



CONESTOGA

Connect Life and Learning

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Deliverable:	Assignment 2
Course Name:	NTWK8141-24S-Sec3-Linux Server

Date Assigned:	25/07/2024
Date Due:	28/07/2024
Rules:	<ul style="list-style-type: none">• Individual.• Cheating is not allowed.• Plagiarism counts as cheating!• That FAILURE to submit work in the course can result in a grade of 'F' or 'I' for failure to complete the course!

Windows Server

The screenshot shows the Windows Server 2019 Control Panel. The left sidebar is titled "Server Manager" and includes "Dashboard", "Local Server" (selected), "All Servers", "AD DS", "DNS", "File and Storage Services", "IIS", "NPAS", and "Remote Desktop Services". The main area is titled "PROPERTIES For WinServer" and displays the following information:

Computer name	WinServer
Domain	LinuxAssign2.local
Windows Defender Firewall	Private: On
Remote management	Enabled
Remote Desktop	Enabled
NIC Teaming	Disabled
Ethernet0	172.23.78.90, IPv6 enabled
Operating system version	Microsoft Windows Server 2019 Datacenter
Hardware information	VMware, Inc. VMware7.1
Processors	Intel(R) Xeon(R) Platinum 8268 CPU @ 2.90GHz
Installed memory (RAM)	4 GB
Total disk space	59.4 GB

Below the properties table is an "EVENTS" section with a link to "Activate Windows". The taskbar at the bottom shows the date and time as 7/27/2024 8:18 PM.

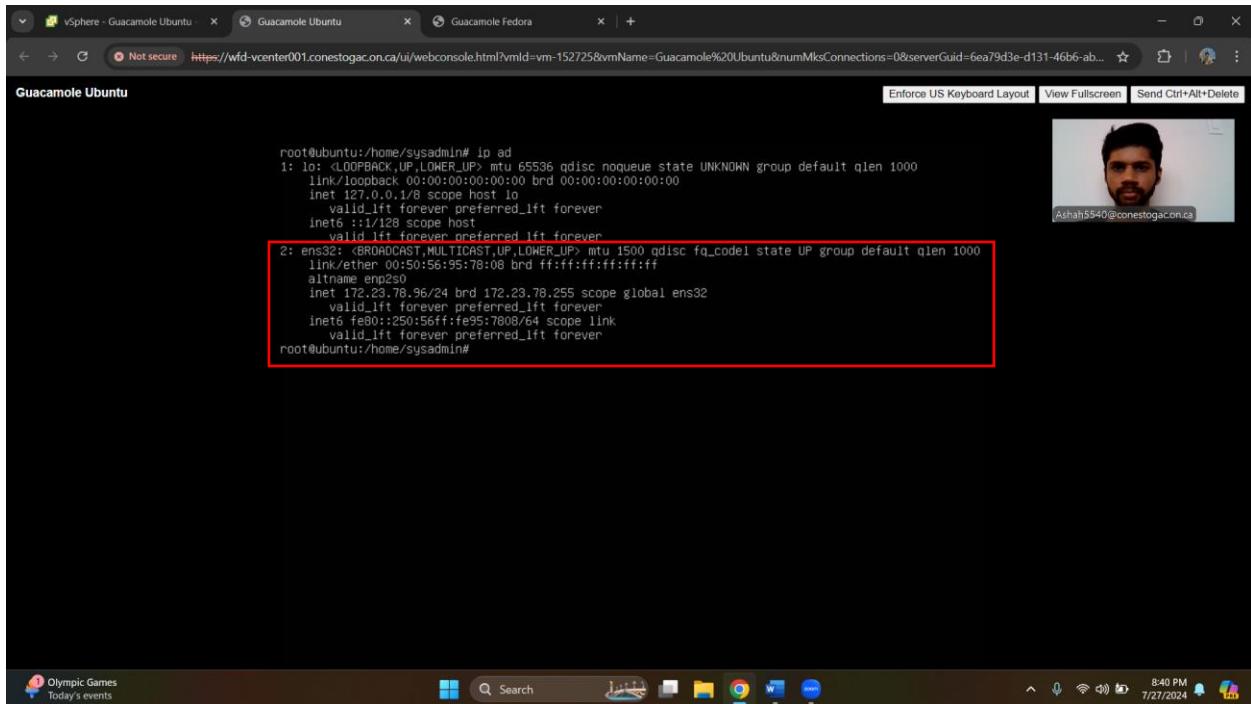
Windows Workstation

The screenshot shows the Windows Workstation Control Panel. The left sidebar is titled "Settings" and includes "IP assignment", "IPv4 address", "IPv4 subnet prefix length", "IPv4 gateway", "IPv4 DNS servers", and an "Edit" button. The main area is titled "Properties" and displays the following network adapter details:

Link speed (Receive/Transmit):	1000/1000 (Mbps)
Link-local IPv6 address:	fe80::535ecf52:5cf0:555d%8
IPv4 address:	172.23.78.91
IPv4 DNS servers:	172.23.78.90
Manufacturer:	Intel Corporation
Description:	Intel(R) 82574L Gigabit Network Connection
Driver version:	12.17.10.8
Physical address (MAC):	00-50-56-95-69-55

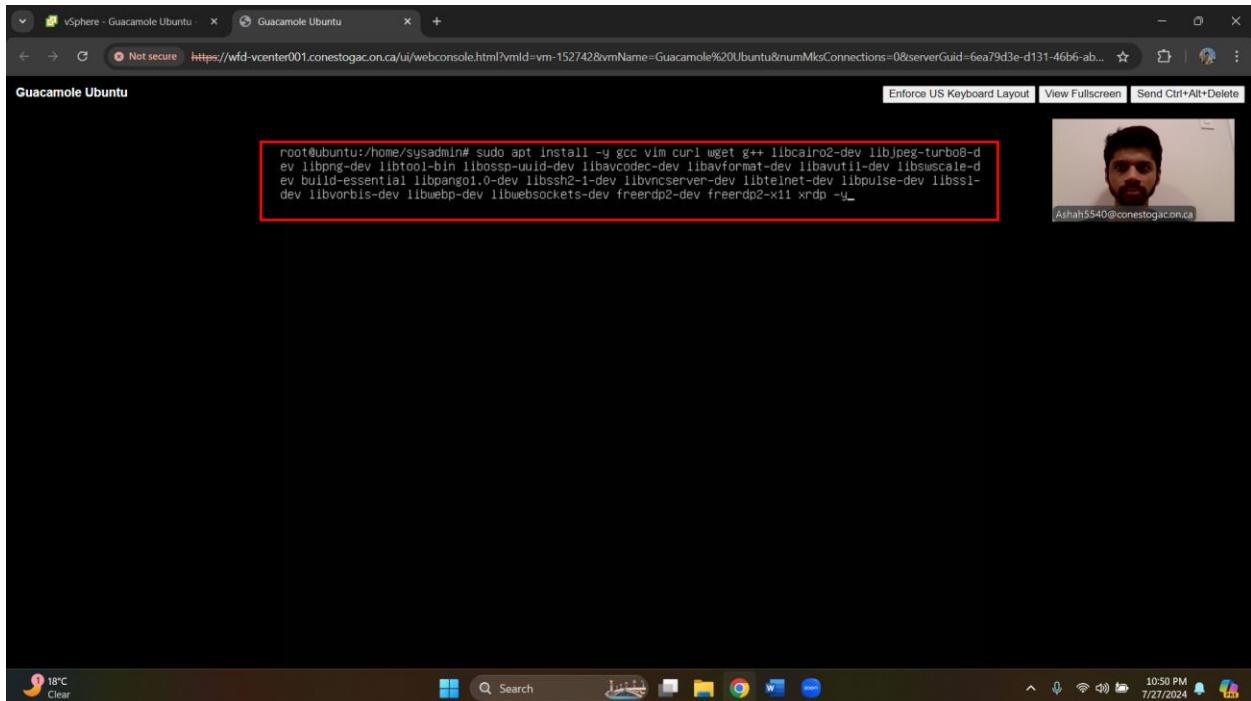
Below the properties table is an "Activate Windows" section with a link to "Go to Settings to activate Windows". The taskbar at the bottom shows the date and time as 7/27/2024 8:19 PM.

