VProfile Project Setup

About the Project

The VProfile project is a multi-tier web application stack set up on a local machine (desktop or laptop). The project utilizes various services such as PHP, MySQL, jQuery, and Apache to power its runtime.

Scenario

Working on this project involves dealing with multiple services, including PHP, MySQL, jQuery, and Apache. However, setting up and managing these services on a local machine can be complex, time-consuming, and not repeatable. Moreover, making changes directly on real servers can be risky and uncomfortable.

Problems

1. Not comfortable making changes on real servers.
2. Local setup is complex.
3. Time-consuming.
4. Not repeatable.

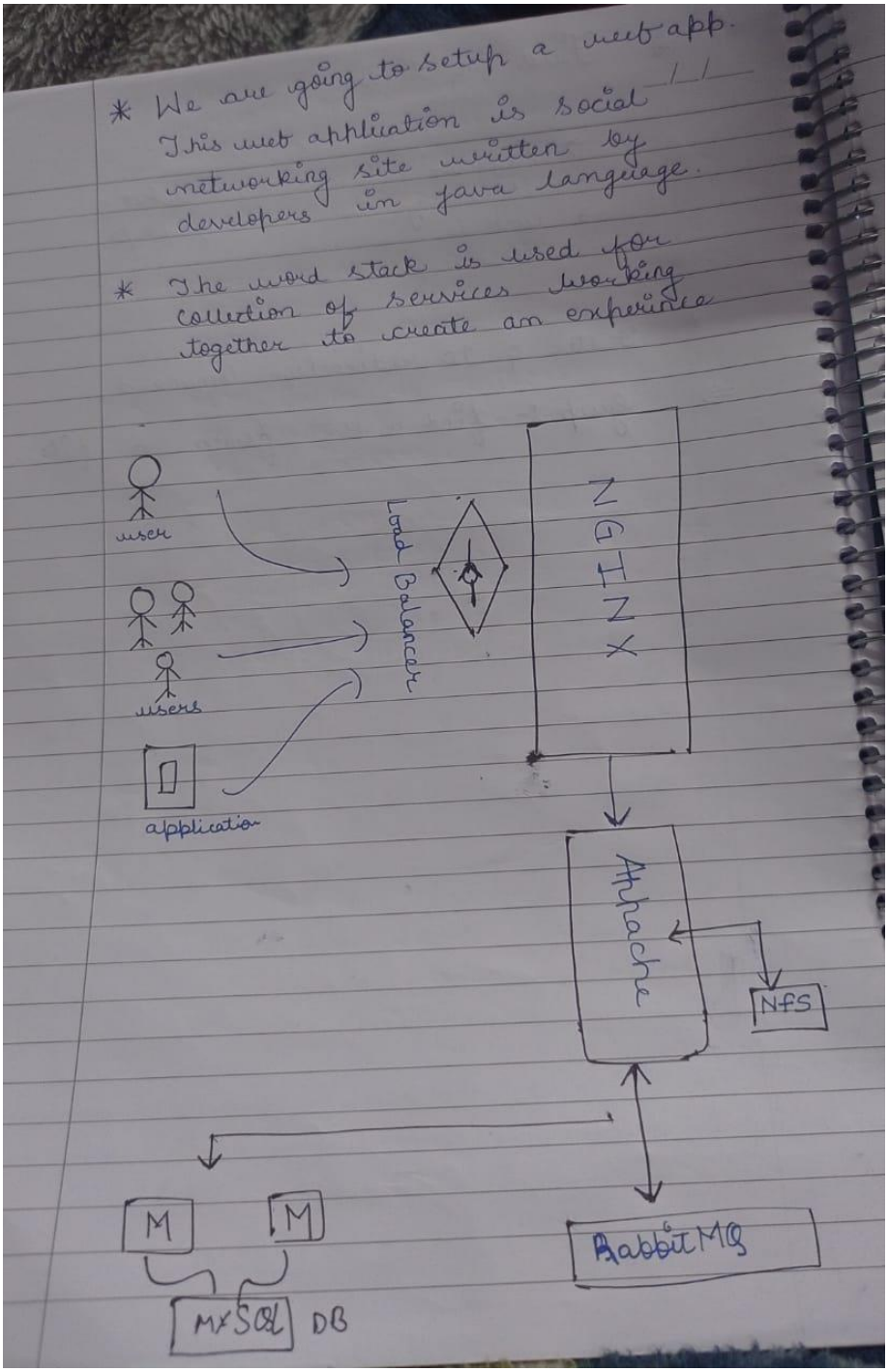
Solution

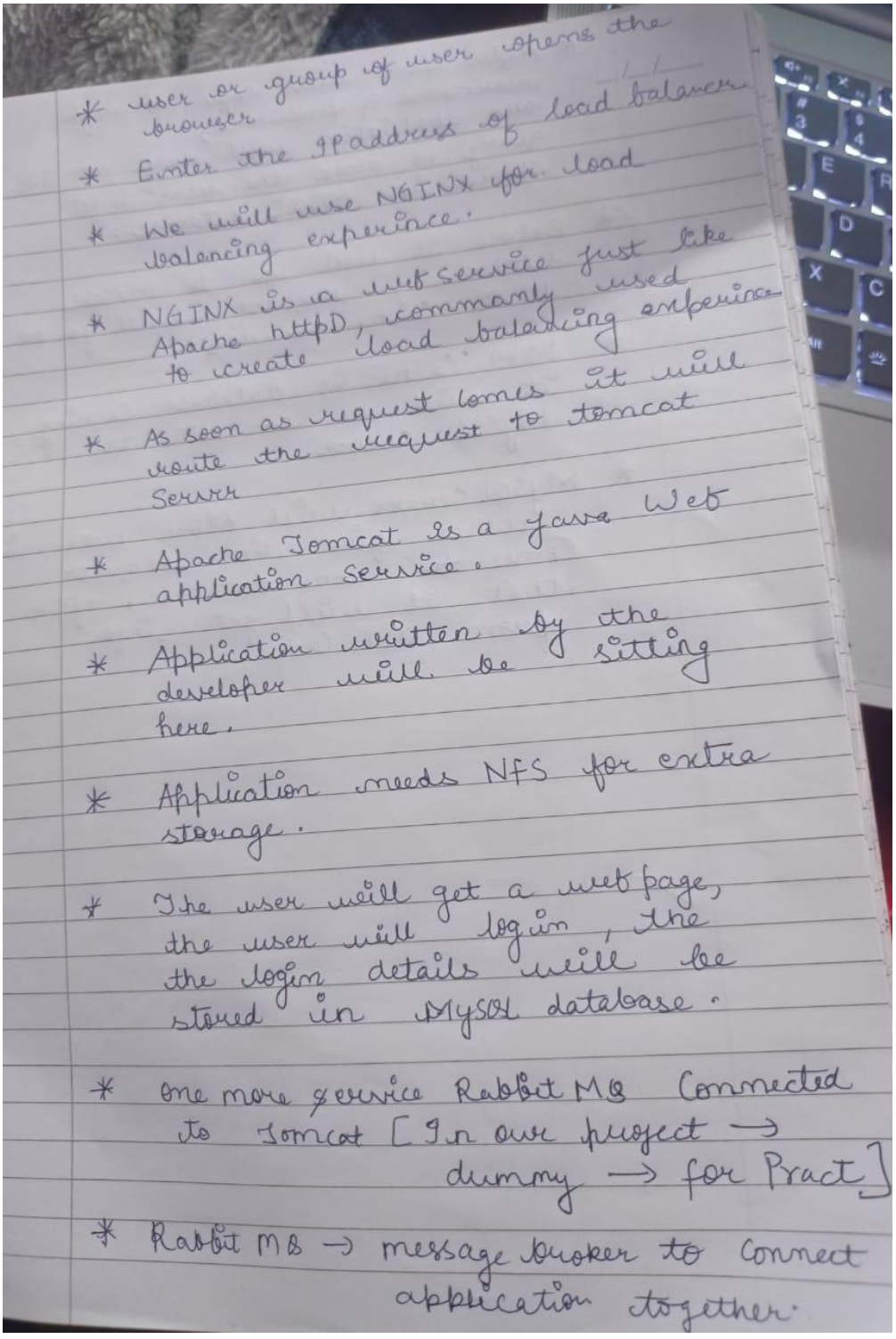
A local setup that is automated, repeatable, and coded (Infrastructure as a Service - IaaS) is the solution. This allows for extensive research and development on the local machine without affecting real servers.

