

VIRTUAL DESKTOPS AND REMOTE WORK

PHASE 4: PROJECT PRESENTATION

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1. Overview of Implementation

This phase focuses on the final implementation, documentation, and demonstration of the Apache Guacamole deployment with a VNC Server on an Oracle Virtual Instance. The goal is to ensure a fully functional, secure, and user-friendly remote desktop access solution. Key components include:

- **Apache Guacamole:** Clientless remote desktop gateway.
- **VNC Server:** Provides remote desktop sessions.
- **MariaDB:** Database backend for user authentication and connection management.
- **Tomcat9:** Servlet container for hosting the Guacamole web application.
- **Oracle Virtual Instance:** Host environment for the deployment.

2. Implementation Details

2.1 Configuring Apache Guacamole

Step 1: Install and Configure Guacamole Server

1. Install dependencies and build tools required for Guacamole Server:

```
sudo apt update

sudo apt install -y build-essential libcairo2-dev libjpeg-turbo8-dev libpng-dev libtool-bin
libossp-uuid-dev libavcodec-dev libavutil-dev libswscale-dev freerdp2-dev libpango1.0-dev
libssh2-1-dev libtelnet-dev libvncserver-dev libpulse-dev libssl-dev libvorbis-dev libwebp-dev
```

2. Download, build, and install Guacamole Server from the source:

```
wget
https://apache.org/dyn/closer.cgi?action=download&filename=guacamole/1.5.4/source/guaca
mole-server-1.5.4.tar.gz

tar -xzf guacamole-server-1.5.4.tar.gz

cd guacamole-server-1.5.4

./configure --with-init-dir=/etc/init.d

make

sudo make install

sudo ldconfig

sudo systemctl daemon-reload

sudo systemctl start guacd

sudo systemctl enable guacd
```

Step 2: Deploy Guacamole Web Application

1. Download the Guacamole WAR file:

```
Wget
https://apache.org/dyn/closer.cgi?action=download&filename=guacamole/1.5.3/binary/guaca
mole-1.5.4.war -O guacamole.war
```

2. Deploy the WAR file to Tomcat9:

```
sudo mv guacamole.war /var/lib/tomcat9/webapps/
```

```
sudo systemctl restart tomcat9
```

Step 3: Configure MariaDB for Guacamole

1. Log into MariaDB:

```
sudo mysql -u root -p
```

2. Create a database and user for Guacamole:

```
CREATE DATABASE guacamole_db;  
CREATE USER 'guacamole_user'@'localhost' IDENTIFIED BY 'your_password';  
GRANT SELECT, INSERT, UPDATE, DELETE ON guacamole_db.* TO  
'guacamole_user'@'localhost';  
FLUSH PRIVILEGES;  
EXIT;
```

3. Import the Guacamole schema:

```
cat /path/to/guacamole-auth-jdbc-1.5.4/mysql/schema/*.sql | mysql -u guacamole_user -p  
guacamole_db
```

4. Configure Guacamole to use MariaDB by editing /etc/guacamole/guacamole.properties

```
# MySQL properties  
mysql-hostname: 127.0.0.1  
mysql-port: 3306  
mysql-database: guac_db  
mysql-username: guac_user  
mysql-password: password  
guacd-hostname: localhost  
guacd-port: 4822
```

2.2 Configuring VNC Server

Step 1: Install and Configure VNC Server

1. Install TigerVNC:

```
sudo apt install -y tigervnc-standalone-server
```

2. Install a desktop environment (e.g., Xfce):

```
sudo apt install -y xfce4 xfce4-goodies
```

3. Set up the VNC Server:

- Start the VNC Server and set a password:

```
vncserver
```

- Kill the VNC Server to edit the startup script:

```
vncserver -kill :1
```

4. Edit the VNC startup script (`~/.vnc/xstartup`) to launch the desktop environment:

```
#!/bin/sh
unset SESSION_MANAGER
unset DBUS_SESSION_BUS_ADDRESS
xrdb $HOME/.Xresources
xsetroot -solid grey
exec startxfce4
```

5. Make the script executable:

```
chmod +x ~/.vnc/xstartup
```

6. Restart the VNC Server:

```
vncserver :1
```

Step 2: Test VNC Server

- Verify that the VNC Server is running on port 5901.
- Test the VNC connection using a VNC client.

