

CSE 3035

PRINCIPLES OF CLOUD COMPUTING



Lab Assessment – 3

L15+L16 | SJT501
Dr. Sivaprakash S

FALL SEMESTER 2022-23

by

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Assessment 3 .

Experiment: 1

Title: X11 Forwarding

Aim:

- To capture the application execution of VM instances in Host OS using X11 traffic forwarding; and
- To test the connection with AWS EC2 VM instance and Local VM instance using X11 traffic forwarding from the Host OS using Xming and Putty tools.

Background Theory:

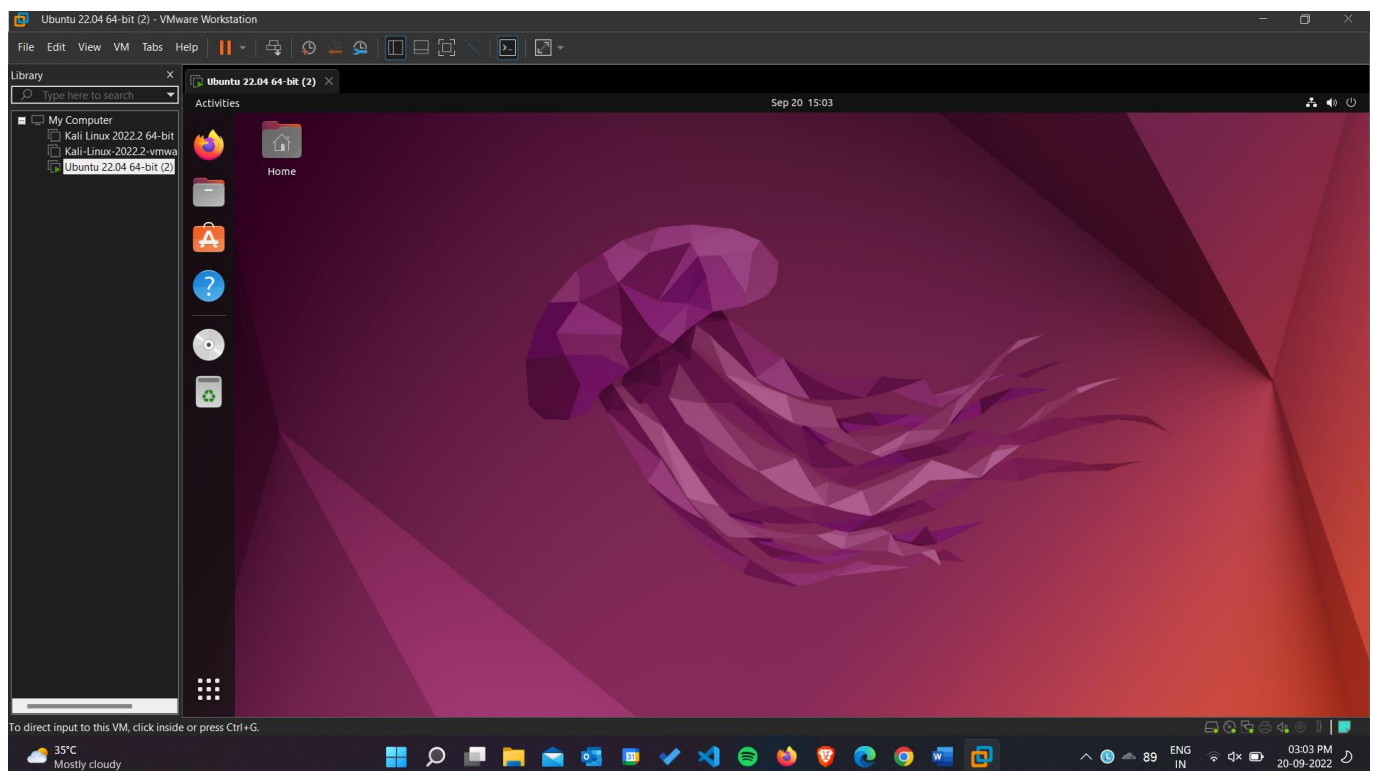
The X Window System (also known as X11, or just X) is a software package and network protocol that lets you interact locally, using your personal computer's display, mouse, and keyboard, with the graphical user interface (GUI) of an application running on a remote networked computer.

Requirements for conducting the experiment:

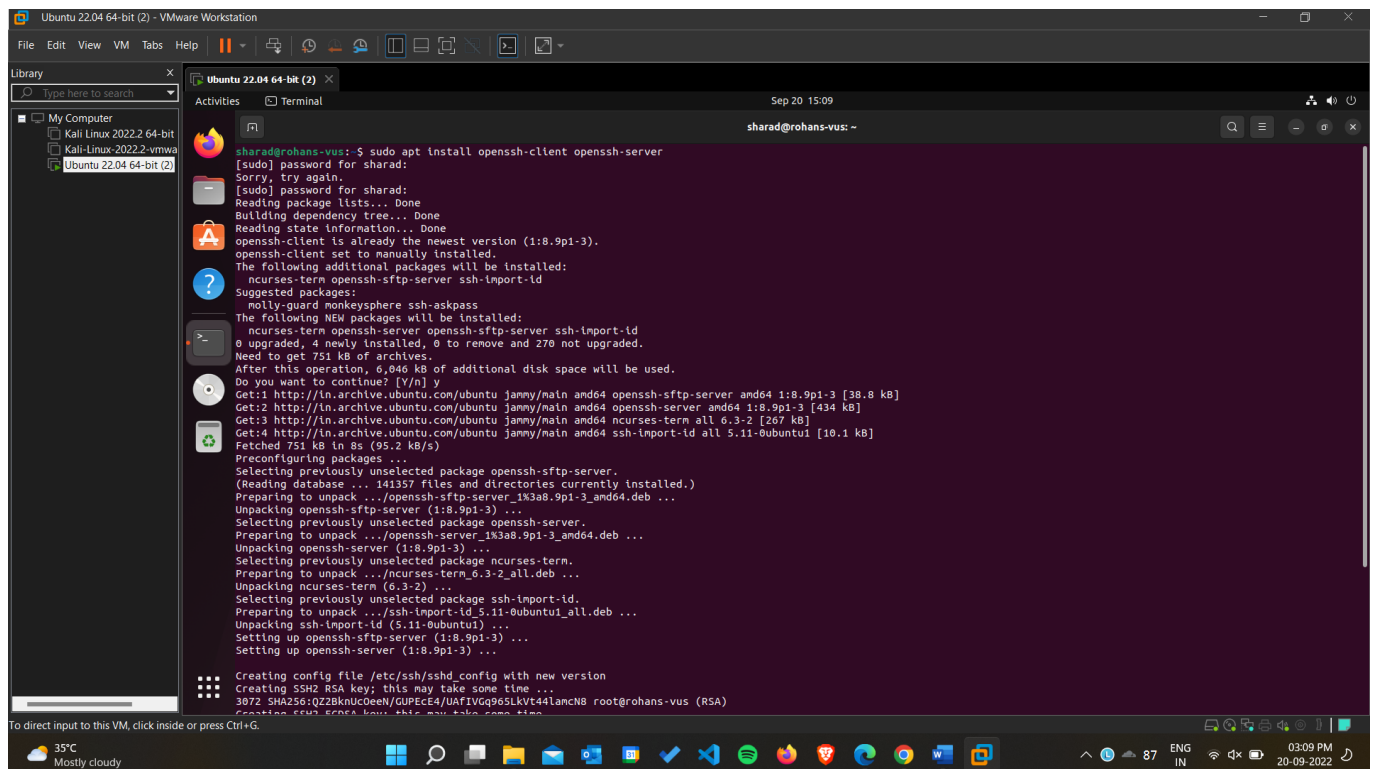
- For X forwarding in SSH to work, the personal computer must be running an X server program. The X server program manages the interaction between the remote application (the X client) and your computer's hardware.
- Most Linux distributions have the X server installed, but if the personal computer is running Windows or macOS, we will most likely need to install and run an X server application.
- Download and install Xming . For X forwarding to work, we'll need to start Xming before connecting to the remote system with your SSH client (for example, PuTTY).