Tools

- **Hypervisor:** Oracle VM VirtualBox
- **Automation:** Vagrant
- **CLI:** Git Bash
- **IDE:** Sublime Text (or any IDE of your choice)

Infrastructure Information




* user or group of user opens the browser
* Enter the IPaddress of load balancer
* We will use NGINX for load balancing experince.
* NGINX is a web service just like Apache httpD, commanly used to create load balancing experince
* As soon as request comes it will route the request to tomcat Server
* Apache Tomcat is a java Web application Service.
* Application written by the developer will be sitting here.
* Application needs NFS for extra storage.
* The user will get a web page, the user will login, the the login details will be stored in MySQL database.
* One more service RabbitMQ Connected to Tomcat [In our project → dummy → for Pract]
* RabbitMQ → message broker to Connect application together.

* After user will login through username & password, our application will run an SQL query to access the user info stored in MYSQL database.

* Before it will go to MYSQL database, request will go to M M Cache servers.

* MM Cache is database caching, it will be connected to MySQL server.

* MySQL Server will store user info when first time request comes to the database, after that it will get info from MM Cache.

VProfile Setup

Prerequisite

1. **Oracle VM VirtualBox**
2. **Vagrant**
3. **Vagrant Plugins**
    - Install the hostmanager plugin:

bash

Copy code

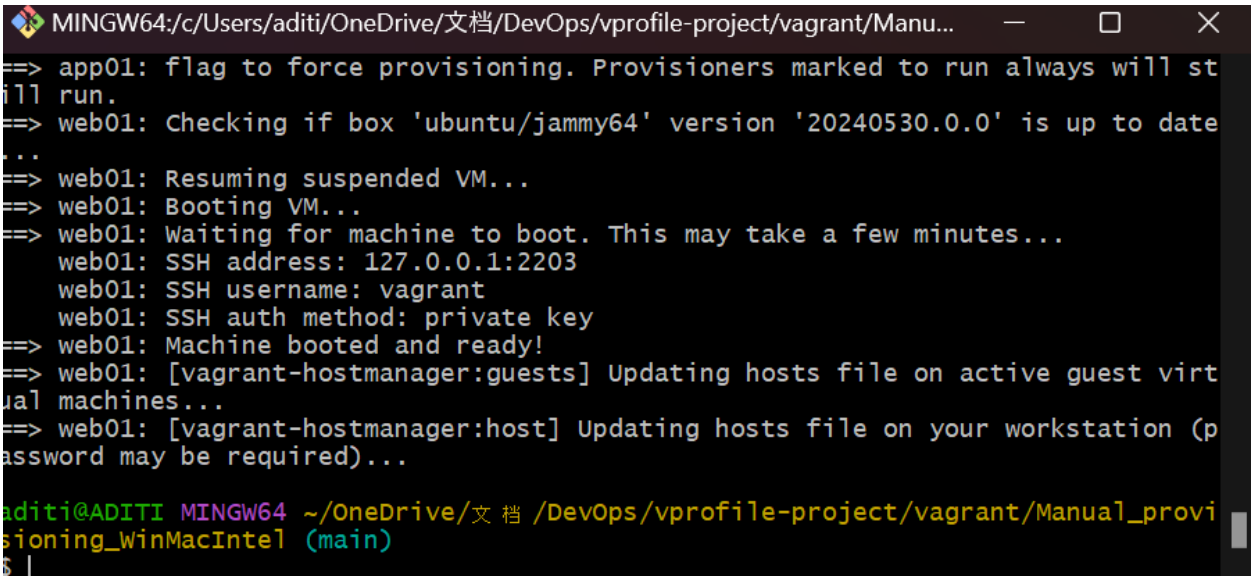
$ vagrant plugin install vagrant-hostmanager