Guacamole Ubuntu



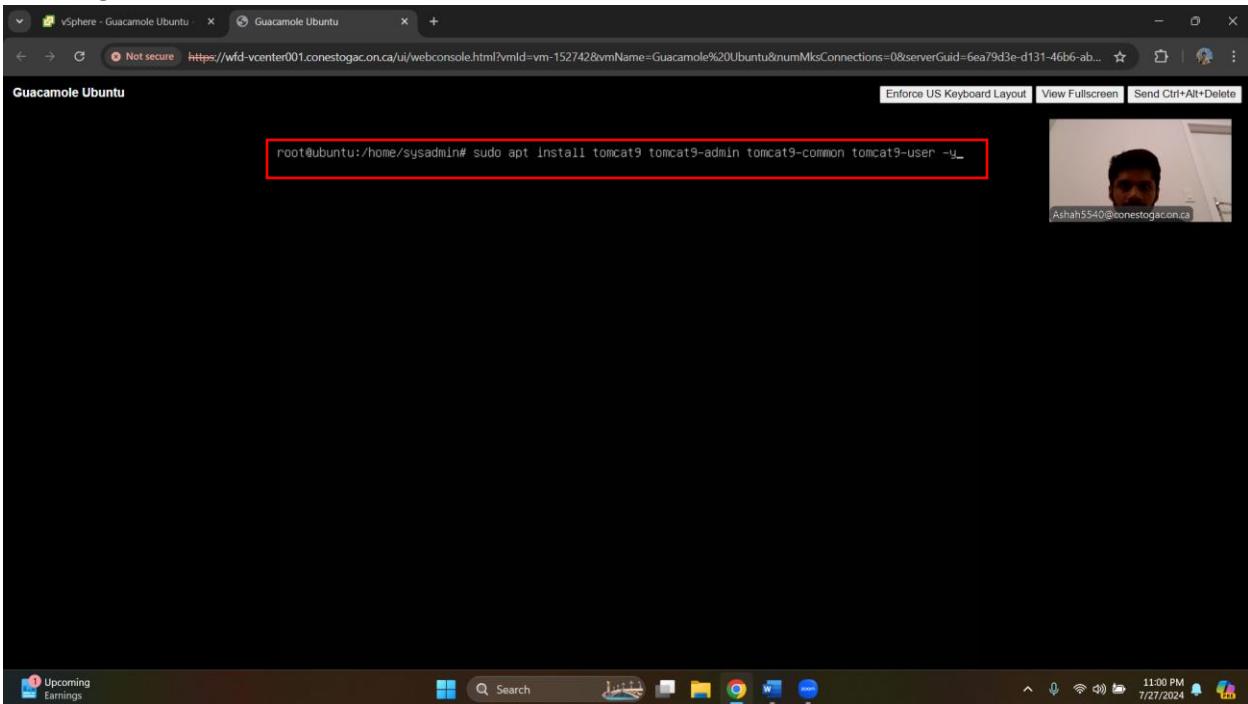
```
root@ubuntu:/home/sysadmin# ip ad
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
            valid_lft forever preferred_lft forever
2: ens32: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:56:95:78:08:08 brd ff:ff:ff:ff:ff:ff
        altname enp2s0
        inet 172.23.78.96/24 brd 172.23.78.255 scope global ens32
            valid_lft forever preferred_lft forever
            inet6 fe80::256:95ff:fe95:7808/64 scope link
                valid_lft forever preferred_lft forever
root@ubuntu:/home/sysadmin#
```

Installing Dependency

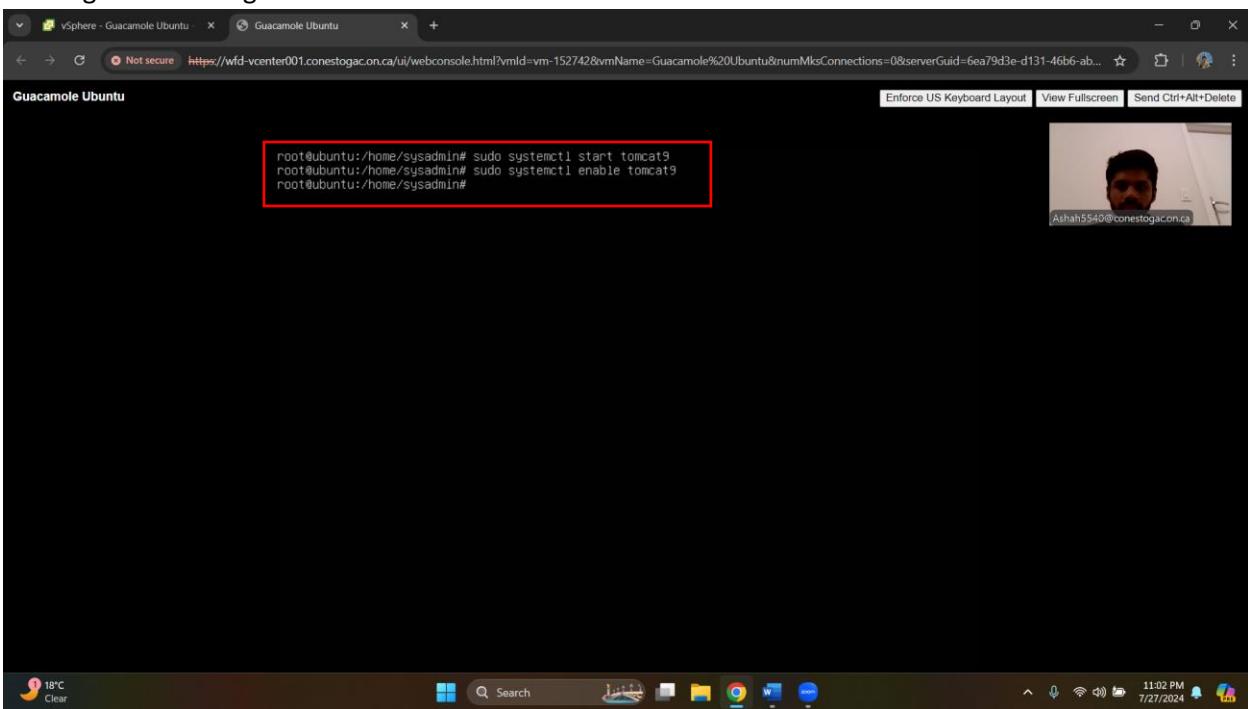


```
root@ubuntu:/home/sysadmin# sudo apt install -y gcc vim curl wget g++ libcairo2-dev libjpeg-turbo8-dev libpng-dev libtool-bin libosp-uuid-dev libavcodec-dev libavformat-dev libavutil-dev libmscale-dev build-essential libpango1.0-dev libssh2-1-dev libvncserver-dev libtelnet-dev libpulse-dev libssl-dev libvorbis-dev libwebrtc-dev libwebsockets-dev freerdp2-dev freerdp2-x11 xrdp -y
```