Procedure & Screenshots:

Step 1: Launch local VM Instance (mine is VMWare Workstation Pro®)



Step 2: Download and run Xming server: `sudo apt install openssh-client openssh-server`



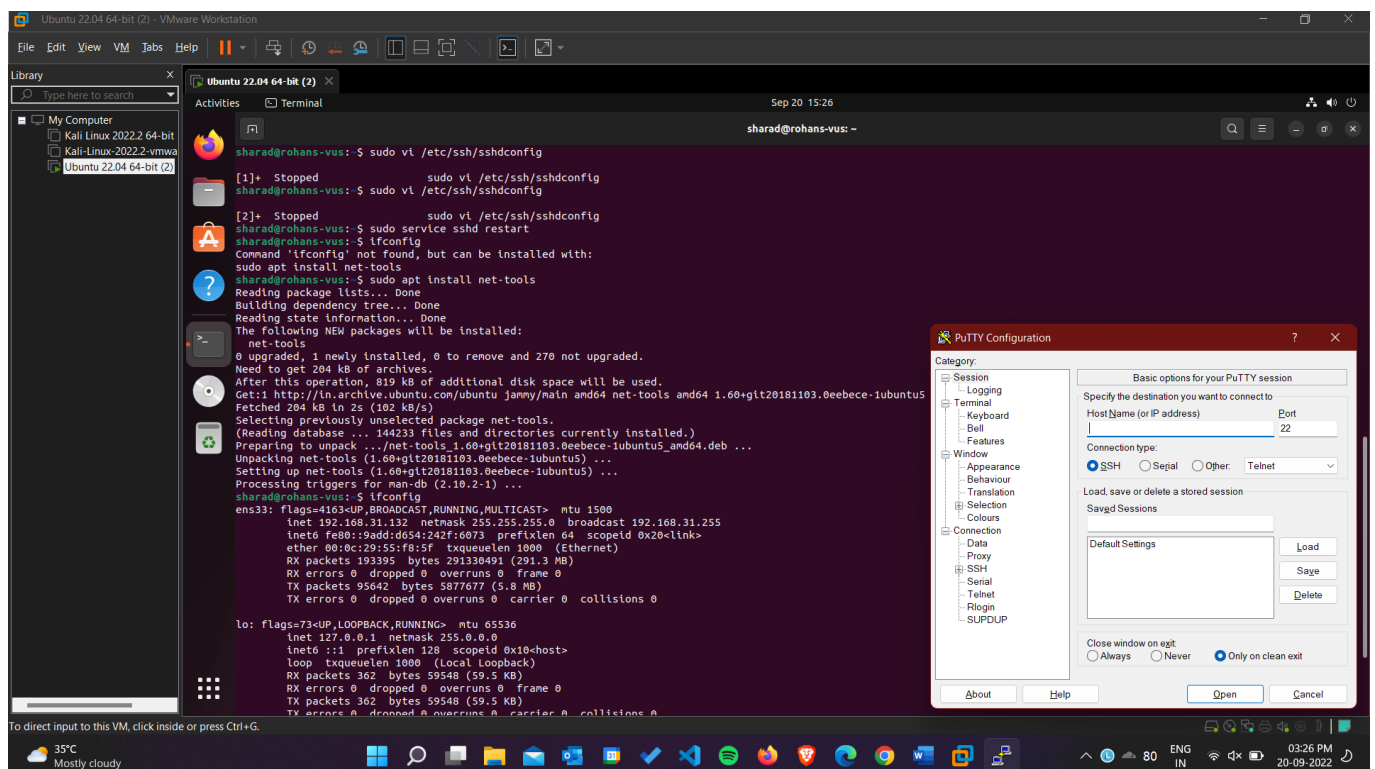
```
sharad@rohans-vus:~$ sudo apt install openssh-client openssh-server
[sudo] password for sharad:
[sudo] password for sharad:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
openssh-client is already the newest version (1:8.9p1-3).
openssh-client set to manually installed.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-sftp-server openssh-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 270 not upgraded.
Need to get 751 kB of archives.
After this operation, 6,046 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu jammy/main amd64 openssh-sftp-server amd64 1:8.9p1-3 [38.8 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu jammy/main amd64 openssh-server amd64 1:8.9p1-3 [434 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu jammy/main amd64 ncurses-term all 6.3-2 [267 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu jammy/main amd64 ssh-import-id all 5.11-0ubuntu1 [10.1 kB]
Fetched 751 kB in 8s (95.2 kB/s)
Preconfiguring packages ...
Selecting previously unselected package openssh-sftp-server.
(Reading database ... 141357 files and directories currently installed.)
Preparing to unpack .../openssh-sftp-server_1k3a8.9p1-3_amd64.deb ...
Unpacking openssh-sftp-server (1:8.9p1-3) ...
Selecting previously unselected package openssh-server.
Preparing to unpack .../openssh-server_1k3a8.9p1-3_amd64.deb ...
Unpacking openssh-server (1:8.9p1-3) ...
Selecting previously unselected package ncurses-term.
Preparing to unpack .../ncurses-term_6.3-2_all.deb ...
Unpacking ncurses-term (6.3-2) ...
Selecting previously unselected package ssh-import-id.
Preparing to unpack .../ssh-import-id_5.11-0ubuntu1_all.deb ...
Unpacking ssh-import-id (5.11-0ubuntu1) ...
Setting up openssh-sftp-server (1:8.9p1-3) ...
Setting up openssh-server (1:8.9p1-3) ...
Creating config file /etc/ssh/sshd_config with new version
Creating SSH2 RSA key; this may take some time ...
3072 SHA256:QZkxnt0eeH/GUPECE4/UAFIVQ96SLKVt44lancNB root@rohans-vus (RSA)
Generating public/private rsa key pair: done.
Warning: Permanently added 'root@rohans-vus' (RSA) to the list of known hosts.
```

Step 3: Open the file `/etc/ssh/sshdconfig` and check if X11Forwarding is enabled or not:

`sudo vi /etc/ssh/sshdconfig`

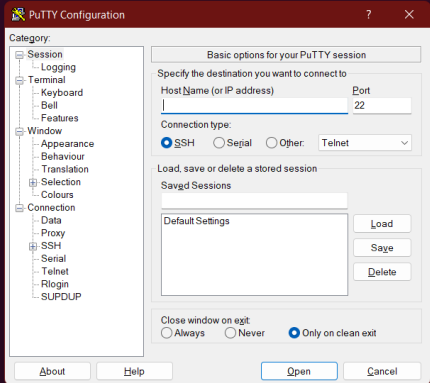
Step 4: Restart sshd service: `sudo service sshd restart`