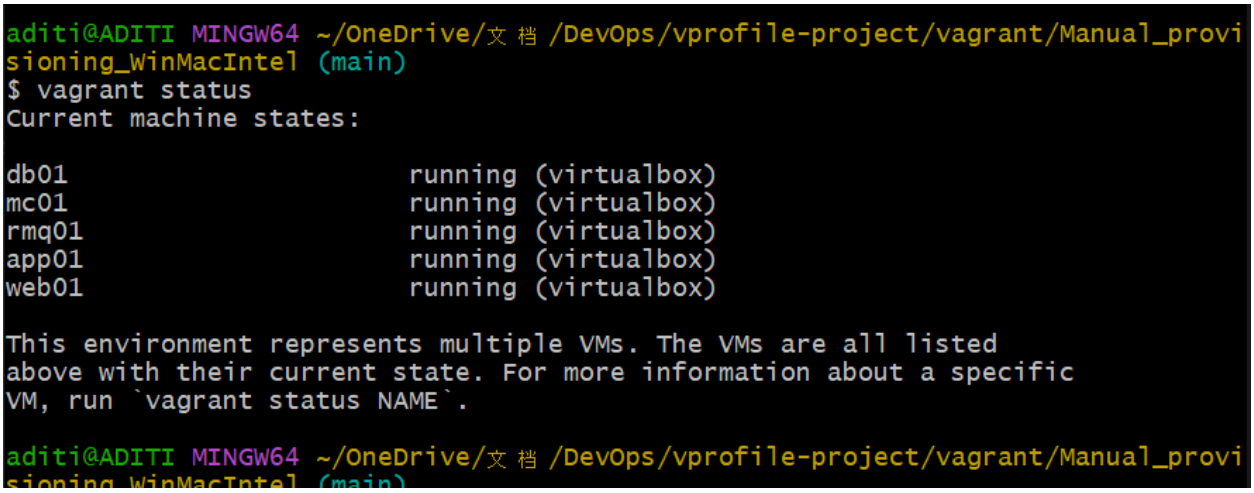
4. **Git Bash or Equivalent Editor**

VM Setup

1. Bring the Vagrant file into the folder and execute vagrant up to set up the VM.

```
aditi@ADITI MINGW64 ~/OneDrive/文档
$ ls
'All Notes'/         CloudHere/       MongoDb/     'Water Scarcity Problem'/
 Certificate/        DevOps/         'PDEU Work'/   WindowsPowerShell/
'Cloud Computing'/   DocMarcksheet/   Python/        desktop.ini
 CloudExamUs/        Illustrator/     Resume/      'pdeu details'/

aditi@ADITI MINGW64 ~/OneDrive/文档
$ cd DevOps/

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps
$ ls
VProject.docx  vprofile-project/

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps
$ cd vprofilr-project/
bash: cd: vprofilr-project/: No such file or directory

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps
$ cd vprofile-project/

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project (main)
$ ls
Jenkinsfile  README.md  ansible/  pom.xml  src/  vagrant/

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project (main)
$ ls
Jenkinsfile  README.md  ansible/  pom.xml  src/  vagrant/

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project (main)
$ cd vagrant

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project/vagrant (main)
$ ls
Automated_provisioning_MacOSM1/      Manual_provisioning_MacOSM1/
Automated_provisioning_WinMacIntel/  Manual_provisioning_WinMacIntel/

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project/vagrant (main)
$ cd ^C

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project/vagrant (main)
$ cd Manual_provisioning_WinMacIntel/

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project/vagrant/Manual_provi
sioning_WinMacIntel (main)
$ vagrant global-status
id       name   provider state  directory
--------------------------------------------------------------------
There are no active Vagrant environments on this computer! Or,
you haven't destroyed and recreated Vagrant environments that were
started with an older version of Vagrant.

aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project/vagrant/Manual_provi
sioning_WinMacIntel (main)
$ vagrant up
Bringing machine 'db01' up with 'virtualbox' provider...
Bringing machine 'mc01' up with 'virtualbox' provider...
```


MINGW64:/c/Users/aditi/OneDrive/文档/DevOps/vprofile-project/vagrant/Manu...
==> app01: flag to force provisioning. Provisioners marked to run always will st
ill run.
==> web01: Checking if box 'ubuntu/jammy64' version '20240530.0.0' is up to date
...
==> web01: Resuming suspended VM...
==> web01: Booting VM...
==> web01: Waiting for machine to boot. This may take a few minutes...
web01: SSH address: 127.0.0.1:2203
web01: SSH username: vagrant
web01: SSH auth method: private key
==> web01: Machine booted and ready!
==> web01: [vagrant-hostmanager:guests] Updating hosts file on active guest virt
ual machines...
==> web01: [vagrant-hostmanager:host] Updating hosts file on your workstation (p
assword may be required)...
aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project/vagrant/Manual_provi
sioning_WinMacIntel (main)
$


aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project/vagrant/Manual_provi
sioning_WinMacIntel (main)
$ vagrant status
Current machine states:
db01 running (virtualbox)
mc01 running (virtualbox)
rmq01 running (virtualbox)
app01 running (virtualbox)
web01 running (virtualbox)
This environment represents multiple VMs. The VMs are all listed
above with their current state. For more information about a specific
VM, run `vagrant status NAME`.
aditi@ADITI MINGW64 ~/OneDrive/文档/DevOps/vprofile-project/vagrant/Manual_provi

Provisioning

Services:

1. **Nginx:** Web Service
2. **Tomcat:** Application Server
3. **RabbitMQ:** Broker/Queuing Agent
4. **Memcache:** DB Caching
5. **ElasticSearch:** Indexing/Search Service
6. **MySQL:** SQL Database

Setup Order:

1. MySQL (Database Service)
2. Memcache (DB Caching Service)
3. RabbitMQ (Broker/Queue Service)
4. Tomcat (Application Service)
5. Nginx (Web Service)

1) MySQL setup :

Login to the db vm

➔ $ vagrant ssh db01

Verify Hosts entry, if entries missing update it with IP and hostnames

➔ # cat /etc/hosts

Update OS with latest patches

➔ # yum update -y

Set Repository

➔ # yum install epel-release -y

Install Maria DB Package

➔ # yum install git mariadb-server -y

Starting & enabling mariadb-server

➔ # systemctl start mariadb
➔ # systemctl enable mariadb

RUN mysql secure installation script.

➔ # mysql_secure_installation

```
haven't set the root password yet, you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password or using the unix_socket ensures that nobody
can log into the MariaDB root user without the proper authorisation.

You already have your root account protected, so you can safely answer 'n'.

Switch to unix_socket authentication [Y/n] y
Enabled successfully!
Reloading privilege tables..
 ... Success!


You already have your root account protected, so you can safely answer 'n'.

Change the root password? [Y/n] y
New password:
Re-enter new password:
Password updated successfully!
Reloading privilege tables..
 ... Success!


By default, a MariaDB installation has an anonymous user, allowing anyone
to log into MariaDB without having to have a user account created for
them.  This is intended only for testing, and to make the installation
go a bit smoother.  You should remove them before moving into a
production environment.

Remove anonymous users? [Y/n] y
 ... Success!

Normally, root should only be allowed to connect from 'localhost'.  This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n] y
 ... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access.  This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n] y
 - Dropping test database...
 ... Success!
 - Removing privileges on test database...
 ... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n] y
 ... Success!
```

Set DB name and users.

- # mysql -u root -padmin123
- mysql> create database accounts;
- mysql> grant all privileges on accounts.* TO 'admin'@'%' identified by 'admin123';
- mysql> FLUSH PRIVILEGES; mysql> exit;

Download Source code & Initialize the Database.