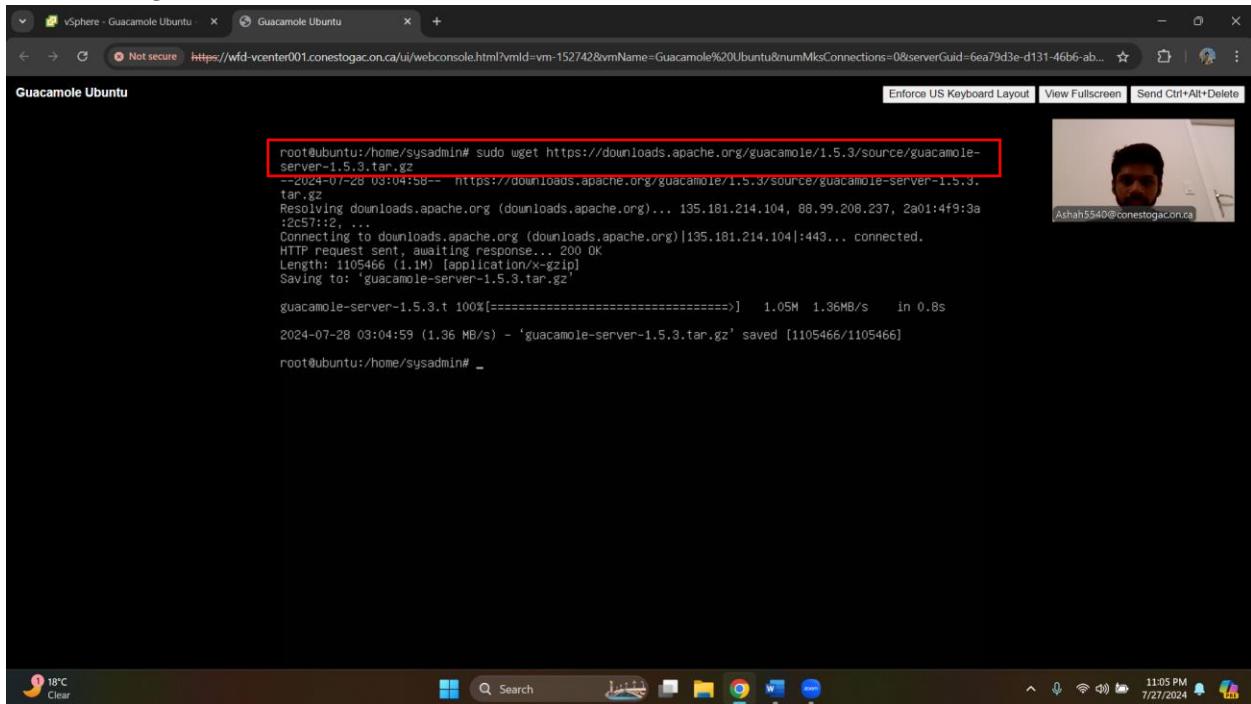
Installing tomcat9



Starting and enabling tomcat9



Downloading Guacamole 1.5.3

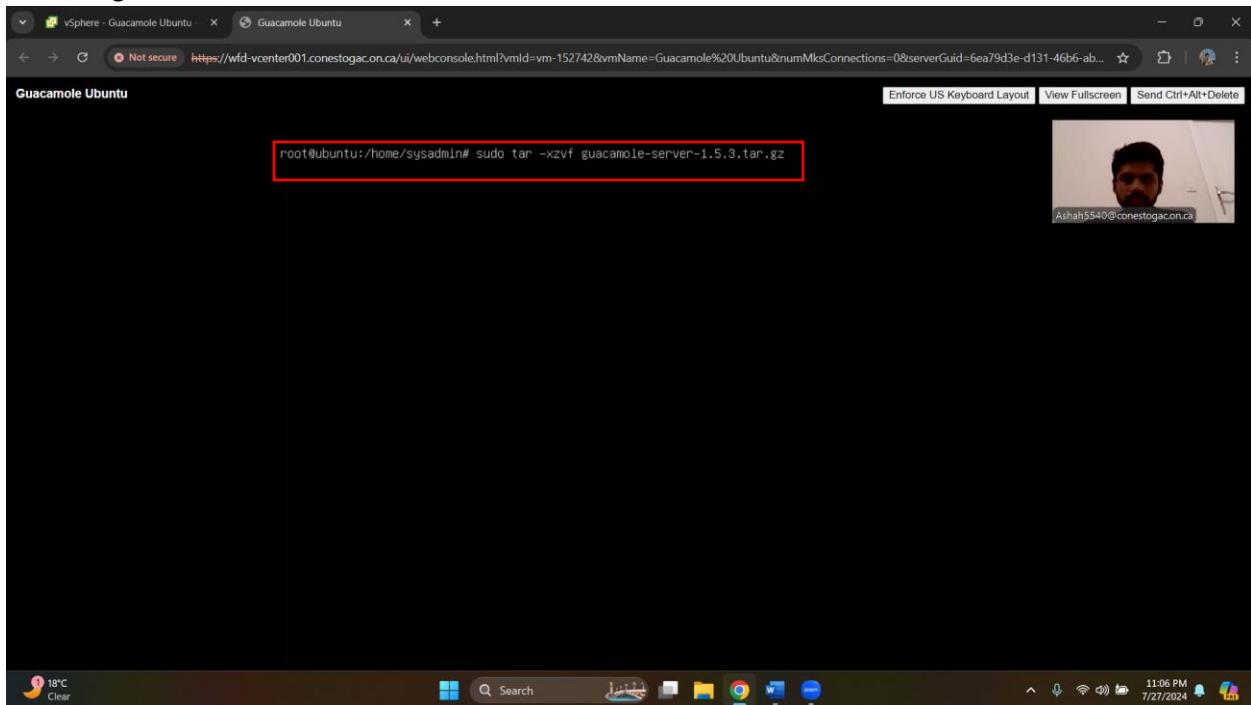


Guacamole Ubuntu

```
root@ubuntu:/home/sysadmin# sudo wget https://downloads.apache.org/guacamole/1.5.3/source/guacamole-server-1.5.3.tar.gz
--2024-07-28 03:04:58-- https://downloads.apache.org/guacamole/1.5.3/source/guacamole-server-1.5.3.
tar.gz
Resolving downloads.apache.org (downloads.apache.org)... 135.181.214.104, 88.99.208.237, 2a01:4f9:3a
:2c57::2, ...
Connecting to downloads.apache.org (downloads.apache.org)|135.181.214.104|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1105466 (1.1M) [application/x-gzip]
Saving to: 'guacamole-server-1.5.3.tar.gz'

guacamole-server-1.5.3.t 100%[=====] 1.05M 1.36MB/s in 0.8s
2024-07-28 03:04:59 (1.36 MB/s) - "guacamole-server-1.5.3.tar.gz" saved [1105466/1105466]
root@ubuntu:/home/sysadmin#
```

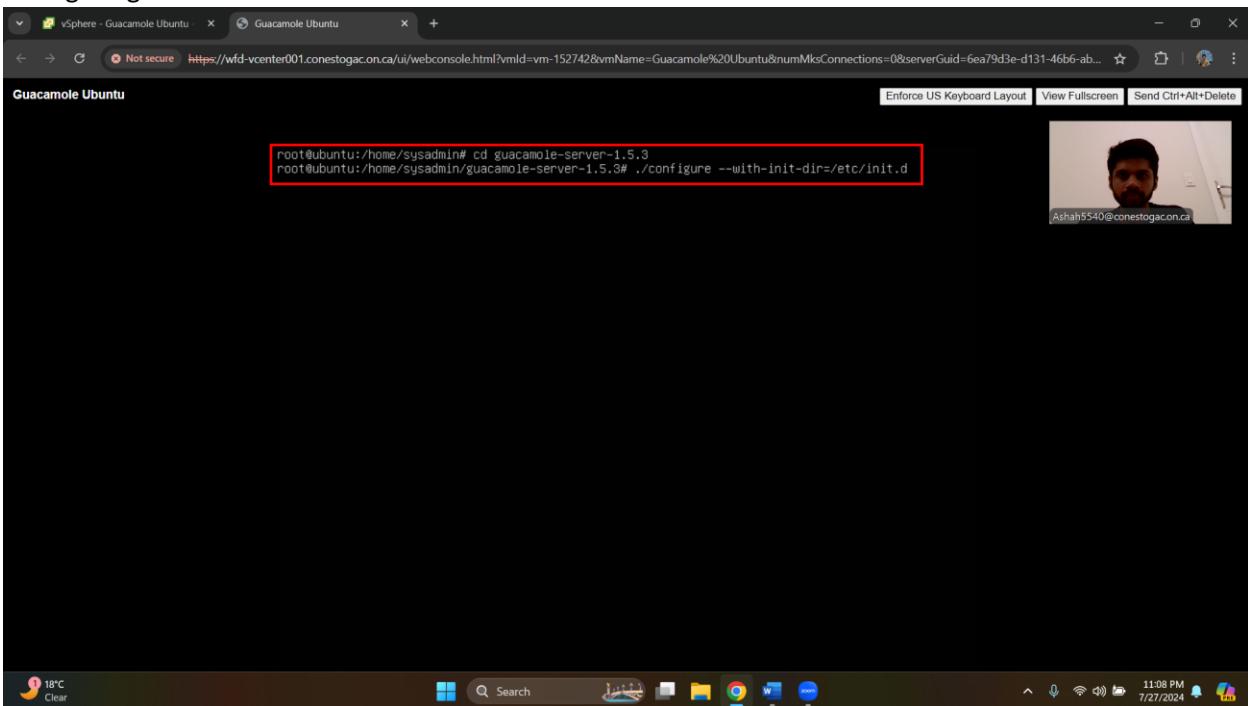
Extracting tar file



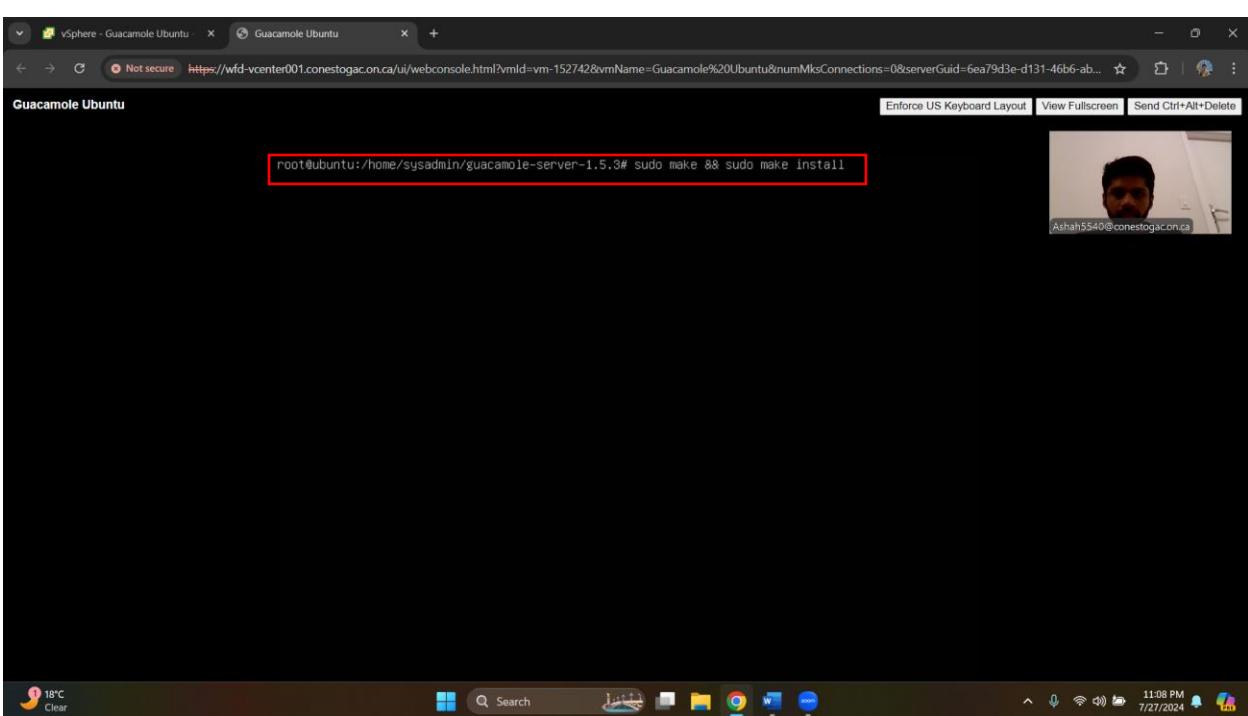
Guacamole Ubuntu

```
root@ubuntu:/home/sysadmin# sudo tar -xvf guacamole-server-1.5.3.tar.gz
```