Step 5: Find out the local VM instance IP using `ifconfig` command.



```
sharad@rohans-vus:~$ sudo vi /etc/ssh/sshdconfig
[1] Stopped sudo vi /etc/ssh/sshdconfig
sharad@rohans-vus:~$ sudo vi /etc/ssh/sshdconfig
[2] Stopped sudo vi /etc/ssh/sshdconfig
sharad@rohans-vus:~$ sudo service sshd restart
Command 'lftconfig' not found, but can be installed with:
sudo apt install net-tools
sharad@rohans-vus:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 270 not upgraded.
Need to get 204 kB of archives.
After this operation, 819 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu jammy/main amd64 net-tools amd64 1.60+git20181103.0eebece-1ubuntu5
Fetched 204 kB in 2s (102 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 144233 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20181103.0eebece-1ubuntu5_amd64.deb ...
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Processing triggers for man-db (2.10.2-1) ...
sharad@rohans-vus:~$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.31.132 netmask 255.255.255.0 broadcast 192.168.31.255
    inet6 fe80::9add:d654:242f:6073 prefixlen 64 scopeid 0x20<link>
    ether 00:0c:29:55:f8:5f txqueuelen 1000 (Ethernet)
    RX packets 193395 bytes 291338491 (291.3 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 95642 bytes 5877677 (5.8 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

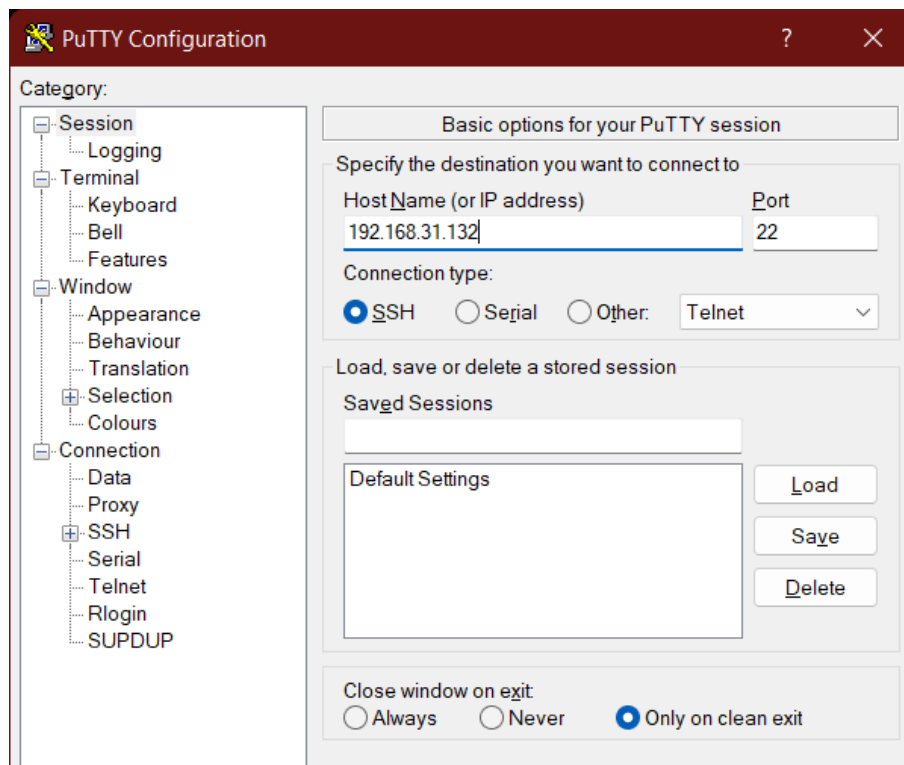
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local loopback)
    RX packets 362 bytes 59548 (59.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 362 bytes 59548 (59.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



