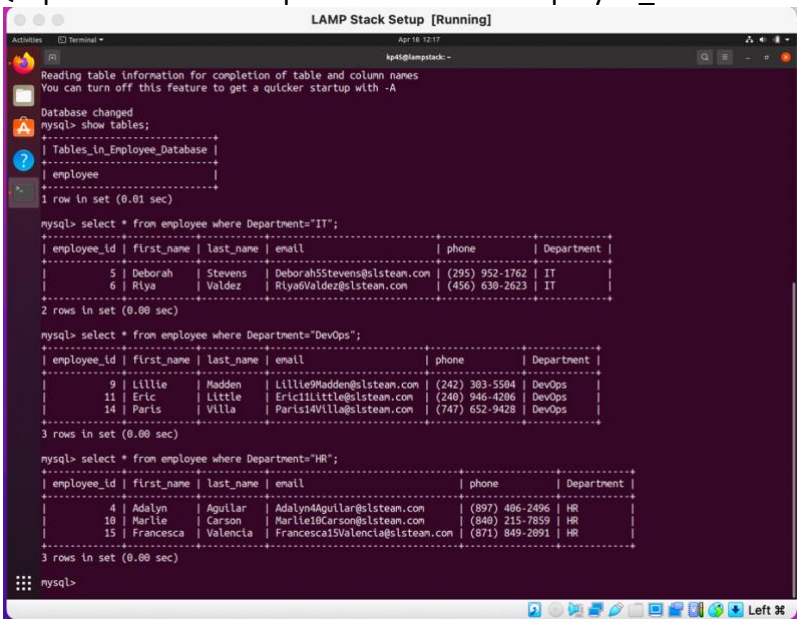
1) Remove any anonymous users to access to MySQL and choose YES or y
2) Disallows any remote access and only allow from localhost as I do not want to my databse to be access over the internet so choose YES or y
3) Next, to remove ‘test’ database that, anyone can access so I removed ‘test’ database and access as I will creating a sample database for myself with controlled access.
4) Lastly, it will ask to reload the privileges table which basically has all user access information and I choose YES or y to configure MySQL with these changes.



Next, I have verified database functionality by creating a sample database “Emplyee_Database” and run few sql queries to access the database.

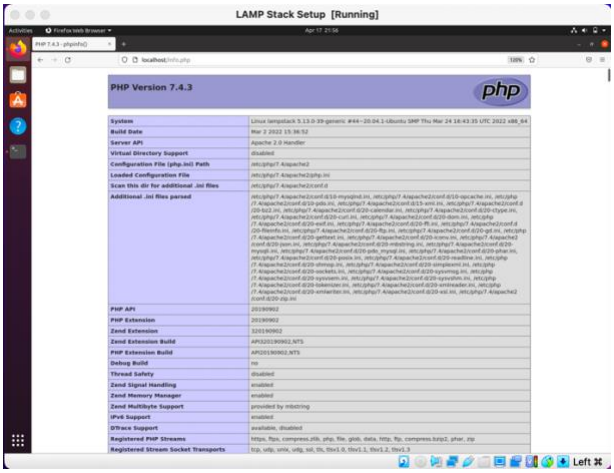


Also, run some SQL queries to extract specific data from Employee_Database.



Configure and set up PHP

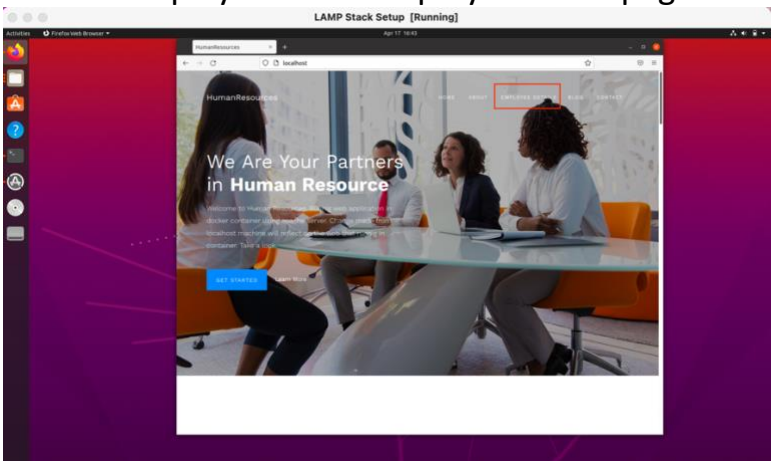
PHP use to display dynamic content on webpage and integrate with MySQL by running php scripts to process database information on webpage. Installed and verified php configuration and hosted on Apache server.