Configuring dir with init.d

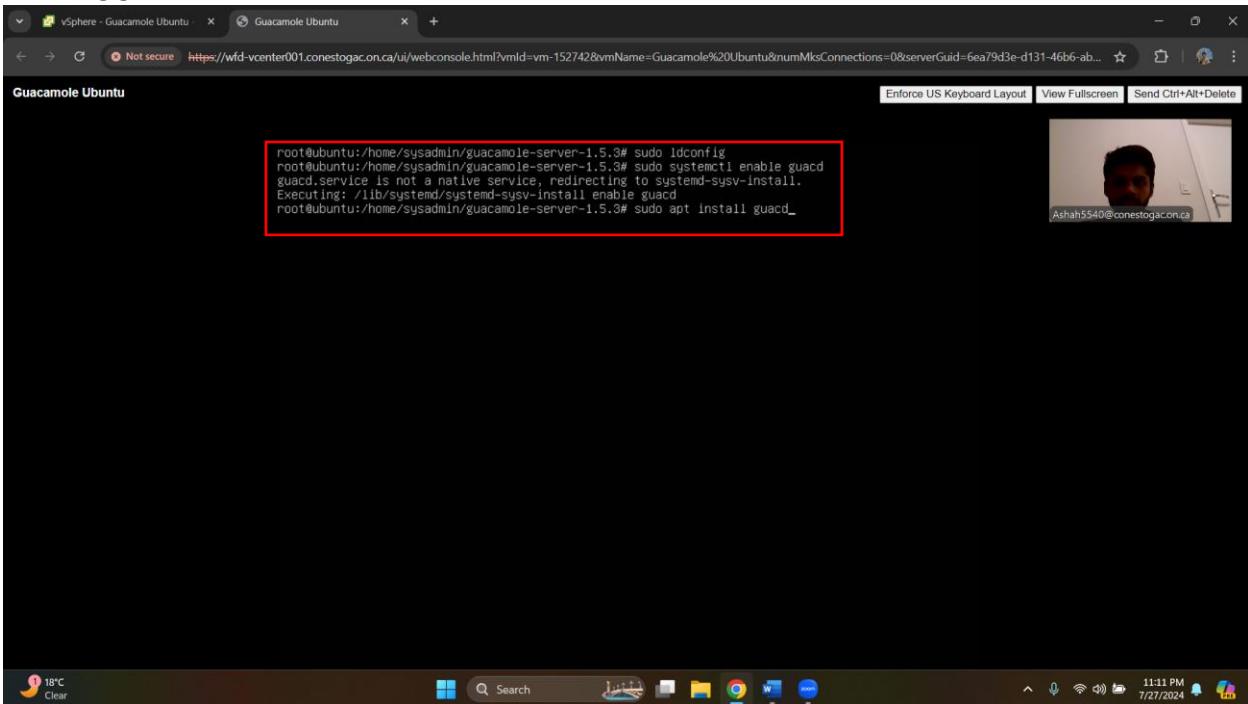


```
root@ubuntu:/home/sysadmin# cd guacamole-server-1.5.3
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# ./configure --with-init-dir=/etc/init.d
```

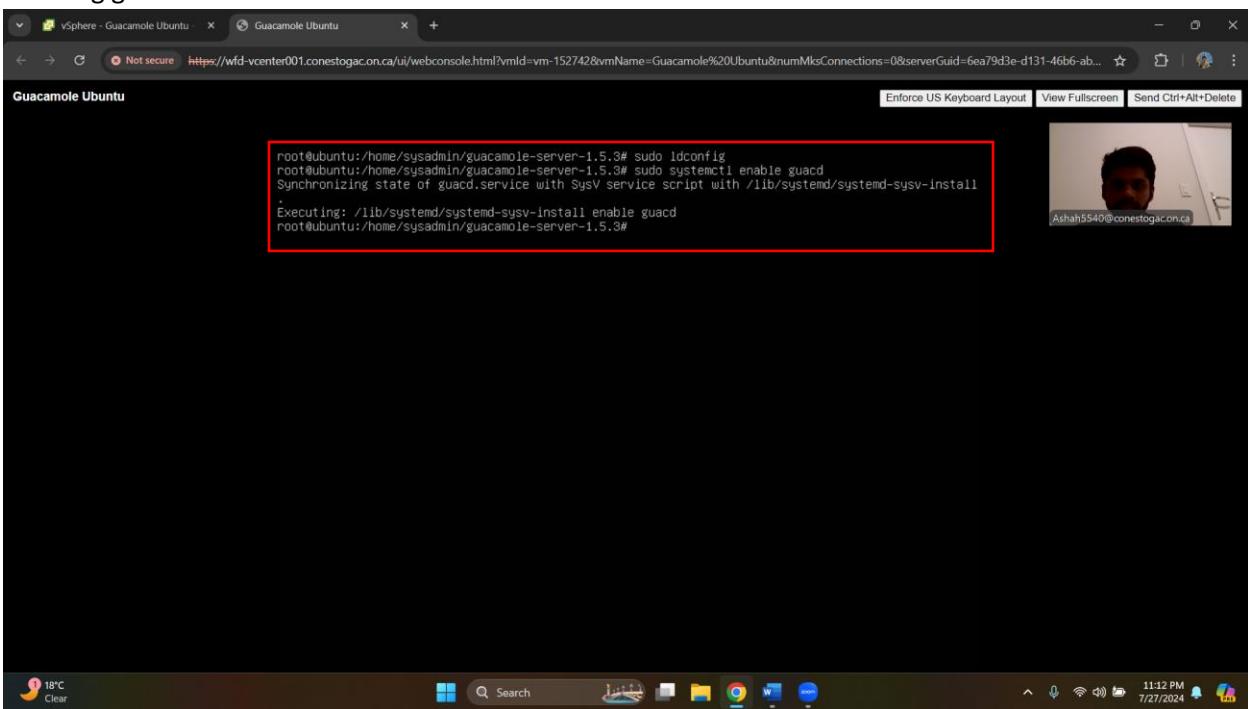


```
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# sudo make && sudo make install
```