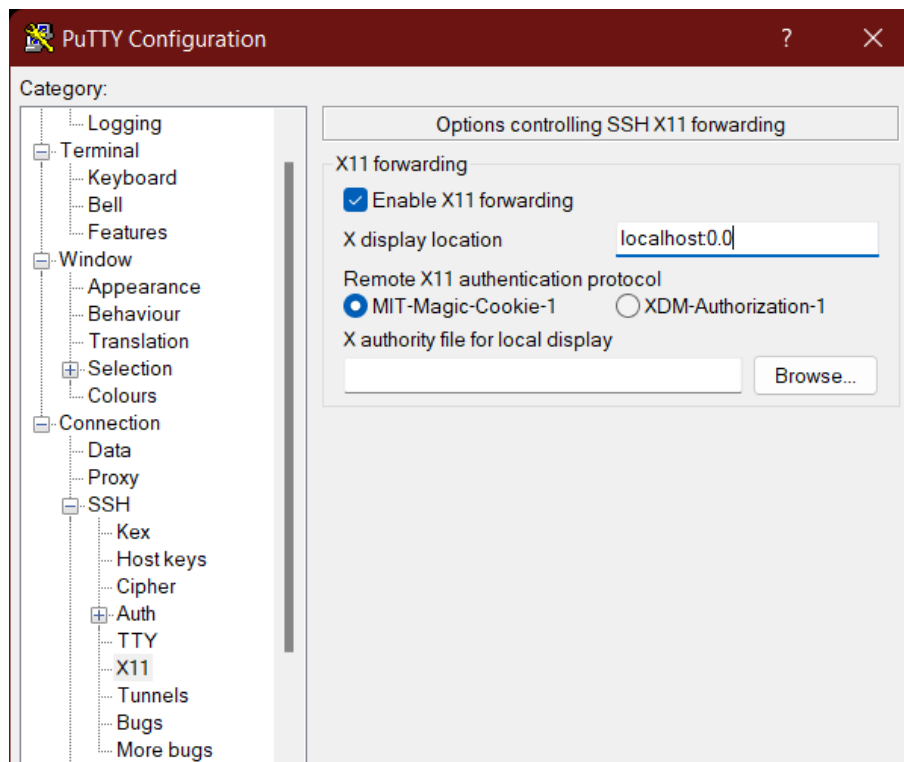
The PuTTY Configuration dialog box is shown with the 'Session' category selected. The 'Host Name (or IP address)' field is empty, and the 'Port' field is set to 22. The 'Connection type' is set to SSH. The 'Load, save or delete a stored session' section is empty. The 'Default Settings' section has buttons for 'Load', 'Save', and 'Delete'. The 'Close window on exit' section has radio buttons for 'Always', 'Never', and 'Only on clean exit', with 'Only on clean exit' selected. The 'Open' button is highlighted.

Using ifconfig, I've found my local VM's IP to be: 192.168.31.132

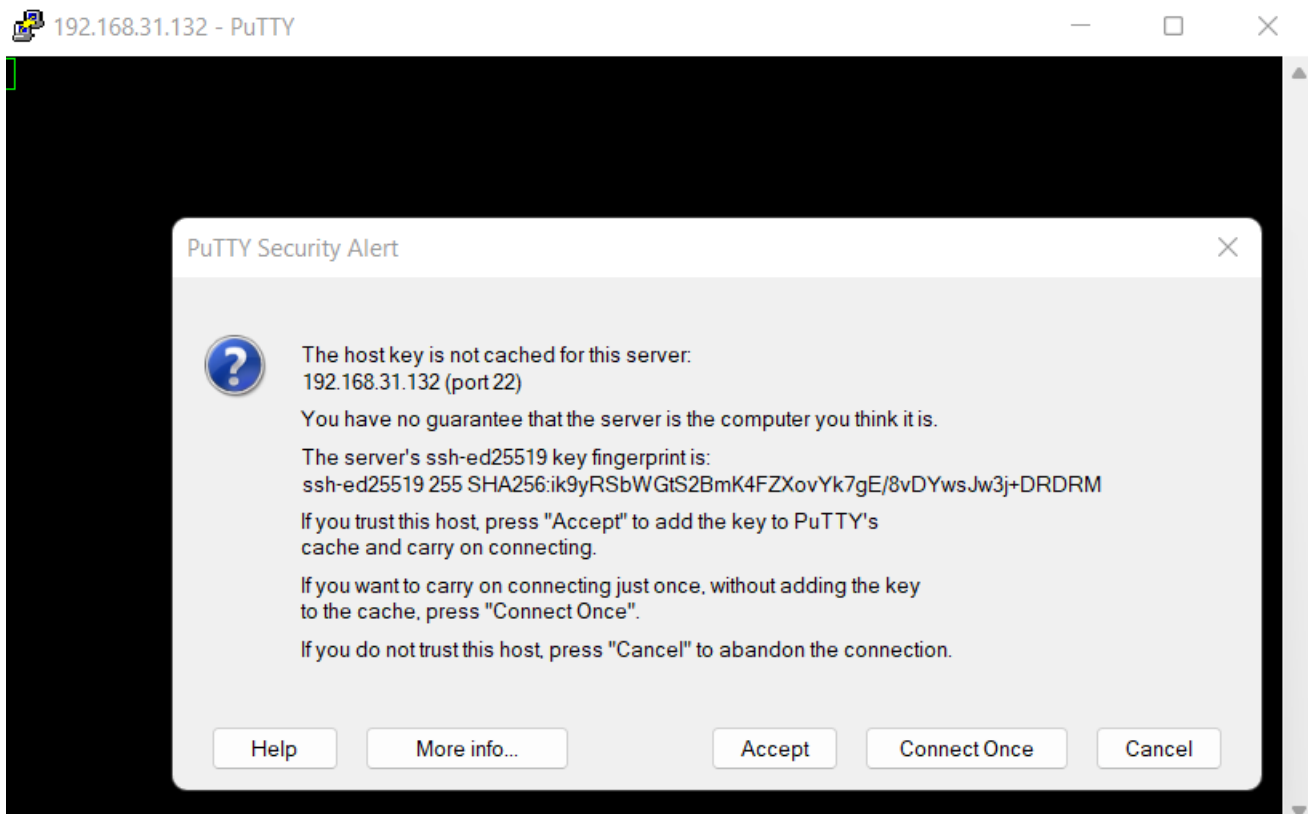
Step 6: Enter this local VM's IP (which is the host here) in PuTTY.



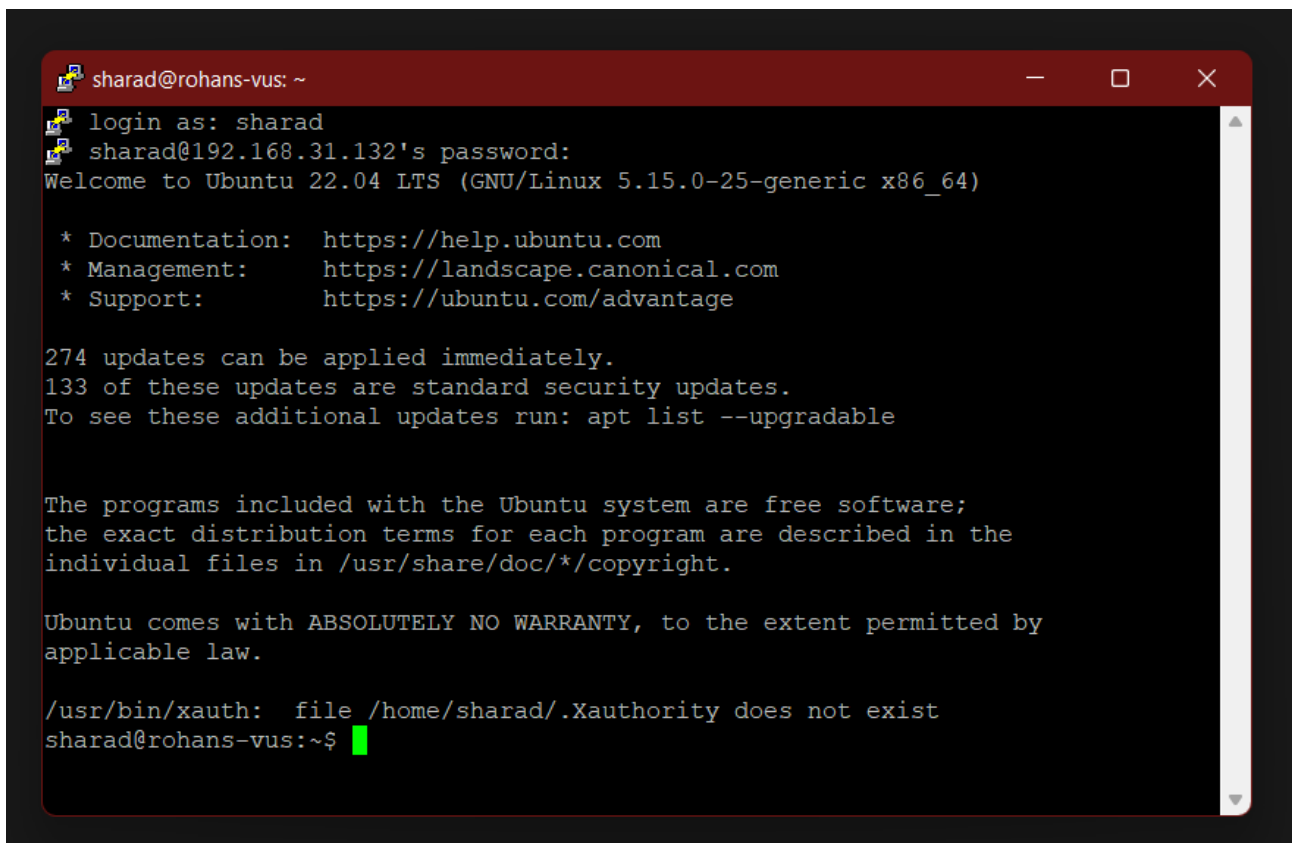
Step 7: Under “Connection→SSH→X11” menu, enable X11 forwarding and enter X display location.



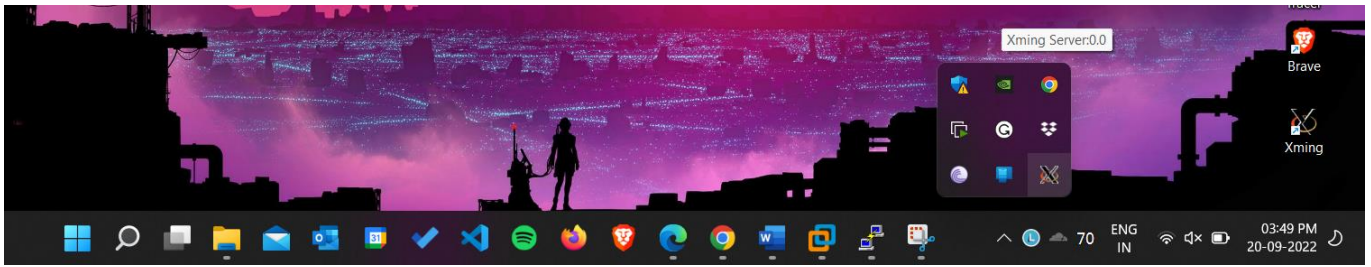
Step 8: Click on Open. Then 'Accept' the warning, since we trust this host.



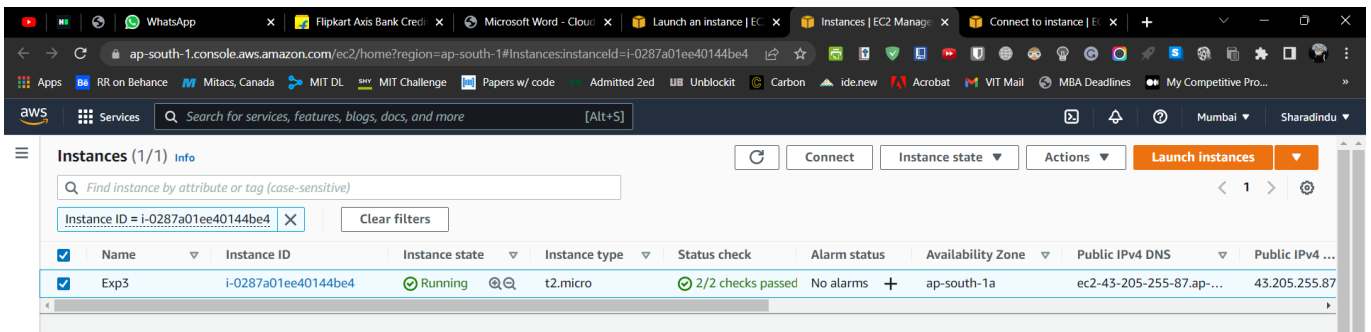
Step 9: Connect to the VM instance with X11 traffic forwarding enabled on the PuTTY.
(login username: sharad (from sharad@rohans-vus))



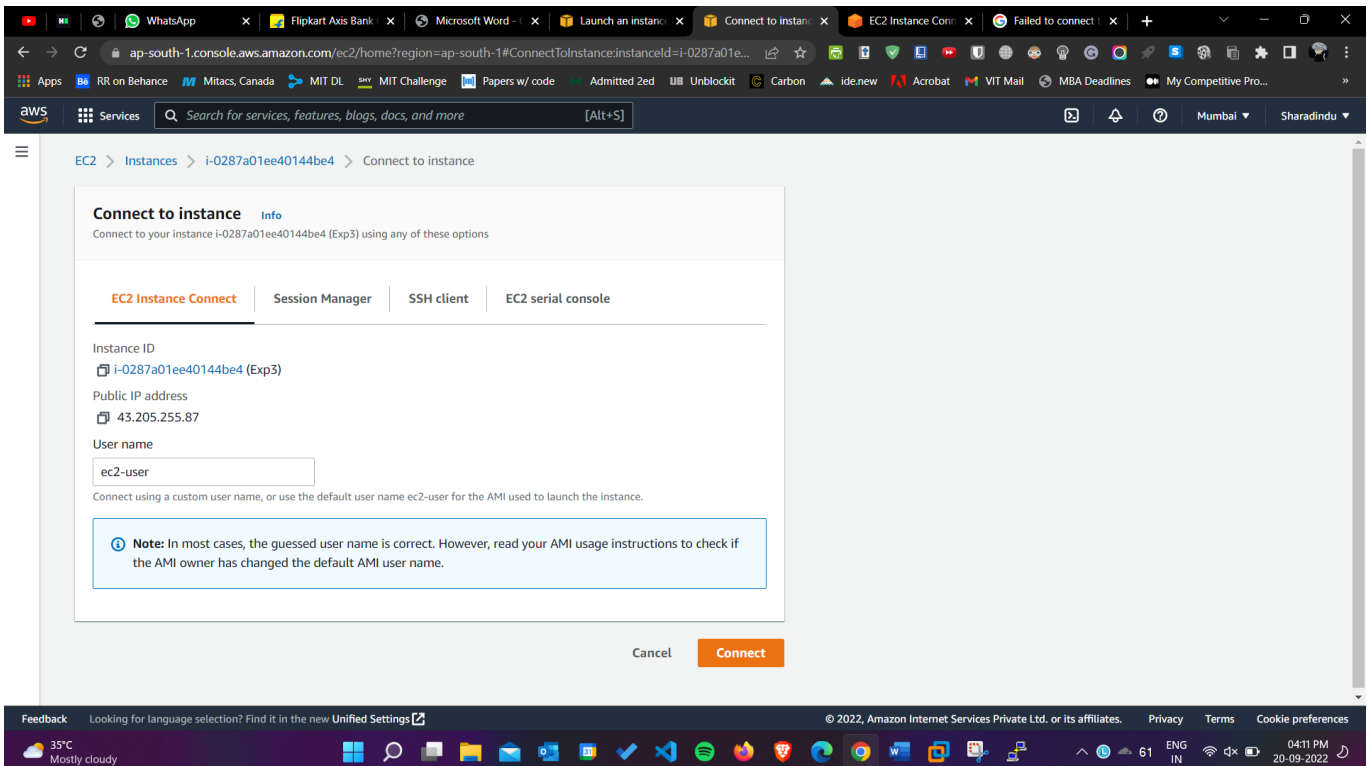
Step 10: Install Xming on local Windows, and have it run alongside PuTTY.



Step 11: Create a new Instance in AWS.



Step 12: Connect to instance. Use the default user name.



Step 13: In the console which appears thereafter, check whether X11 forwarding is enabled, using:
`sudo vi /etc/ssh/sshd_config`