3. Documentation with Code

3.1 GitHub Repository

All code, scripts, and documentation for this project are hosted on GitHub.

- **GitHub Repository Link:** https://github.com/shafaz9539/Virtual_Desktop_And_Remote_Work

3.2 YouTube Video Demonstration

A detailed demonstration of the deployment process is available on YouTube.

- **YouTube Video Link:** <https://youtu.be/8oBft1SV5II>

4. Testing and Validation

4.1 Functional Testing

- Verify that users can access the Guacamole web interface and log in successfully.
- Test remote desktop connections via the VNC protocol.

4.2 Stress Testing

- Simulate multiple concurrent users accessing the Guacamole web interface.
- Monitor system resources (CPU, memory, network) during stress testing.

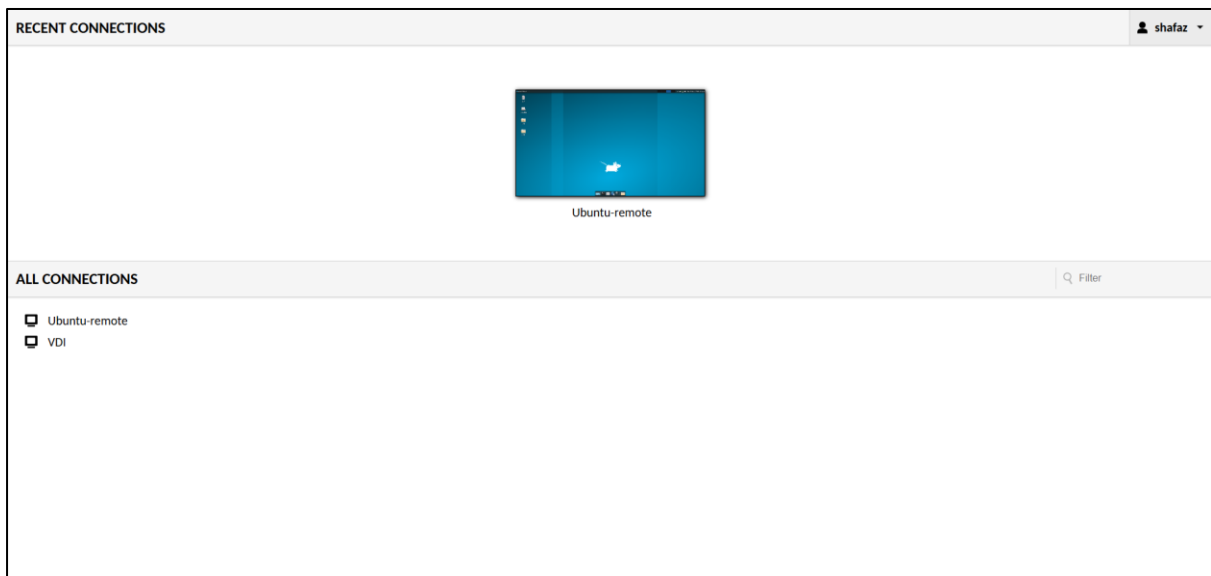
4.3 Error Simulation

- Create controlled failure scenarios (e.g., database downtime, VNC Server unavailability).
- Verify that the system can recover gracefully from failures.