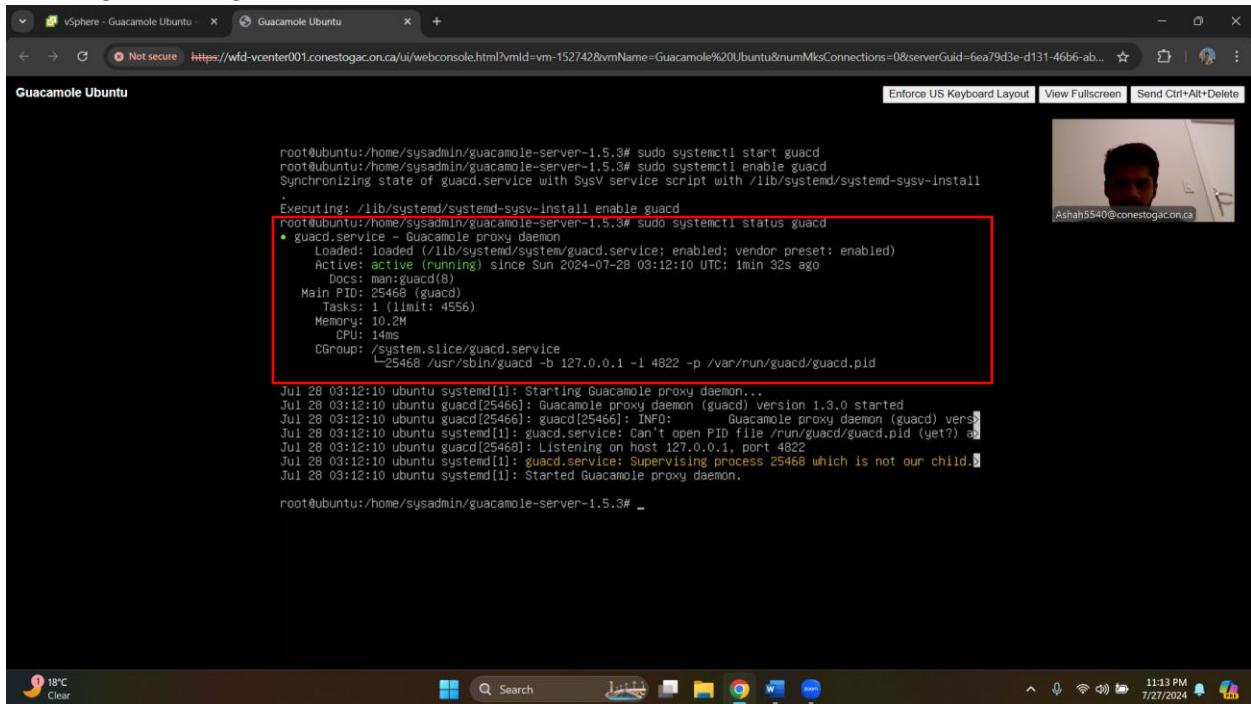
Installing guacd



Enabling guacd



Checking status of guacd

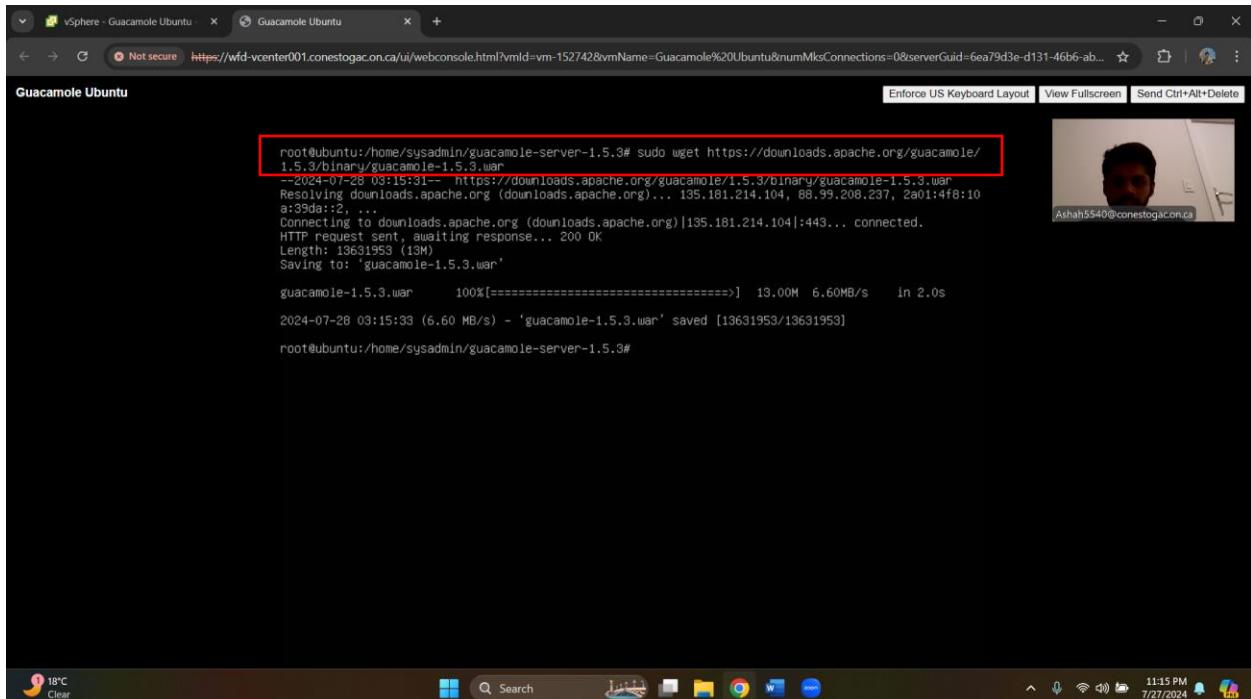


root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# sudo systemctl start guacd
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# sudo systemctl enable guacd
Synchronizing state of guacd.service with SysV service script with /lib/systemd/systemd-sysv-install
Executing: /lib/systemd/systemd-sysv-install enable guacd
● guacd.service - Guacamole proxy daemon
 Loaded: loaded (/lib/systemd/system/guacd.service; enabled; vendor preset: enabled)
 Active: active (running) since Sun 2024-07-28 03:12:10 UTC; 1min 32s ago
 Docs: man:guacd(8)
 Main PID: 25468 (guacd)
 Tasks: 1 (limit: 4556)
 Memory: 10.2M
 CPU: 14ms
 CGroup: /system.slice/guacd.service
 └─25468 /usr/sbin/guacd -b 127.0.0.1 -1 4822 -p /var/run/guacd/guacd.pid

Jul 28 03:12:10 ubuntu systemd[1]: Starting Guacamole proxy daemon...
Jul 28 03:12:10 ubuntu guacd[25468]: Guacamole proxy daemon (guacd) version 1.3.0 started
Jul 28 03:12:10 ubuntu guacd[25468]: INFO: Guacamole proxy daemon (guacd) vers
Jul 28 03:12:10 ubuntu systemd[1]: guacd.service: Can't open PID file /run/guacd/guacd.pid (yet?) @
Jul 28 03:12:10 ubuntu guacd[25468]: Listening on host 127.0.0.1, port 4822
Jul 28 03:12:10 ubuntu systemd[1]: guacd.service: Supervising process 25468 which is not our child.
Jul 28 03:12:10 ubuntu systemd[1]: Started Guacamole proxy daemon.

root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# _

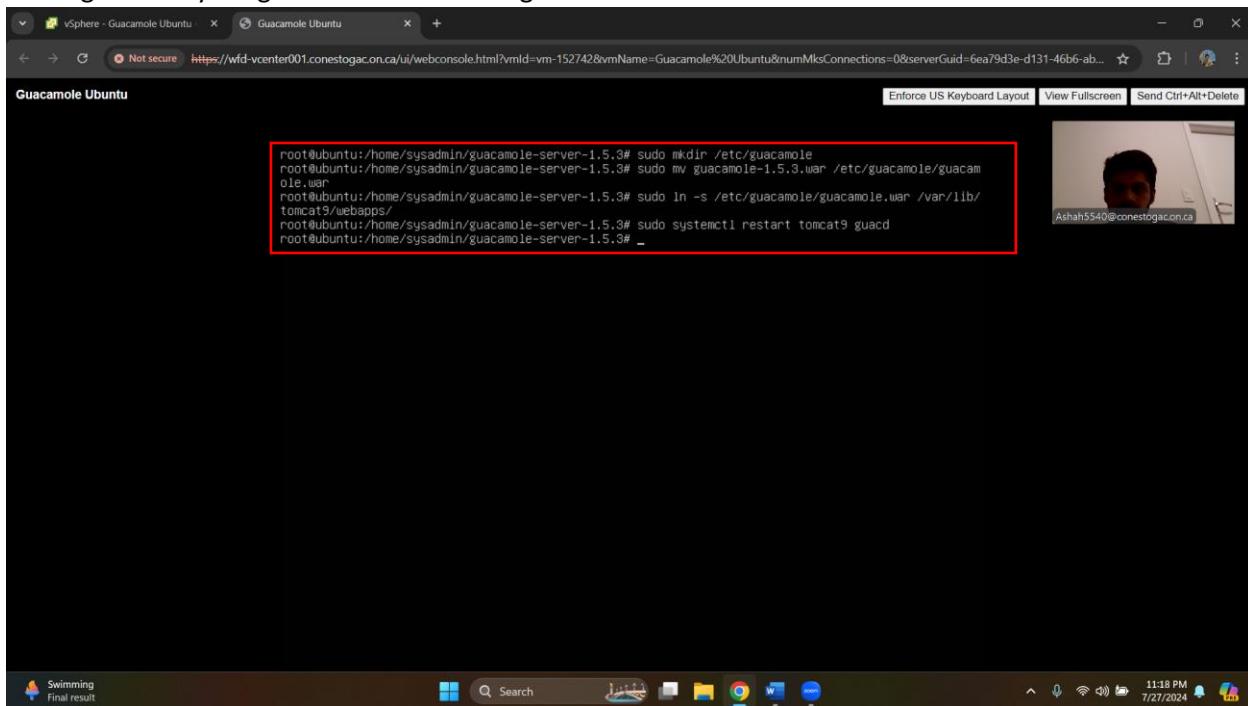
Downloading guacamole for webapp



root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# sudo wget https://downloads.apache.org/guacamole/1.5.3/binaries/guacamole-1.5.3.war
--2024-07-28 03:15:31-- https://downloads.apache.org/guacamole/1.5.3/binaries/guacamole-1.5.3.war
Resolving downloads.apache.org (downloads.apache.org)... 195.181.214.104, 88.99.208.237, 2a01:4f8:10
a:39da::2,...
Connecting to downloads.apache.org (downloads.apache.org)|195.181.214.104|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 13631953 (13M)
Saving to: 'guacamole-1.5.3.war'