```
#GatewayPorts no
X11Forwarding yes
#X11DisplayOffset 10
#X11UseLocalhost yes
#PermitTTY yes
#PrintMotd yes
#PrintLastLog yes
#TCPKeepAlive yes
#UseLogin no
#UsePrivilegeSeparation sandbox
#PermitUserEnvironment no
#Compression delayed
#ClientAliveInterval 0
#ClientAliveCountMax 3
#ShowPatchLevel no
#UseDNS yes
#PidFile /var/run/sshd.pid
#MaxStartups 10:30:100
#PermitTunnel no
#ChrootDirectory none
#VersionAddendum none

# no default banner path
#Banner none
```

i-0287a01ee40144be4 (Exp3)
PublicIPs: 43.205.255.87 PrivateIPs: 172.31.38.147

Step 14: Configure PuTTY with the public IP (43.205.255.87) in the EC2 instance.

EC2 > Instances > i-0287a01ee40144be4 > Connect to instance

Connect to instance Info

Connect to your instance i-0287a01ee40144be4 (Exp3) using any of these options

EC2 Instance Connect Session Manager SSH client EC2 serial console

Instance ID
i-0287a01ee40144be4 (Exp3)

Public IP address
43.205.255.87

User name
ec2-user

Connect using a custom user name, or use the default user name ec2-user for the AMI used to launch the instance.

Note: In most cases, the guessed user name is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.

Cancel Connect

PuTTY Configuration

Category:

- Session
- Logging
- Terminal
- Keyboard
- Bell
- Features
- Window
- Appearance
- Behaviour
- Translation
- Selection
- Colours
- Connection
- Data
- Proxy
- SSH
- Serial
- Telnet
- Rlogin
- SUPDUP

Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address) 43.205.255.87 Port 22

Connection type: ☒ SSH ☐ Serial ☐ Other: Telnet

Load, save or delete a stored session

Saved Sessions

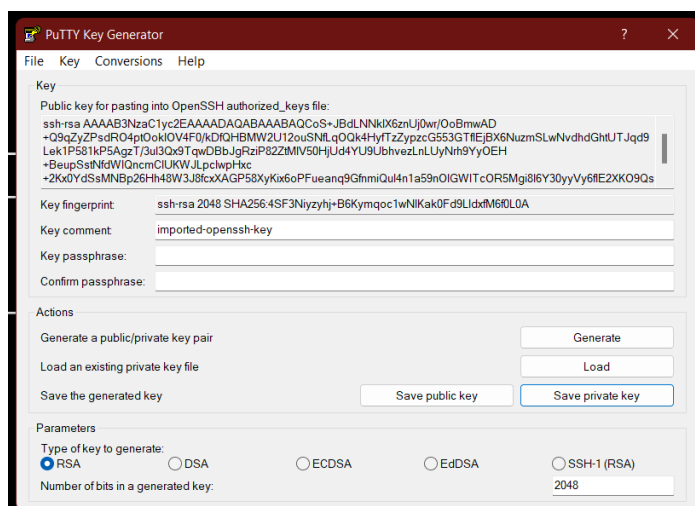
Default Settings

Load Save Delete

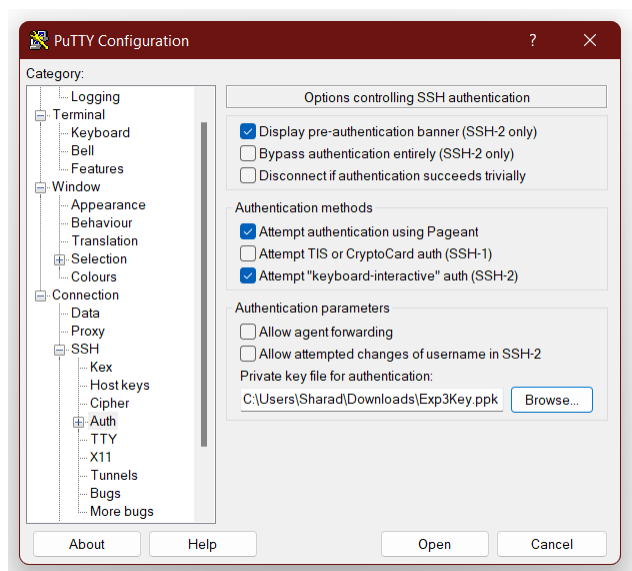
Close window on exit: ☐ Always ☐ Never ☒ Only on clean exit