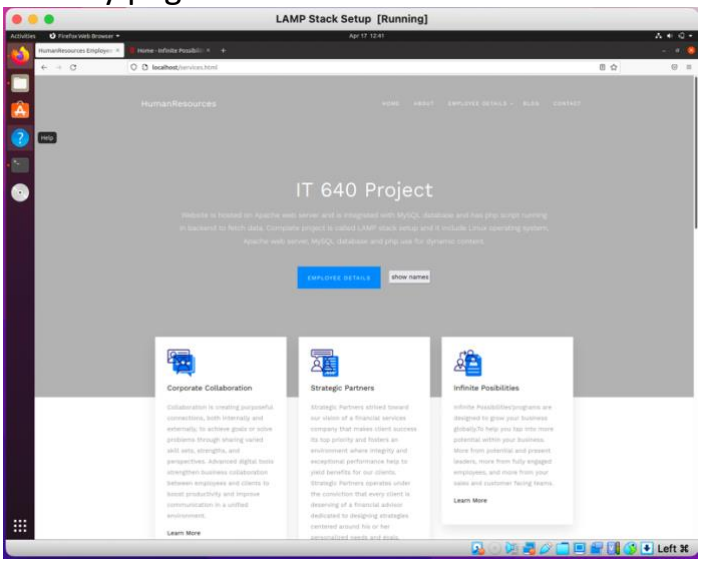
To implement LAMP stack setup as in real time, I have hosted a sample website of “XYZ” company and HR department of this company using this website for their internal use and update their employees about companies incites. To illustrate php and MySQL functionality, I have created a php script to connect to MySQL database called “Employee_Database”.

Employee_Database is mainly contained employee table which has record of current employees of the “XYZ” company and any employees can access information about how many employees working, what departments they are in and their contact details.

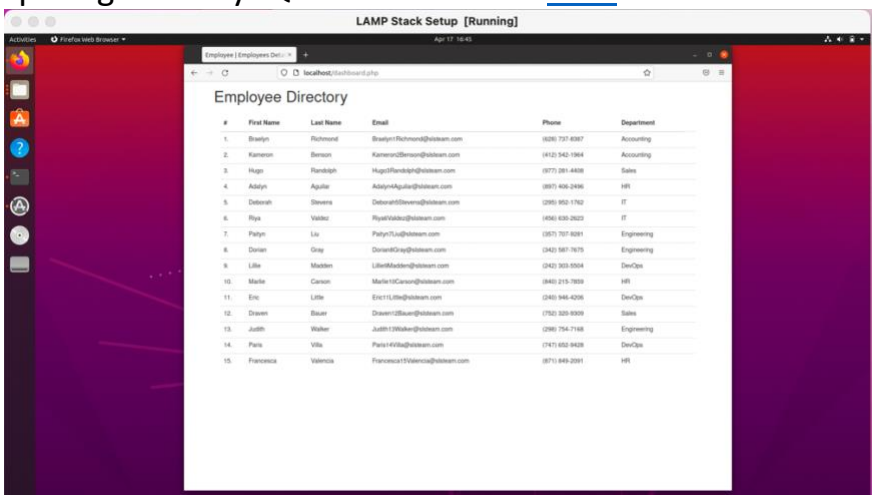
1) Companies Internal HR homepage. By navigating to EMPLOYEE DETAILS button and it will display internal employee detail page.



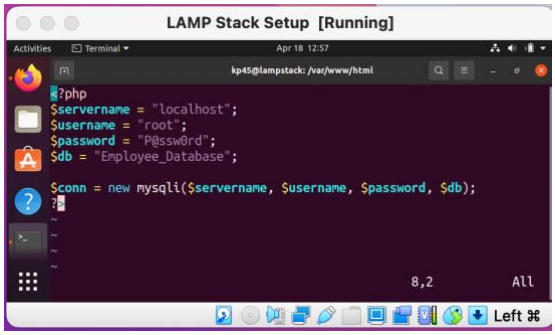
2) Internal employee details page. Select blue button and it will display employee directory page.



As we can see Employee data displays on our website running on localhost. You can verify by comparing with MySQL database table here.



Php script to connect to database:



Problem I faced during the host configuration:
Apache by default host index.html page, as part of this project I wanted to host php pages as they are more dynamic in nature so, initially I'd to change the default dir.conf file of the Apache and it can be found at /etc/apache2/mods-enabled/dir.conf and changed the DirectoryIndex specification and set below index and it solved my issue.