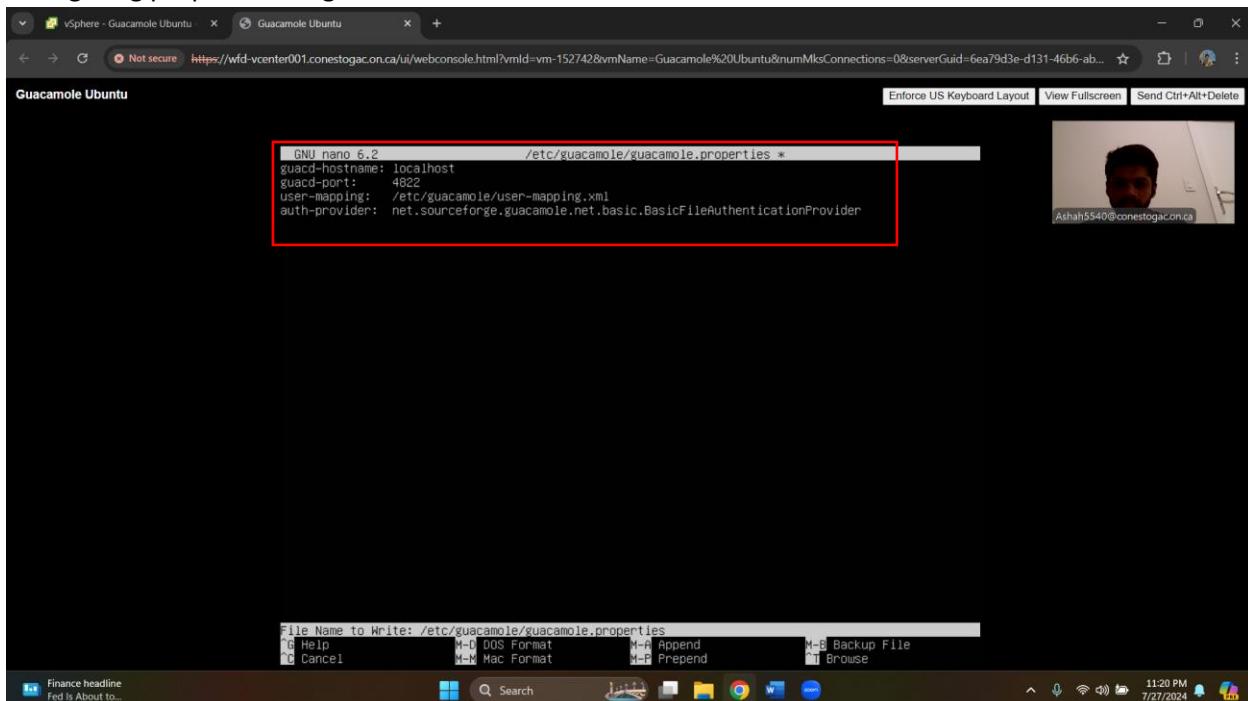
guacamole-1.5.3.war 100%[=====] 13.00M 6.60MB/s in 2.0s
2024-07-28 03:15:33 (6.60 MB/s) - 'guacamole-1.5.3.war' saved [13631953/13631953]
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3#

Making directory for guacamole and moving file to its folder



```
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# sudo mkdir /etc/guacamole
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# sudo mv guacamole-1.5.3.war /etc/guacamole/guacamole.war
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# sudo ln -s /etc/guacamole/guacamole.war /var/lib/tomcat9/webapps/
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# sudo systemctl restart tomcat9 guacd
root@ubuntu:/home/sysadmin/guacamole-server-1.5.3# _
```

Configuring properties for guacamole



```
GNU nano 6.2          /etc/guacamole/guacamole.properties *
guacd-hostname: localhost
guacd-port: 4822
user-mapping: /etc/guacamole/user-mapping.xml
auth-provider: net.sourceforge.guacamole.net.basic.BasicFileAuthenticationProvider
```

File Name to Write: /etc/guacamole/guacamole.properties

Configuring user mapping of guacamole

The screenshot shows a terminal window titled "Guacamole Ubuntu" running on a Linux desktop. The terminal displays the contents of a file named "user-mapping.xml". A red box highlights the XML code, which defines two connections: "Server" and "Workstation", both using the RDP protocol. The "Server" connection has a host IP of 172.23.78.90 and port 3389. The "Workstation" connection has a host IP of 172.23.78.91 and port 3389. Both connections have an "ignore-cert" parameter set to true, an "username" of "Administrator", and a "password" of "Secret55". The XML structure includes "authorise", "connection", and "user-mapping" tags.

```
GNU nano 6.2          user-mapping.xml *
<user-mapping>
<authorise username="admin" password="Secret55">
<connection name="Server">
<protocol>rdp</protocol>
<param name="hostname">172.23.78.90</param>
<param name="port">3389</param>
<param name="ignore-cert">true</param>
<param name="username">Administrator</param>
<param name="password">Secret55</param>
</connection>
<connection name="Workstation">
<protocol>rdp</protocol>
<param name="hostname">172.23.78.91</param>
<param name="port">3389</param>
<param name="ignore-cert">true</param>
<param name="username">Administrator</param>
<param name="password">Secret55</param>
</connection>
</authorise>
</user-mapping>
```

At the bottom of the terminal window, there is a file selection dialog with the title "File Name to Write: user-mapping.xml". The dialog lists several options: Help, Cancel, F-D DOS Format, F-M Mac Format, M-A Append, M-P Prepend, M-B Backup File, and M-T Browse. The current path shown is "/etc/guacamole#".

Editing en.json file of guacamole

The screenshot shows a terminal window titled "Guacamole Ubuntu" running on a Linux desktop. The terminal displays the command "root@ubuntu:/etc/guacamole# nano /var/lib/tomcat9/webapps/guacamole/translations/en.json". A red box highlights the command line. The desktop environment includes a taskbar with icons for various applications like a browser, file manager, and system tools. The system tray shows the date and time as 11:34 PM, 7/27/2024.

```
root@ubuntu:/etc/guacamole# nano /var/lib/tomcat9/webapps/guacamole/translations/en.json
```

vSphere - Guacamole Ubuntu - Guacamole Ubuntu

Guacamole Ubuntu

Not secure https://wfd-vcenter001.conestogac.on.ca/ui/webconsole.html?vmId=vm-152742&vmName=Guacamole%20Ubuntu&numMksConnections=0&serverGuid=6ea79d3e-d131-46b6-ab... ☆ View Fullscreen Send Ctrl+Alt+Delete

Enforce US Keyboard Layout

GNU nano 6.2 /var/11b/tomcat9/webapps/guacamole/translations/en.json *

```

{
  "NAME": "English",
  "NAME": {
    "NAME": "Ubuntu_Guacamole",
    "VERSION": "1.5.3",
    "NAME": "Cancel",
    "NAME": "Clone",
    "NAME": "Continue",
    "NAME": "Delete",
    "NAME": "Kill Sessions",
    "NAME": "Download",
    "NAME": "Logout",
    "NAME": "Re-login",
    "NAME": "Logout",
    "NAME": "Connections",
    "NAME": "Preferences",
    "NAME": "Settings",
    "NAME": "Active Sessions",
    "NAME": "Users",
    "NAME": "Groups",
    "NAME": "Back",
    "NAME": "Home",
    "NAME": "Pause",
    "NAME": "Play",
    "NAME": "Save",
    "NAME": "Search",
    "NAME": "Share",
    "NAME": "Update Password",
    "NAME": "Cancel"
  }
}

```

Help Write Out Where Is Cut Execute Location Undo Read File Replace Paste Go To Line Redo

20°C Clear 11:34 PM 7/27/2024

Checking services of tomcat and guacd

vSphere - Guacamole Ubuntu - Guacamole Ubuntu

Guacamole Ubuntu

Not secure https://wfd-vcenter001.conestogac.on.ca/ui/webconsole.html?vmId=vm-152742&vmName=Guacamole%20Ubuntu&numMksConnections=0&serverGuid=6ea79d3e-d131-46b6-ab... ☆ View Fullscreen Send Ctrl+Alt+Delete

Enforce US Keyboard Layout

Guacamole Ubuntu

Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:05.754 [main] INFO o.a.g.GuacamoleServletContextListener\$1: Tomcat initialized (v9.0.60)
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:05.756 [main] INFO o.a.g.rest.auth.HashTokenSessionManager\$1: HashTokenSessionManager initialized
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:06.054 [main] INFO o.a.g.t.w.WebSocketTunnelModule - WebSocket tunnel module initialized
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:06.473 [main] WARN o.g.Jersey.server.wadl.WadlFeature - Jersey WADL support is disabled
Jul 28 03:35:05 ubuntu tomcat9[26022]: Deployment of web application archive [/var/lib/tomcat9/webapps/guacamole.war]
Jul 28 03:35:07 ubuntu tomcat9[26022]: At least one JAR was scanned for TLDs yet contained no TLDs.
Jul 28 03:35:07 ubuntu tomcat9[26022]: Deployment of web application directory [/var/lib/tomcat9/webapps/guacamole]
Jul 28 03:35:07 ubuntu tomcat9[26022]: Starting ProtocolHandler ['http-nio-8080']
Jul 28 03:35:07 ubuntu tomcat9[26022]: Server startup in [4009] milliseconds