About Help Open Cancel

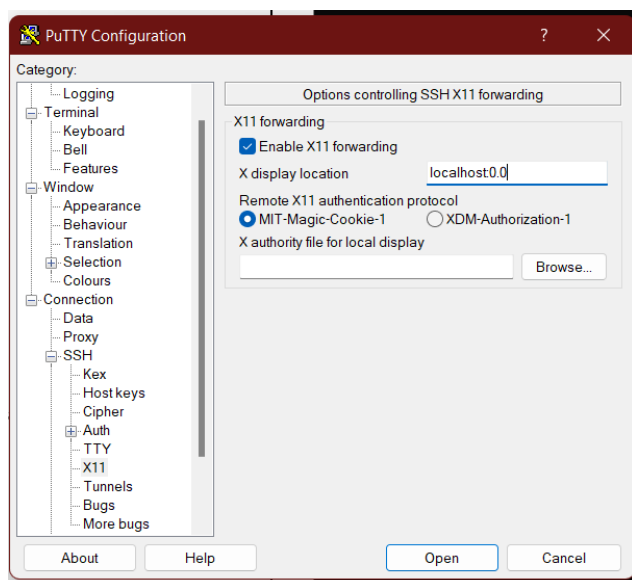
Step 15: Convert the private key from .pem to .ppk using PuTTYgen.



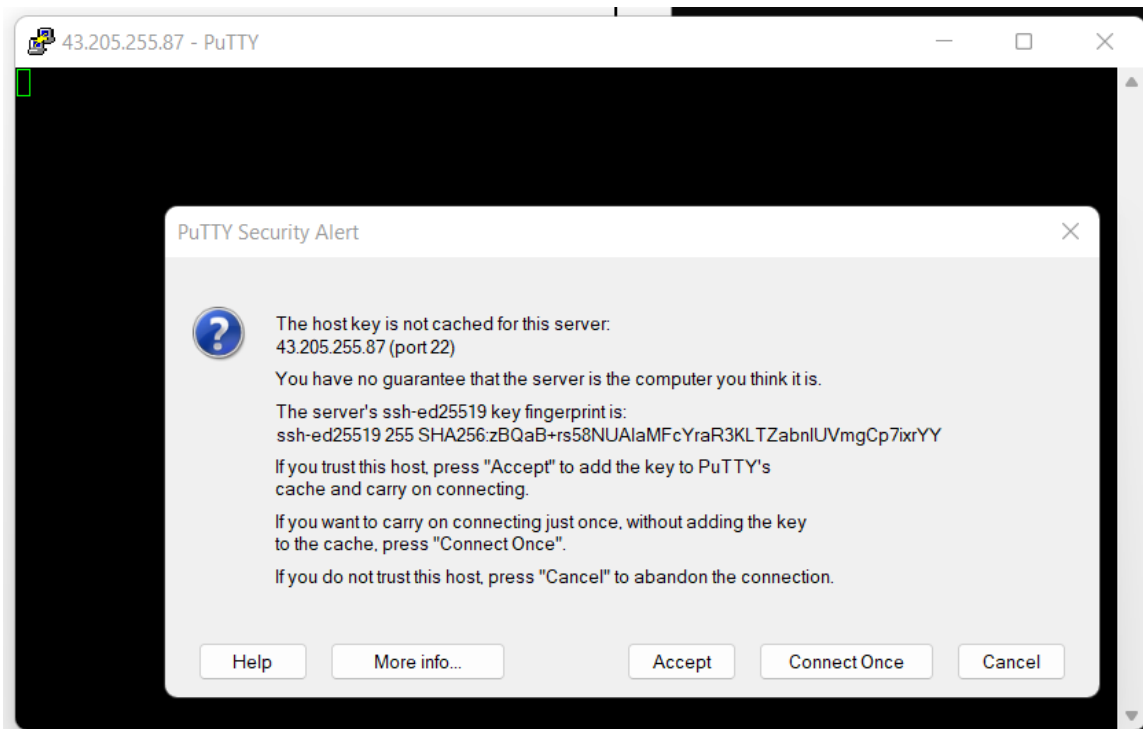
Step 16: Load the private key for the EC2 instance and go to X11 forwarding settings in PuTTY.



Step 17: In the “connection→ssh→auth→x11” menu, enable X11 forwarding and set X display location.



Step 18: Accept the warning, like earlier, since we trust this host.

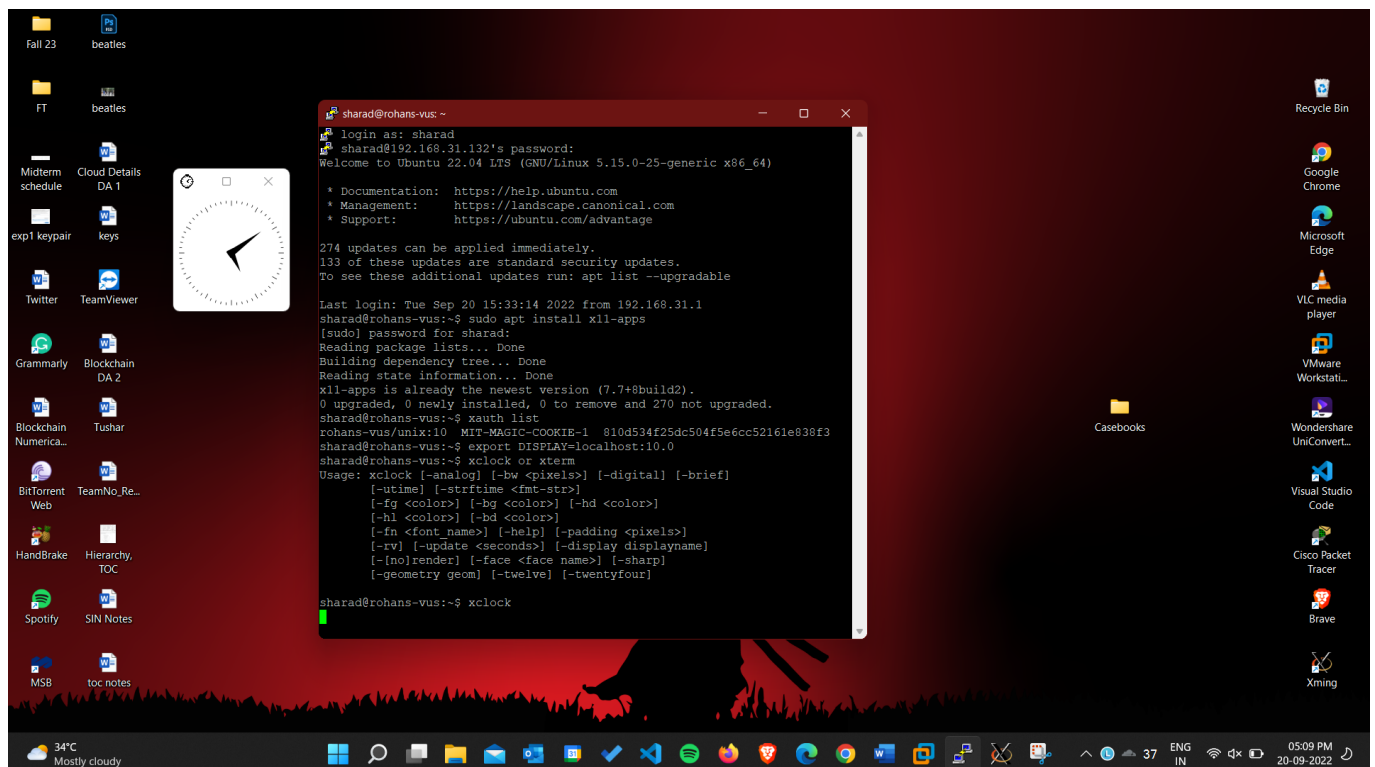


Step 19: Connect to the EC2 instance and check if the X11 traffic forwarding is working using following commands:

`xauth list`

`export DISPLAY=localhost:10.0`

`xclock or xterm`



Experiment: 2

Title: Hosting Website on AWS

Aim:

- Create an SSH tunnel between your server in the local machine and remote clients in EC2 instances and test the connections with programs using X11 traffic.
- DaaS – Deployment of a basic web app and adding additional Functionality.

Background Theory:

- Amazon Web Services offers cloud web hosting solutions that provide businesses, non-profits, and governmental organizations with low-cost ways to deliver their websites and web applications. Whether you're looking for a marketing, rich-media, or ecommerce website, AWS offers a wide-range of website hosting options, and we'll help you select the one that is right for you.
- Resizable compute capacity in the cloud --- EC2 can be applied to host websites that use multiple data centers, and for sites that need to scale using load balancing, autoscaling, or external databases.

Requirements for conducting the experiment:

- AWS Licence, PuTTY

Procedure & Screenshots:

Step 1: Launch local VM Instance (mine is VMWare Workstation Pro®) and have the key pair saved as .ppk (since we're using PuTTY).