- # git clone -b main https://github.com/hkhcoder/vprofile-project.git
- # cd vprofile-project
- # mysql -u root -padmin123 accounts < src/main/resources/db_backup.sql
- # mysql -u root -padmin123 accounts
- mysql> show tables;
- mysql> exit;

```
You can turn off this feature to get a quicker startup with -A

Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 15
Server version: 10.5.22-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [accounts]> show tables;
+--------------------+
| Tables_in_accounts |
+--------------------+
| role               |
| user               |
| user_role          |
+--------------------+
3 rows in set (0.001 sec)
```

Restart mariadb-server

- # systemctl restart mariadb

2.MEMCACHE SETUP

Login to the Memcache vm

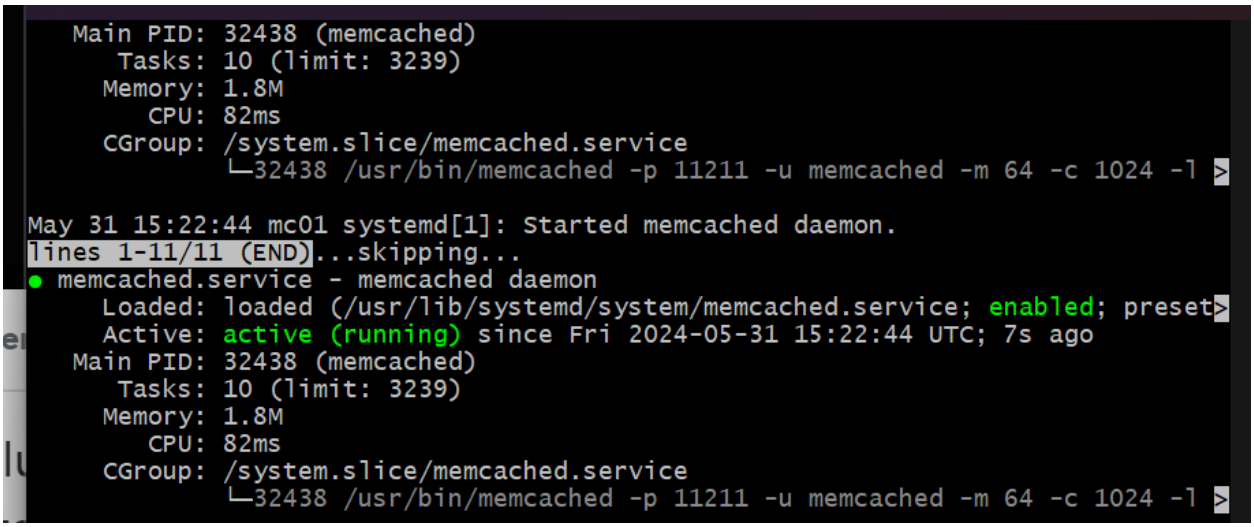
➔ $ vagrant ssh mc01

Update OS with latest patches

➔ # yum update -y

Install, start & enable memcache on port 11211

```
# sudo dnf install epel-release -y
# sudo dnf install memcached -y
# sudo systemctl start memcached
# sudo systemctl enable memcached
# sudo systemctl status memcached
# sed -i 's/127.0.0.1/0.0.0.0/g' /etc/sysconfig/memcached
# sudo systemctl restart memcached
```



Starting the firewall and allowing the port 11211 to access memcache

```
# firewall-cmd --add-port=11211/tcp
# firewall-cmd --runtime-to-permanent
# firewall-cmd --add-port=11111/udp
# firewall-cmd --runtime-to-permanent
# sudo memcached -p 11211 -U 11111 -u memcached -d
```

3.RABBITMQ SETUP

Follow same procedure.

```
Complete!
[root@rmq01 ~]#  systemctl enable --now rabbitmq-server
Created symlink /etc/systemd/system/multi-user.target.wants/rabbitmq-server.service → /u
sr/lib/systemd/system/rabbitmq-server.service.
[root@rmq01 ~]# sudo sh -c 'echo "[{rabbit, [{loopback_users, []}]}]." > /etc/rabbitmq/r
abbitmq.config'
[root@rmq01 ~]# ^[[200~ sudo rabbitmqctl add_user test test
-bash: $'\E[200~': command not found
[root@rmq01 ~]# ~ sudo rabbitmqctl add_user test test
-bash: /root: Is a directory
[root@rmq01 ~]# sudo rabbitmqctl set_user_tags test administrator
Setting tags for user "test" to [administrator] ...
Error:
User "test" does not exist
[root@rmq01 ~]# sudo rabbitmqctl add_user test test
Adding user "test" ...
Done. Don't forget to grant the user permissions to some virtual hosts! See 'rabbitmqctl
 help set_permissions' to learn more.
[root@rmq01 ~]# sudo rabbitmqctl set_user_tags test administrator
Setting tags for user "test" to [administrator] ...
[root@rmq01 ~]# sudo systemctl restart rabbitmq-server
[root@rmq01 ~]# exit
logout
[vagrant@rmq01 ~]$
```

Backend Is all Set !

4. Tomcat Setup

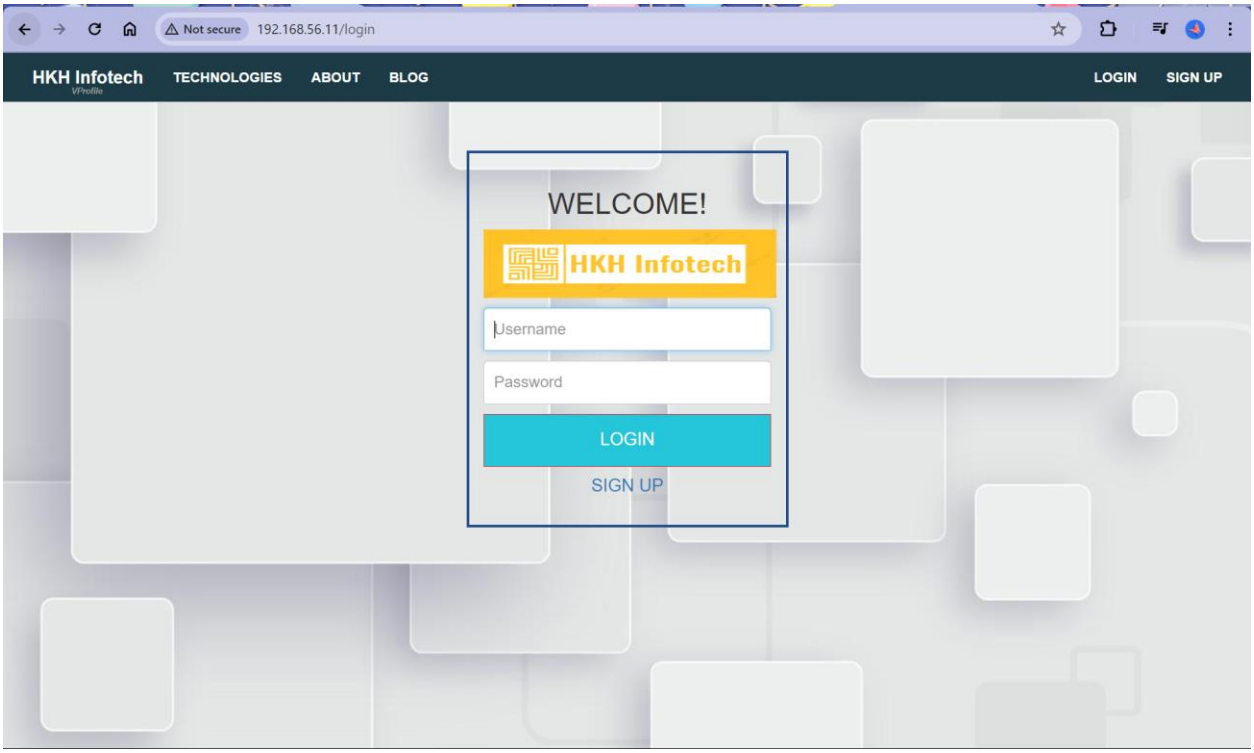
```
apache-tomcat-9.0.75/bin/ciphers.sh
apache-tomcat-9.0.75/bin/configtest.sh
apache-tomcat-9.0.75/bin/daemon.sh
apache-tomcat-9.0.75/bin/digest.sh
apache-tomcat-9.0.75/bin/makebase.sh
apache-tomcat-9.0.75/bin/setclasspath.sh
apache-tomcat-9.0.75/bin/shutdown.sh
apache-tomcat-9.0.75/bin/startup.sh
apache-tomcat-9.0.75/bin/tool-wrapper.sh
apache-tomcat-9.0.75/bin/version.sh
[root@app01 tmp]# useradd --home-dir /usr/local/tomcat --shell /sbin/nologin tom
cat
[root@app01 tmp]# id tomcat
uid=1001(tomcat) gid=1001(tomcat) groups=1001(tomcat)
[root@app01 tmp]# ls /usr/local/tomcat
[root@app01 tmp]#  cp -r /tmp/apache-tomcat-9.0.75/* /usr/local/tomcat/
[root@app01 tmp]# # chown -R tomcat.tomcat /usr/local/tomcat
[root@app01 tmp]# vi /etc/systemd/system/tomcat.service
[root@app01 tmp]# systemctl daemon-reload
[root@app01 tmp]# systemctl start tomcat
[root@app01 tmp]# systemctl enable tomcat
Created symlink /etc/systemd/system/multi-user.target.wants/tomcat.service → /et
c/systemd/system/tomcat.service.
[root@app01 tmp]#
```