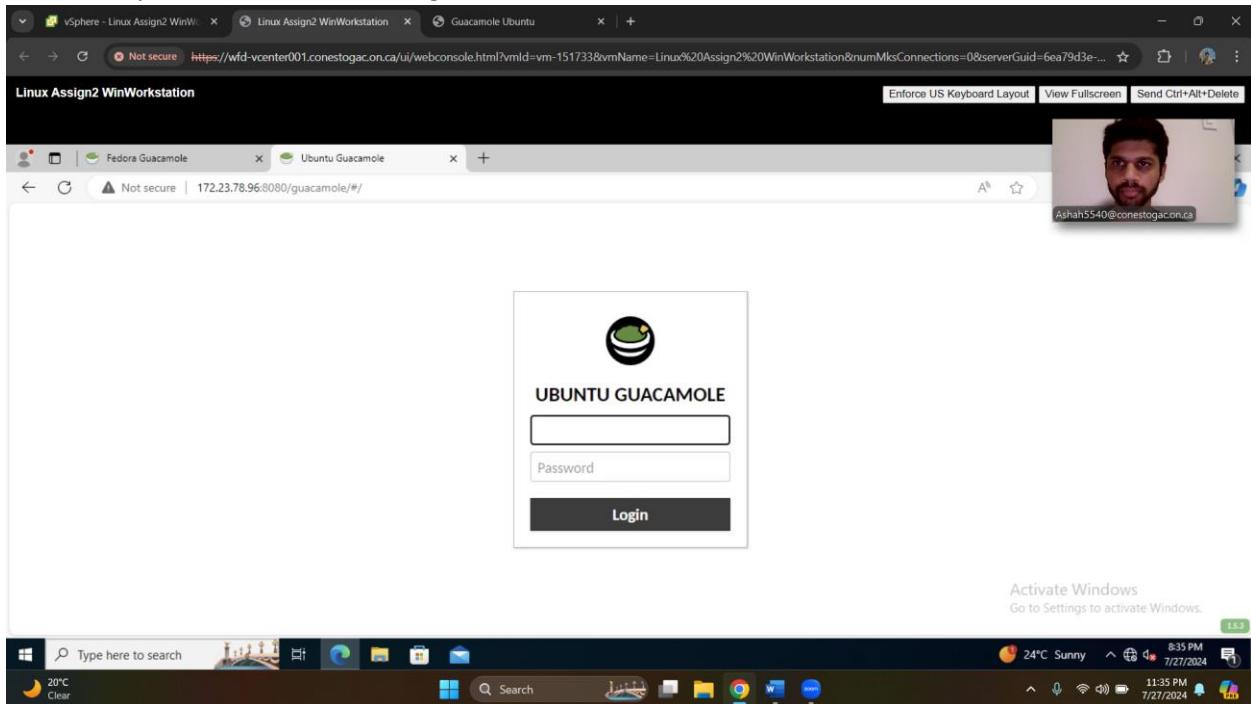
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:05.754 [main] INFO o.a.g.GuacamoleServletContextListener\$1: Tomcat initialized (v9.0.60)
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:05.756 [main] INFO o.a.g.rest.auth.HashTokenSessionManager\$1: HashTokenSessionManager initialized
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:06.054 [main] INFO o.a.g.t.w.WebSocketTunnelModule - WebSocket tunnel module initialized
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:06.473 [main] WARN o.g.Jersey.server.wadl.WadlFeature - Jersey WADL support is disabled
Jul 28 03:35:05 ubuntu tomcat9[26022]: Deployment of web application archive [/var/lib/tomcat9/webapps/guacamole.war]
Jul 28 03:35:07 ubuntu tomcat9[26022]: At least one JAR was scanned for TLDs yet contained no TLDs.
Jul 28 03:35:07 ubuntu tomcat9[26022]: Deployment of web application directory [/var/lib/tomcat9/webapps/guacamole]
Jul 28 03:35:07 ubuntu tomcat9[26022]: Starting ProtocolHandler ['http-nio-8080']
Jul 28 03:35:07 ubuntu tomcat9[26022]: Server startup in [4009] milliseconds

Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:05.754 [main] INFO o.a.g.GuacamoleServletContextListener\$1: Tomcat initialized (v9.0.60)
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:05.756 [main] INFO o.a.g.rest.auth.HashTokenSessionManager\$1: HashTokenSessionManager initialized
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:06.054 [main] INFO o.a.g.t.w.WebSocketTunnelModule - WebSocket tunnel module initialized
Jul 28 03:35:05 ubuntu tomcat9[26022]: 03:35:06.473 [main] WARN o.g.Jersey.server.wadl.WadlFeature - Jersey WADL support is disabled
Jul 28 03:35:05 ubuntu tomcat9[26022]: Deployment of web application archive [/var/lib/tomcat9/webapps/guacamole.war]
Jul 28 03:35:07 ubuntu tomcat9[26022]: At least one JAR was scanned for TLDs yet contained no TLDs.
Jul 28 03:35:07 ubuntu tomcat9[26022]: Deployment of web application directory [/var/lib/tomcat9/webapps/guacamole]
Jul 28 03:35:07 ubuntu tomcat9[26022]: Starting ProtocolHandler ['http-nio-8080']
Jul 28 03:35:07 ubuntu tomcat9[26022]: Server startup in [4009] milliseconds

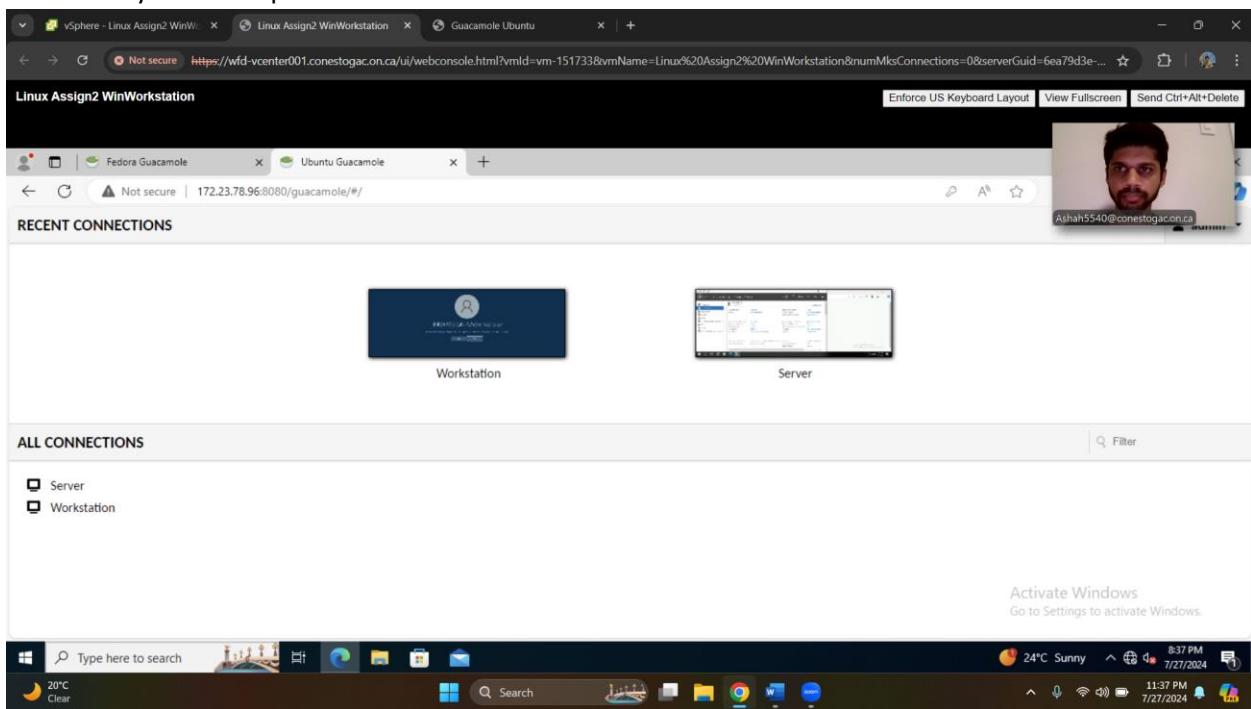
Jul 28 03:35:02 ubuntu systemd[1]: Starting Guacamole proxy daemon...
lines 1-36