The screenshot displays the AWS Management Console interface. At the top, there's a navigation bar with the AWS logo and a search bar. Below this, the 'Instances' page is shown, with a filter for 'Instance ID = i-03575eebf590175a'. A table lists the instance 'Exp-3B' with its ID, state (Running), type (t2.micro), and public IP address (43.205.233.235). Below the table, the 'Details' tab for the selected instance is visible, showing the instance summary, public IPv4 address, private IPv4 address, and public IPv4 DNS address.

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...
Exp-3B	i-03575eebf590175a	Running	t2.micro	2/2 checks passed	No alarms	ap-south-1a	ec2-43-205-233-235.ap...	43.205.233.23

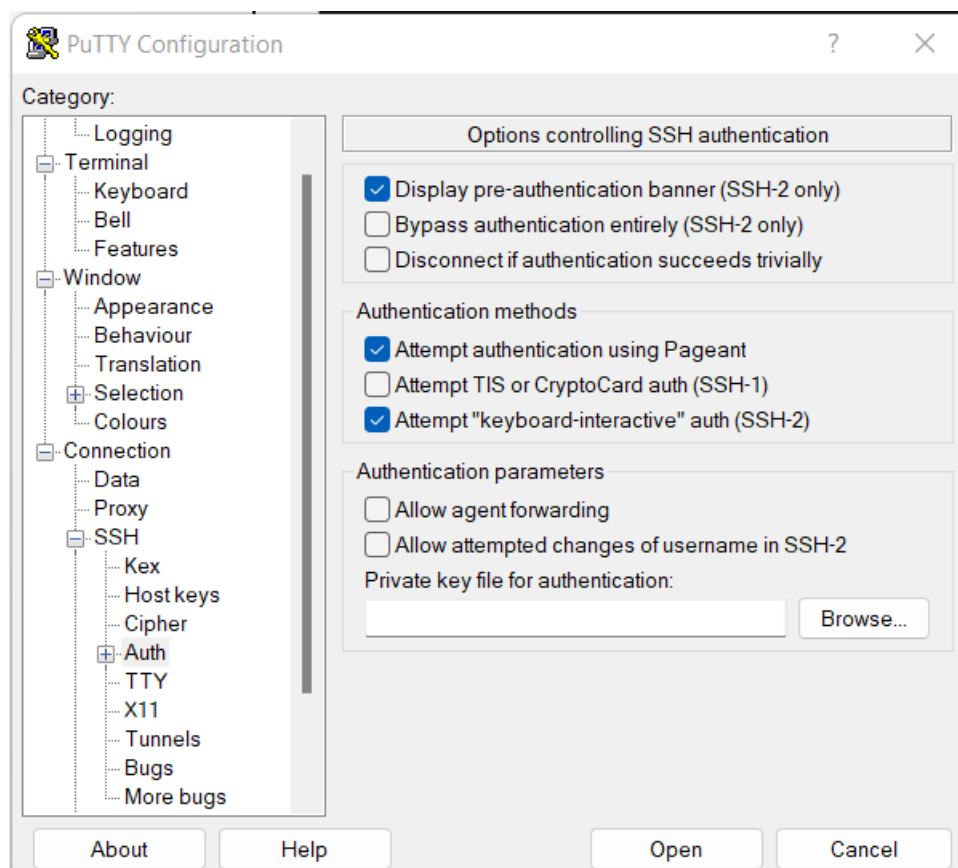
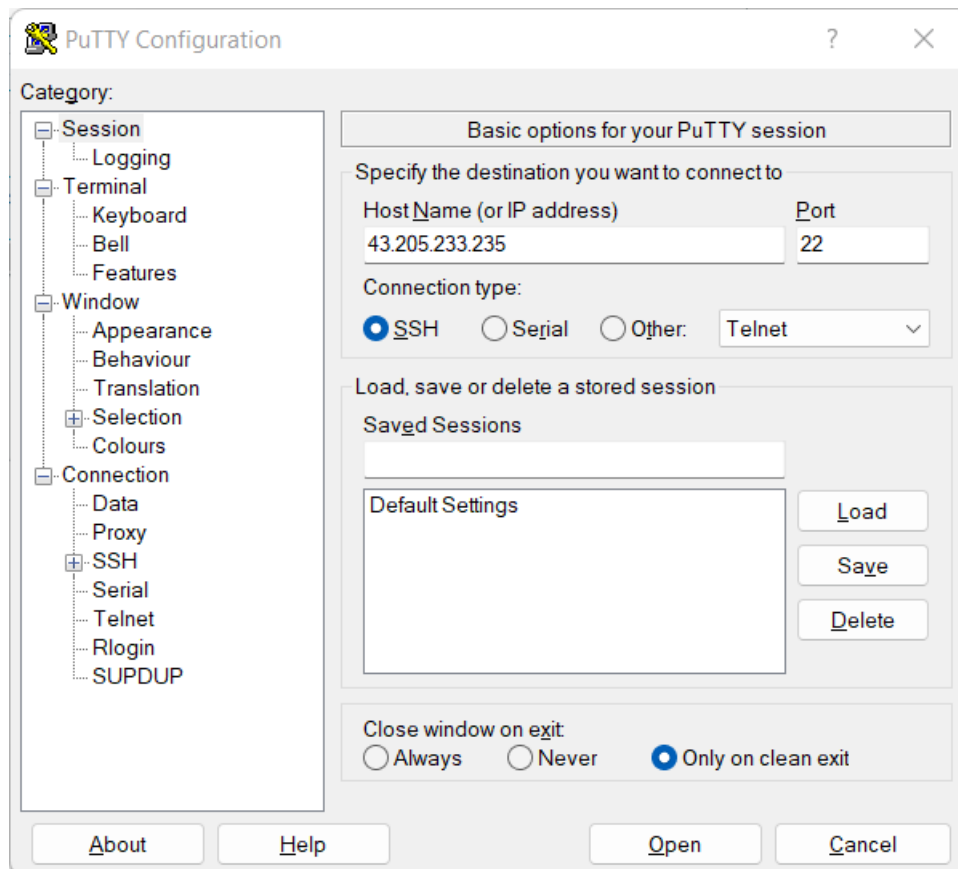
Instance: i-03575eebf590175a (Exp-3B)

Details | Security | Networking | Storage | Status checks | Monitoring | Tags

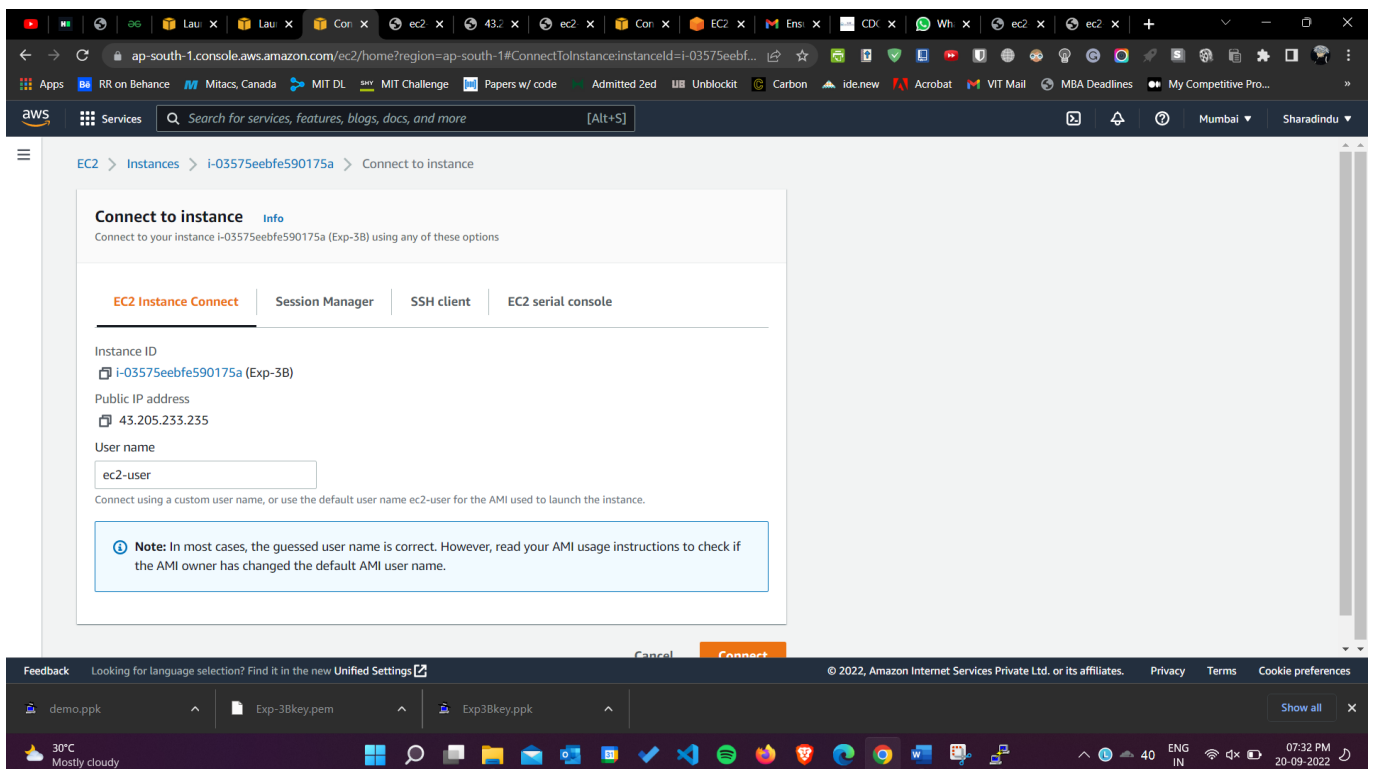
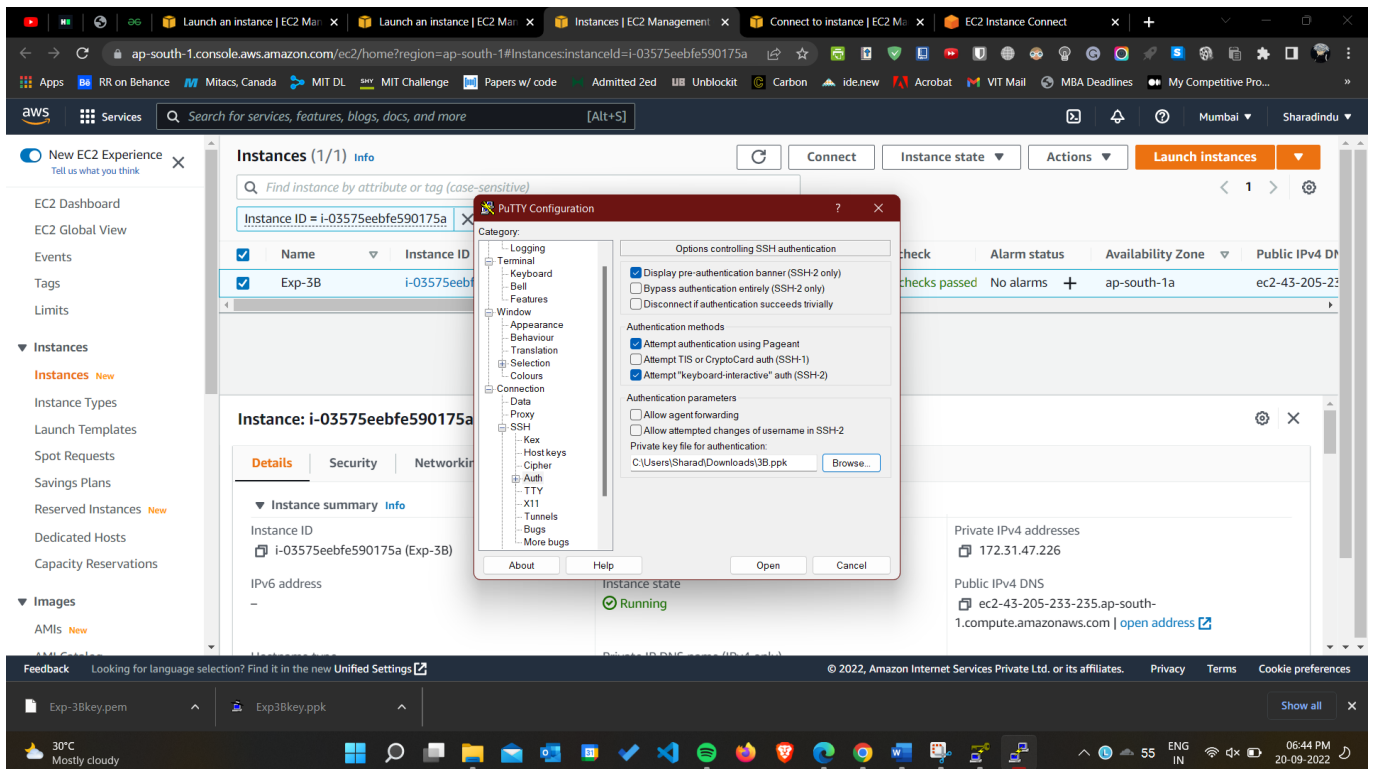
Instance summary Info

Instance ID i-03575eebf590175a (Exp-3B)	Public IPv4 address 43.205.233.235 open address	Private IPv4 addresses 172.31.47.226
IPv6 address -	Instance state Running	Public IPv4 DNS ec2-43-205-233-235.ap-south-1.compute.amazonaws.com open address

Step 2: Configure the PuTTY: Copy the public IPv4 address from AWS Instance and paste it to the Host Name of PuTTY.



Step 3: Upload the converted RSA key pair (from .pem to .ppk) and upload in the 'Private key file for authentication' (in PuTTY and open it.)



Step 4: Run the following commands in PuTTY:

- Enter command `sudo su` to gain root access.
- Installing the apache server using the command `sudo yum -y install httpd`.
- Start the apache server using the command `sudo service httpd start`.

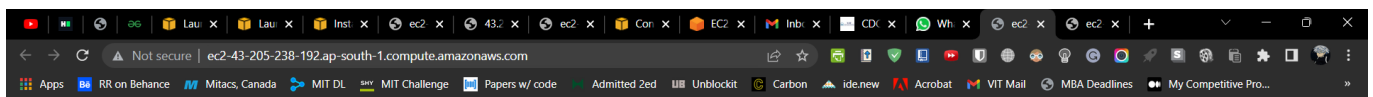