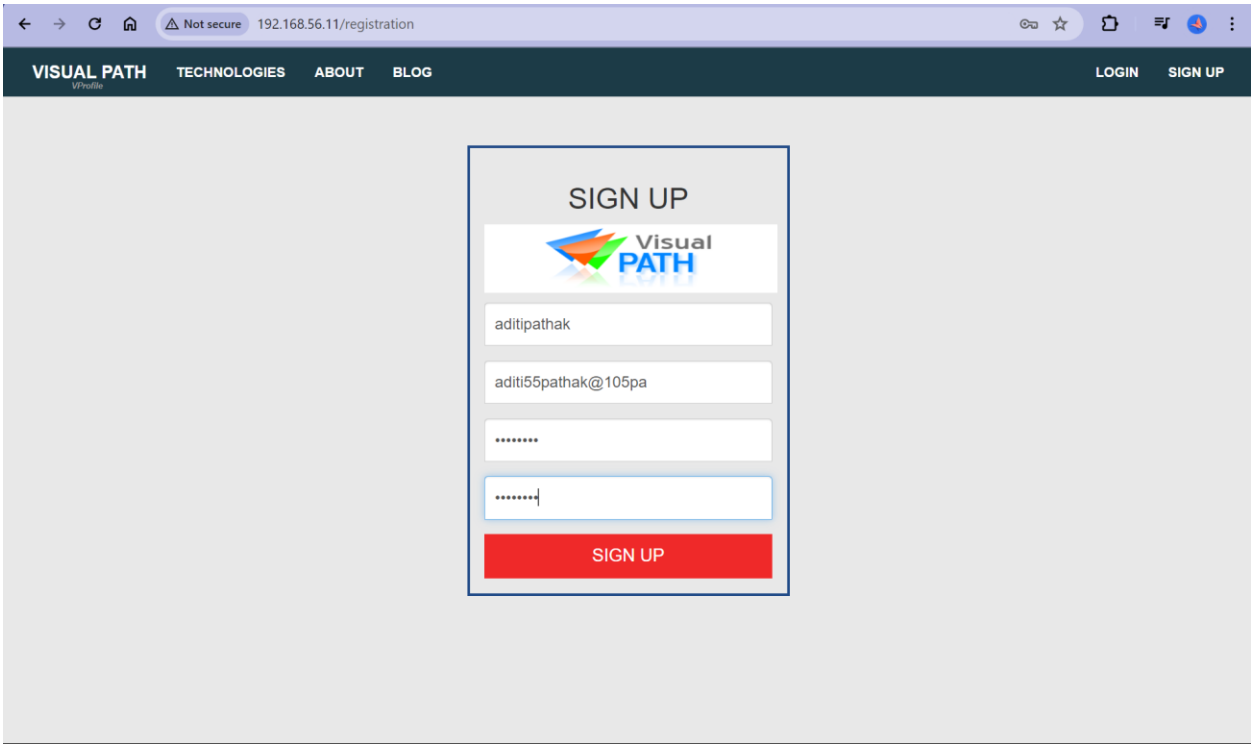
```
            └─61350 /usr/lib/jvm/jre/bin/java -Djava.util.logging.confi>

May 31 23:53:36 app01 tomcat-[61350]: 31-May-2024 23:53:36.951 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.209 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.211 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.346 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.415 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.457 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.476 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.526 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.557 INFO [mai>
May 31 23:53:38 app01 tomcat-[61350]: 31-May-2024 23:53:38.738 INFO [mai>
lines 1-20/20 (END)
[1]+  Stopped                 systemctl status tomcat
lines 1-20/20 (END)
[root@app01 tmp]# ls /usr/local/tomcat
bin           CONTRIBUTING.md  logs        RELEASE-NOTES  webapps
BUILDING.txt  lib              NOTICE      RUNNING.txt    work
conf          LICENSE          README.md   temp
[root@app01 tmp]# ls /usr/local/tomcat/bin/
bootstrap.jar                configtest.sh     shutdown.sh
catalina.bat                 daemon.sh         startup.bat
catalina.sh                  digest.bat        startup.sh
catalina-tasks.xml           digest.sh         tomcat-juli.jar
ciphers.bat                  makebase.bat      tomcat-native.tar.gz
ciphers.sh                   makebase.sh       tool-wrapper.bat
commons-daemon.jar           setclasspath.bat  tool-wrapper.sh
commons-daemon-native.tar.gz setclasspath.sh   version.bat
configtest.bat               shutdown.bat      version.sh
[root@app01 tmp]#
```