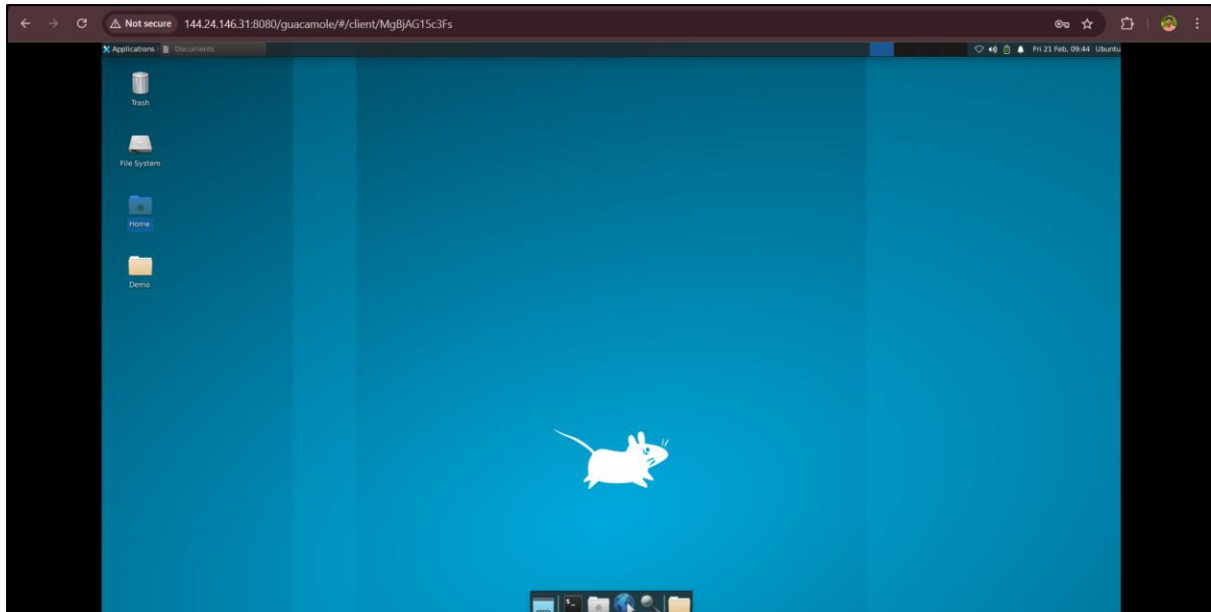
5. Screenshot



Guacamole Login Page



Guacamole Home Page with Connection Details



Virtual Desktop Accessed Through Web Browser

6. Accessing the Virtual Desktop System

1. Open a Web Browser

- Navigate to the following URL:

<http://144.24.146.31:8080/guacamole>

2. Login to Guacamole

- Enter your **username** = “**demo**” and **password** = “**demo1234**” as provided.
- Click **Login** to access the dashboard.

3. Launching the Virtual Desktop

- Once logged in, you will see a list of available remote desktop connections.
- Click on the **ubuntu-remote session** configured for your instance. Use “**Shafaz@9539**” as ubuntu password
- The virtual desktop will launch directly in your browser, allowing you to interact with it as if it were a local machine.

4. Using the Remote Desktop

- You can now use the virtual desktop for various tasks, including development, system administration, or any cloud-based operations.
- The connection supports **clipboard sharing, file transfers, and multi-user access** based on configuration.

5. Logging Out

- Once done, **log out** from Guacamole to secure your session.

7. Conclusion

The **Virtual Desktops & Remote Work** project successfully demonstrates a **secure, scalable, and fully browser-based remote desktop solution** using **Oracle Cloud, Apache Guacamole, VNC Server, and Tomcat9**. By leveraging these technologies, we have built an **efficient remote access system** that allows users to connect to virtual desktops seamlessly without requiring additional software.

This solution offers **enhanced accessibility, security, and flexibility**, making it ideal for **remote work, IT administration, and cloud-based computing**. The integration of **Guacamole with VNC and Tomcat9** ensures a smooth user experience while maintaining strict **authentication and encryption mechanisms**.

With this setup, organizations can **enable remote workforces, manage virtual environments efficiently, and reduce infrastructure costs**—all while ensuring a seamless and intuitive desktop experience from anywhere.

This project highlights the **power of cloud-based remote desktop solutions** and how they can revolutionize the way we work in a **connected and digital-first world**.

6. Further Enhancements

1. **High Availability:** Implement load balancing and failover mechanisms for Guacamole and MariaDB.
2. **Advanced Security:** Integrate multi-factor authentication (MFA) and SSL/TLS encryption for enhanced security.
3. **Monitoring and Alerts:** Use Oracle Cloud Monitoring to track system performance and set up alerts for critical metrics.