```

root@ip-172-31-34-28:/var/www/html
login as: ec2-user
Authenticating with public key "imported-openssh-key"
Last login: Tue Sep 20 13:32:50 2022 from ec2-13-233-177-0.ap-south-1.compute.am
amazonaws.com

 _ _ _ _ _
|_| ( _ _ _ ) / Amazon Linux 2 AMI
 _ _ _ _ _

https://aws.amazon.com/amazon-linux-2/
1 package(s) needed for security, out of 3 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-172-31-34-28 ~]$ sudo su
[ec2-user@ip-172-31-34-28 ~]$ sudo yum -y install httpd
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core | 3.7 kB | 00:00
Package httpd-2.4.54-1.amzn2.x86_64 already installed and latest version
Nothing to do
[ec2-user@ip-172-31-34-28 ~]$ sudo service httpd start
Redirecting to /bin/systemctl start httpd.service
[ec2-user@ip-172-31-34-28 ~]$ sudo service httpd start
Redirecting to /bin/systemctl start httpd.service
[ec2-user@ip-172-31-34-28 ~]$ pwd
/home/ec2-user
[ec2-user@ip-172-31-34-28 ~]$ cd /var/www/html
[ec2-user@ip-172-31-34-28 html]$ ls
index.html
[ec2-user@ip-172-31-34-28 html]$ vi index.html
[ec2-user@ip-172-31-34-28 html]$ vi index.html
[ec2-user@ip-172-31-34-28 html]$ sudo service httpd start
Redirecting to /bin/systemctl start httpd.service
[ec2-user@ip-172-31-34-28 html]$

```



DOCTYPE html>

19BCE2105

Sharadindu Adhikari



Turn on the light

Turn off the light