5. Nginx Setup

```
root@web01:~# vi /etc/nginx/sites-available/vproapp
root@web01:~# rm -rf /etc/nginx/sites-enabled/default
root@web01:~# ln -s /etc/nginx/sites-available/vproapp /etc/nginx/sites-enabled
vproapp
root@web01:~# systemctl restart nginx
root@web01:~# systemctl status nginx
● nginx.service - A high performance web server and a reverse proxy server
     Loaded: loaded (/lib/systemd/system/nginx.service; enabled; vendor preset:
     Active: active (running) since Mon 2024-06-03 16:59:39 UTC; 34s ago
       Docs: man:nginx(8)
    Process: 4335 ExecStartPre=/usr/sbin/nginx -t -q -g daemon on; master_proce
    Process: 4336 ExecStart=/usr/sbin/nginx -g daemon on; master_process on; (c
   Main PID: 4337 (nginx)
      Tasks: 3 (limit: 835)
     Memory: 3.5M
        CPU: 57ms
     CGroup: /system.slice/nginx.service
             ├─4337 "nginx: master process /usr/sbin/nginx -g daemon on; master
             ├─4338 "nginx: worker process" "" "" "" "" "" "" "" "" "" "" "" "" ""
             └─4339 "nginx: worker process" "" "" "" "" "" "" "" "" "" "" "" "" ""

Jun 03 16:59:39 web01 systemd[1]: Starting A high performance web server and a
Jun 03 16:59:39 web01 systemd[1]: Started A high performance web server and a r
lines 1-17/17 (END)
```

Checking if everything is validated!


Not secure
192.168.56.11/login
HKH Infotech
VProfile
TECHNOLOGIES
ABOUT
BLOG
LOGIN
SIGN UP
WELCOME!
HKH Infotech
Username
Password
LOGIN
SIGN UP

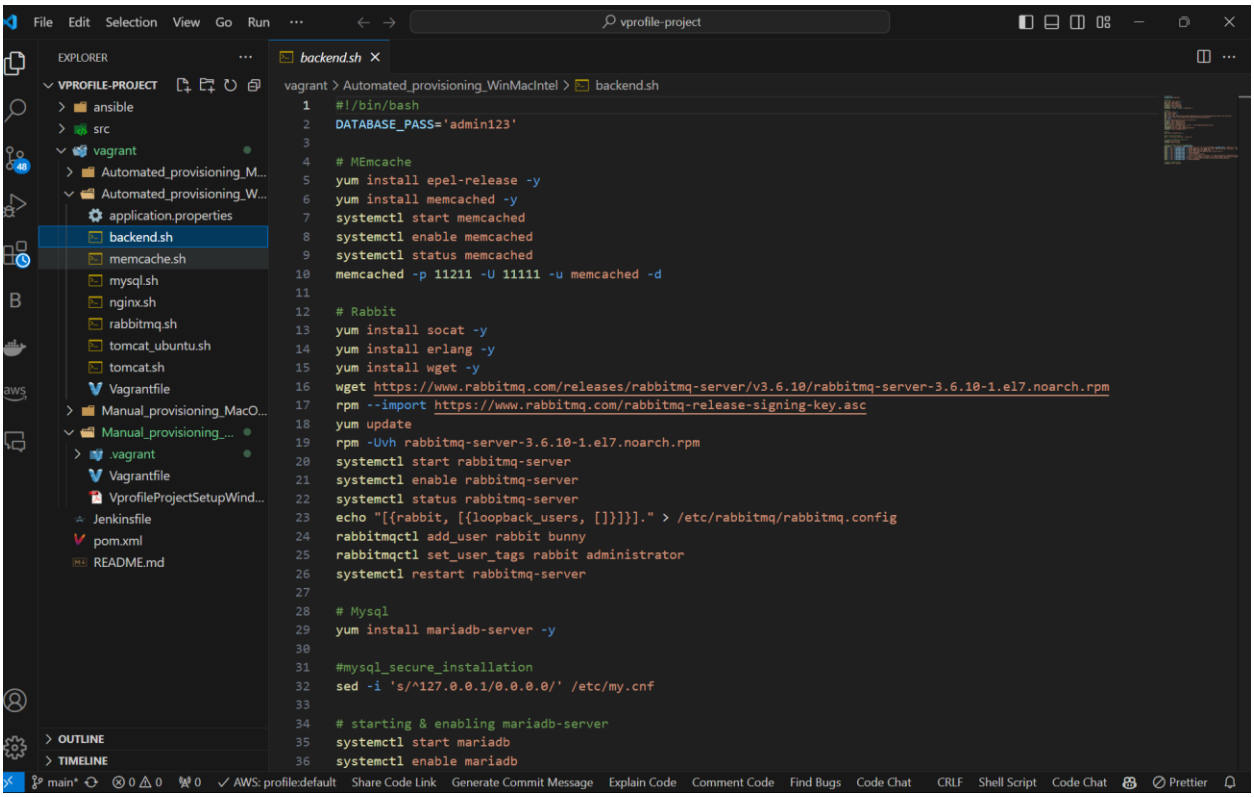

Not secure
192.168.56.11/registration
VISUAL PATH
VProfile
TECHNOLOGIES
ABOUT
BLOG
LOGIN
SIGN UP
SIGN UP
Visual
PATH
aditipathak
aditi55pathak@105pa
SIGN UP

So far we saw how to run application and setup manually.

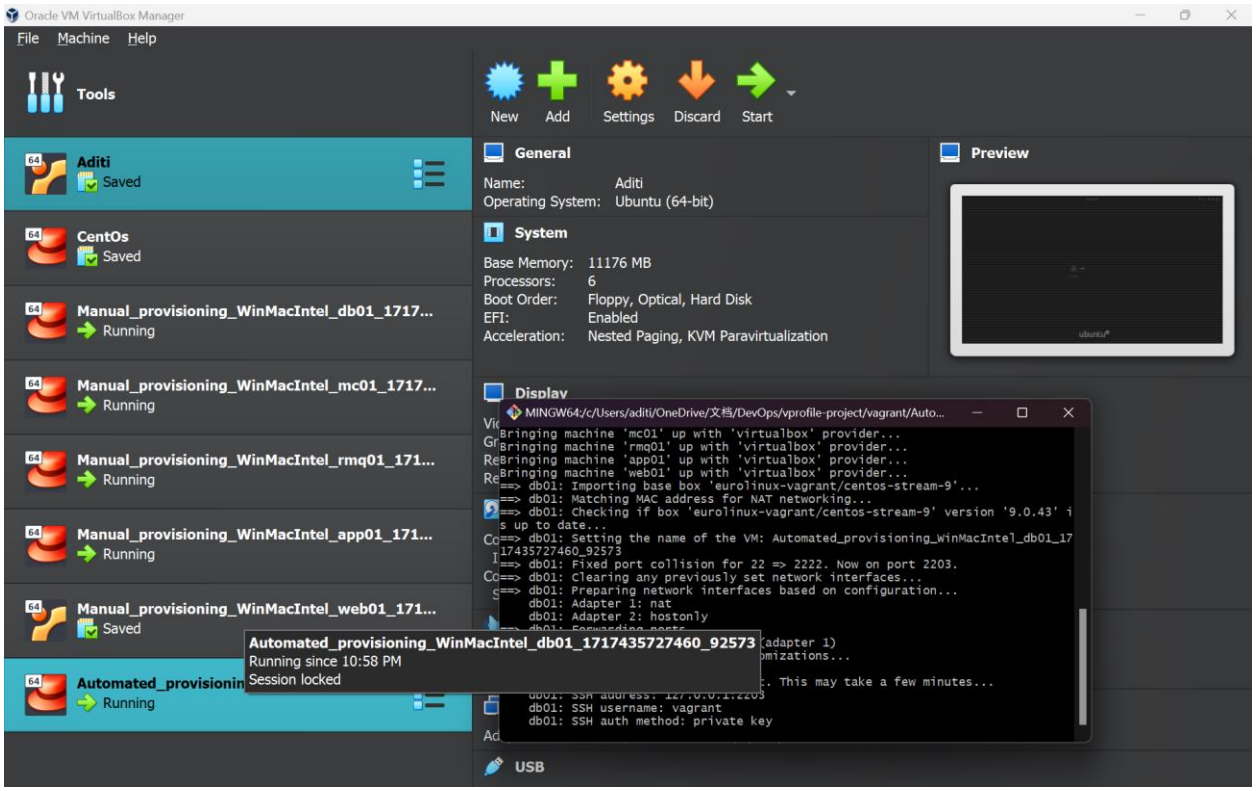
Now we will explore how to make whole setup automated.

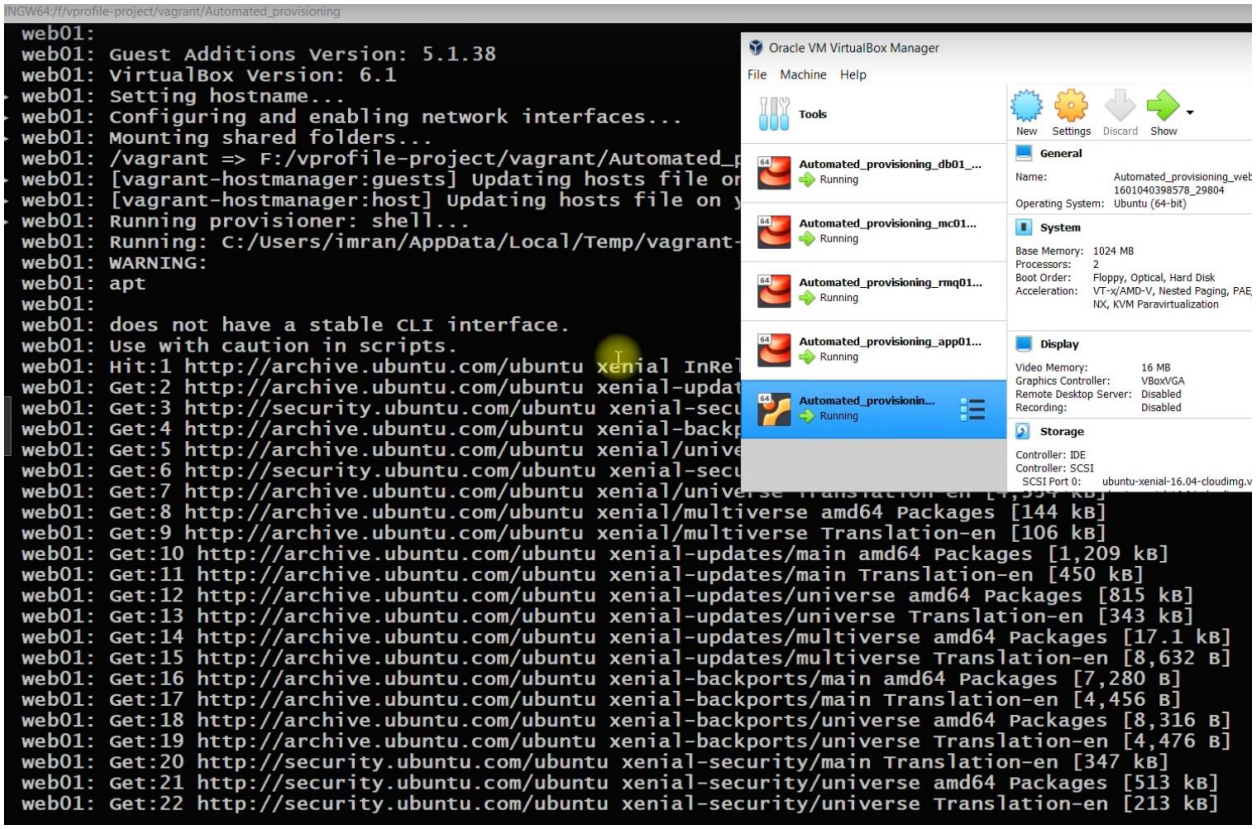
Automation

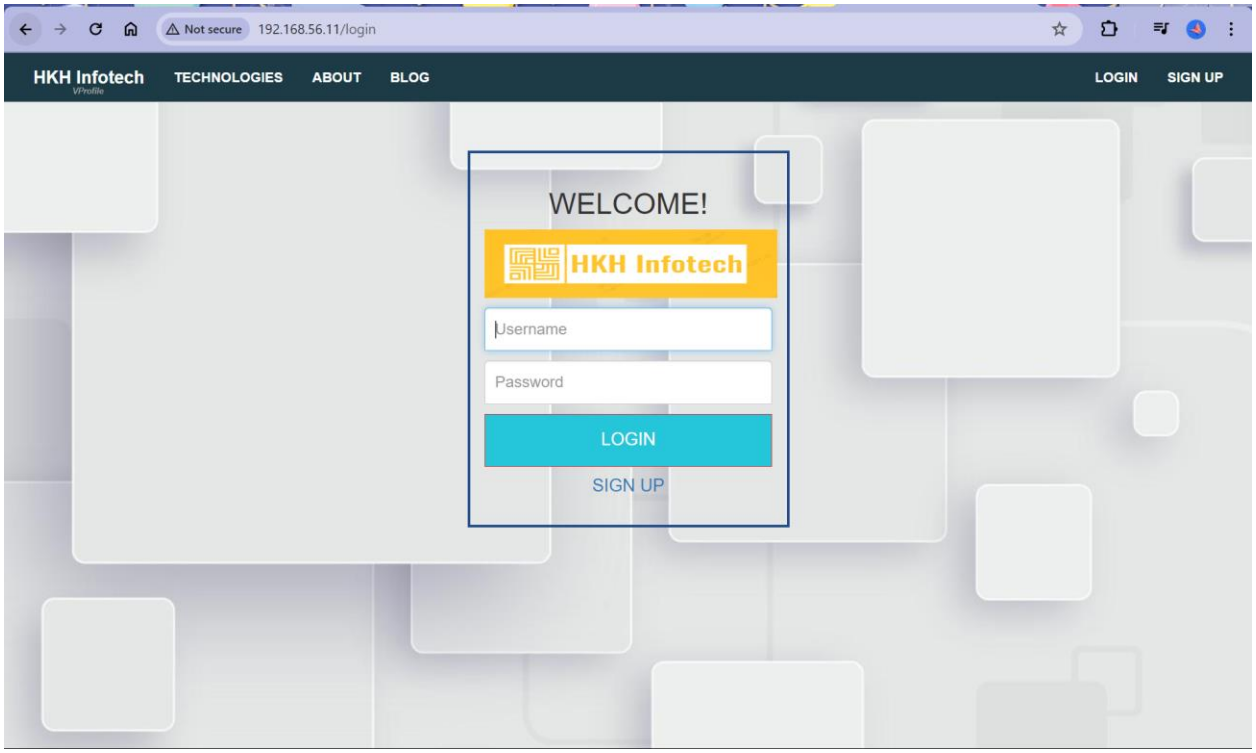
1) Automated Code:



2) Automated Execution:


Oracle VM VirtualBox Manager
File Machine Help
Tools
New Add Settings Discard Start
Aditi
Saved
CentOs
Saved
Manual_provisioning_WinMacIntel_db01_1717...
Running
Manual_provisioning_WinMacIntel_mc01_1717...
Running
Manual_provisioning_WinMacIntel_rmq01_171...
Running
Manual_provisioning_WinMacIntel_app01_171...
Running
Manual_provisioning_WinMacIntel_web01_171...
Saved
Automated_provisionin
Running
General
Name: Aditi
Operating System: Ubuntu (64-bit)
System
Base Memory: 11176 MB
Processors: 6
Boot Order: Floppy, Optical, Hard Disk
EFI: Enabled
Acceleration: Nested Paging, KVM Paravirtualization
Preview
Display
MINGW64:/c/Users/aditi/OneDrive/文档/DevOps/vprofile-project/vagrant/Auto...
Bringing machine 'mc01' up with 'virtualbox' provider...
Bringing machine 'rmq01' up with 'virtualbox' provider...
Bringing machine 'app01' up with 'virtualbox' provider...
Bringing machine 'web01' up with 'virtualbox' provider...
==> db01: Importing base box 'eurolinux-vagrant/centos-stream-9'...
==> db01: Matching MAC address for NAT networking...
==> db01: Checking if box 'eurolinux-vagrant/centos-stream-9' version '9.0.43' i
s up to date...
==> db01: Setting the name of the VM: Automated_provisioning_WinMacIntel_db01_17
17435727460_92573
==> db01: Fixed port collision for 22 => 2222. Now on port 2203.
==> db01: Clearing any previously set network interfaces...
==> db01: Preparing network interfaces based on configuration...
db01: Adapter 1: nat
db01: Adapter 2: hostonly
db01: SSH username: vagrant
db01: SSH auth method: private key
Automated_provisioning_WinMacIntel_db01_1717435727460_92573
Running since 10:58 PM
Session locked
USB


web01:
web01: Guest Additions Version: 5.1.38
web01: VirtualBox Version: 6.1
web01: Setting hostname...
web01: Configuring and enabling network interfaces...
web01: Mounting shared folders...
web01: /vagrant => F:/vprofile-project/vagrant/Automated_p
web01: [vagrant-hostmanager:guests] Updating hosts file or
web01: [vagrant-hostmanager:host] Updating hosts file on y
web01: Running provisioner: shell...
web01: Running: C:/Users/imran/AppData/Local/Temp/vagrant-
web01: WARNING:
web01: apt
web01:
web01: does not have a stable CLI interface.
web01: Use with caution in scripts.
web01: Hit:1 http://archive.ubuntu.com/ubuntu xenial InRel
web01: Get:2 http://archive.ubuntu.com/ubuntu xenial-updat
web01: Get:3 http://security.ubuntu.com/ubuntu xenial-secu
web01: Get:4 http://archive.ubuntu.com/ubuntu xenial-backp
web01: Get:5 http://archive.ubuntu.com/ubuntu xenial/unive
web01: Get:6 http://security.ubuntu.com/ubuntu xenial-secu
web01: Get:7 http://archive.ubuntu.com/ubuntu xenial/unive
web01: Get:8 http://archive.ubuntu.com/ubuntu xenial/multiverse amd64 Packages [144 kB]
web01: Get:9 http://archive.ubuntu.com/ubuntu xenial/multiverse Translation-en [106 kB]
web01: Get:10 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 Packages [1,209 kB]
web01: Get:11 http://archive.ubuntu.com/ubuntu xenial-updates/main Translation-en [450 kB]
web01: Get:12 http://archive.ubuntu.com/ubuntu xenial-updates/universe amd64 Packages [815 kB]
web01: Get:13 http://archive.ubuntu.com/ubuntu xenial-updates/universe Translation-en [343 kB]
web01: Get:14 http://archive.ubuntu.com/ubuntu xenial-updates/multiverse amd64 Packages [17.1 kB]
web01: Get:15 http://archive.ubuntu.com/ubuntu xenial-updates/multiverse Translation-en [8,632 B]
web01: Get:16 http://archive.ubuntu.com/ubuntu xenial-backports/main amd64 Packages [7,280 B]
web01: Get:17 http://archive.ubuntu.com/ubuntu xenial-backports/main Translation-en [4,456 B]
web01: Get:18 http://archive.ubuntu.com/ubuntu xenial-backports/universe amd64 Packages [8,316 B]
web01: Get:19 http://archive.ubuntu.com/ubuntu xenial-backports/universe Translation-en [4,476 B]
web01: Get:20 http://security.ubuntu.com/ubuntu xenial-security/main Translation-en [347 kB]
web01: Get:21 http://security.ubuntu.com/ubuntu xenial-security/universe amd64 Packages [513 kB]
web01: Get:22 http://security.ubuntu.com/ubuntu xenial-security/universe Translation-en [213 kB]
Oracle VM VirtualBox Manager
File Machine Help
Tools
New Settings Discard Show
Automated_provisioning_db01_...
Running
Automated_provisioning_mc01...
Running
Automated_provisioning_rmq01...
Running
Automated_provisioning_app01...
Running
Automated_provisionin...
Running
General
Name: Automated_provisioning_web
1601040398578_29804
Operating System: Ubuntu (64-bit)
System
Base Memory: 1024 MB
Processors: 2
Boot Order: Floppy, Optical, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging, PAE
NX, KVM Paravirtualization
Display
Video Memory: 16 MB
Graphics Controller: VBoxVGA
Remote Desktop Server: Disabled
Recording: Disabled
Storage
Controller: IDE
Controller: SCSI
SCSI Port 0: ubuntu-xenial-16.04-cloudimg.v


Not secure
192.168.56.11/login
HKH Infotech
VProfile
TECHNOLOGIES
ABOUT
BLOG
LOGIN
SIGN UP
WELCOME!
HKH Infotech
Username
Password
LOGIN
SIGN UP