20°C Clear 11:35 PM 7/27/2024

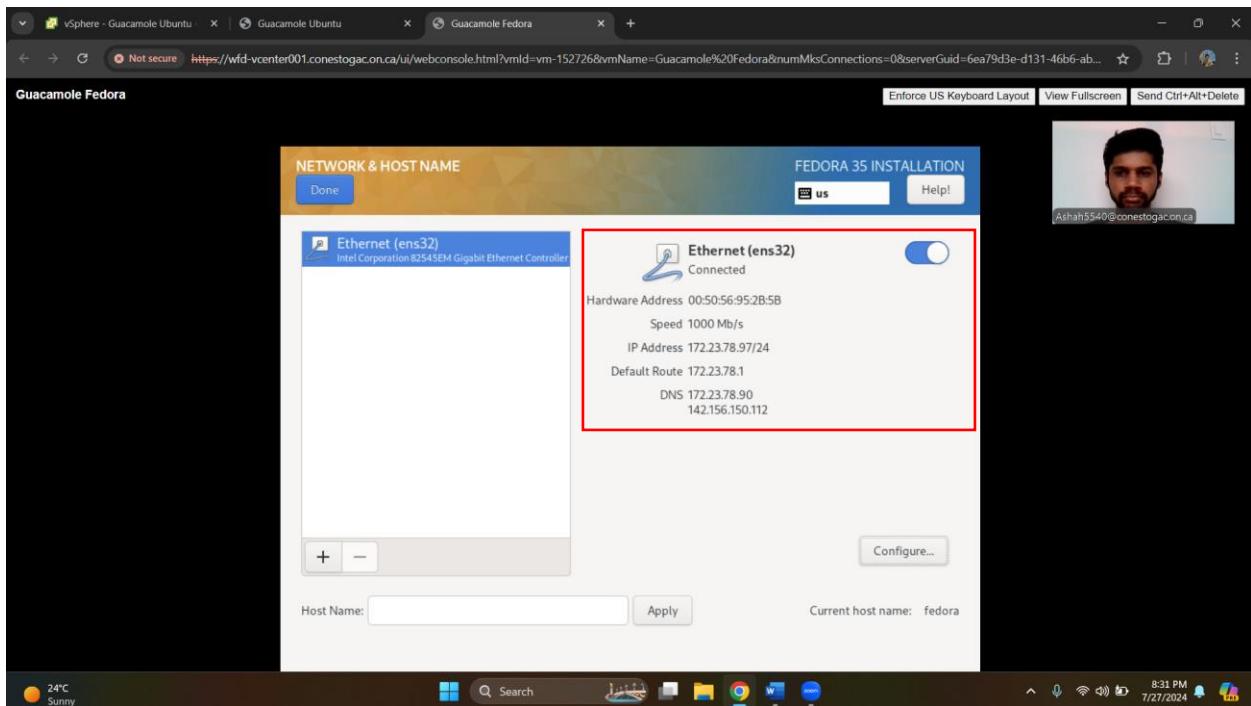
Successfully able to launch Ubuntu guacamole on browser



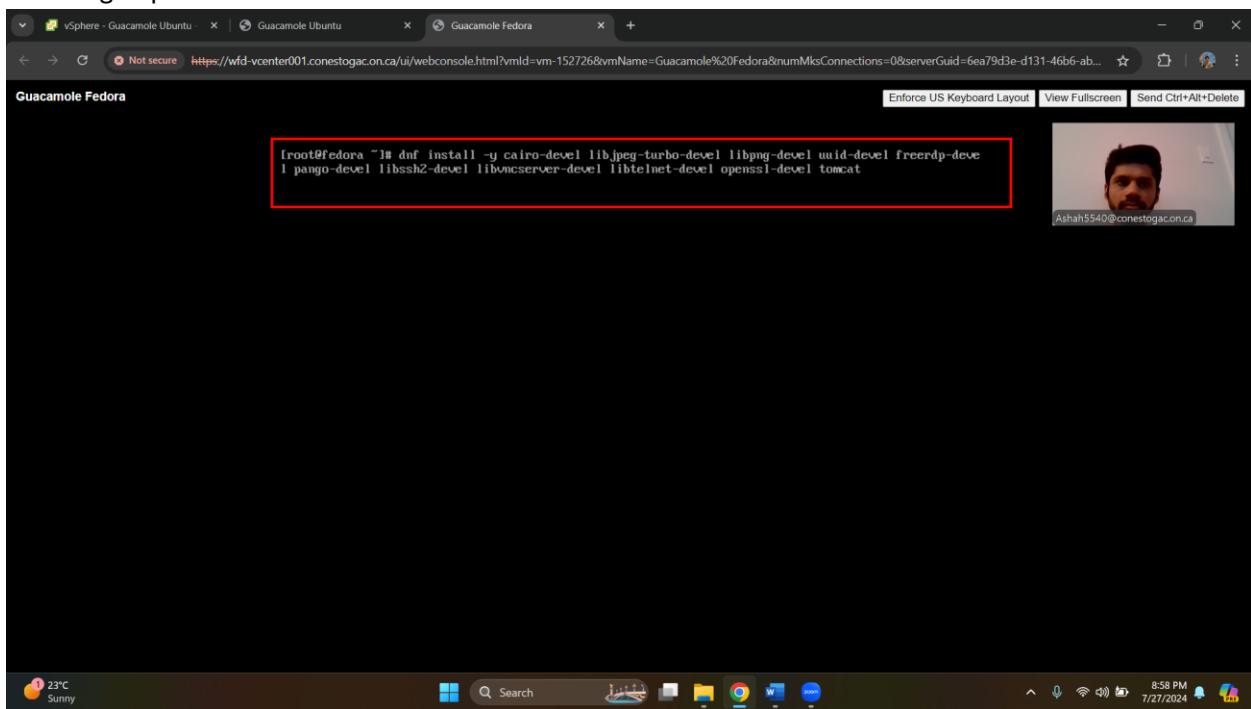
Successfully able to rdp into workstation and server



Guacamole Fedora



Installing dependencies



Downloading guacamole

A screenshot of a Linux terminal window titled "Guacamole Fedora". The terminal shows the command `wget https://dlcdn.apache.org/guacamole/1.5.3/source/guacamole-server-1.5.3.tar.gz` being run. The output of the command is displayed, showing the progress of the download from the Apache CDN. The terminal window has a dark background and white text. A small video player interface is visible in the top right corner, showing a man's face.

```
[root@fedora ~]# wget https://dlcdn.apache.org/guacamole/1.5.3/source/guacamole-server-1.5.3.tar.gz
--2024-07-27 21:05:49-- https://dlcdn.apache.org/guacamole/1.5.3/source/guacamole-server-1.5.3.tar.gz
Resolving dlcdn.apache.org (dlcdn.apache.org)... 151.101.2.132, 2a04:4e42:644
Connecting to dlcdn.apache.org (dlcdn.apache.org) 151.101.2.132:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1105466 (1.1M) [application/x-gzip]
Saving to: 'guacamole-server-1.5.3.tar.gz'

guacamole-server-1.5.3.t 100%[=====] 1.05M --.-KB/s in 0.03s
2024-07-27 21:05:49 (31.3 MB/s) - 'guacamole-server-1.5.3.tar.gz' saved [1105466/1105466]

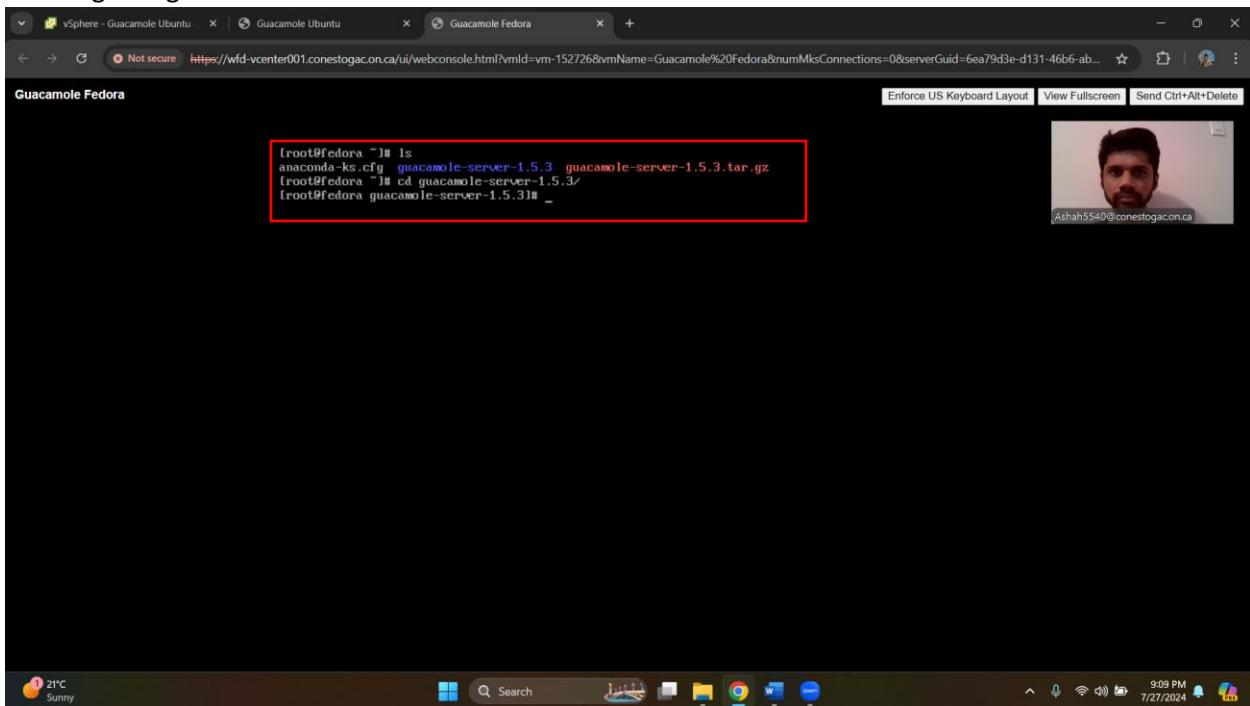
[root@fedora ~]#
```

Extracting tar file

A screenshot of a Linux terminal window titled "Guacamole Fedora". The terminal shows the command `tar -xvf guacamole-server-1.5.3.tar.gz` being run. The terminal window has a dark background and white text. A small video player interface is visible in the top right corner, showing a man's face.

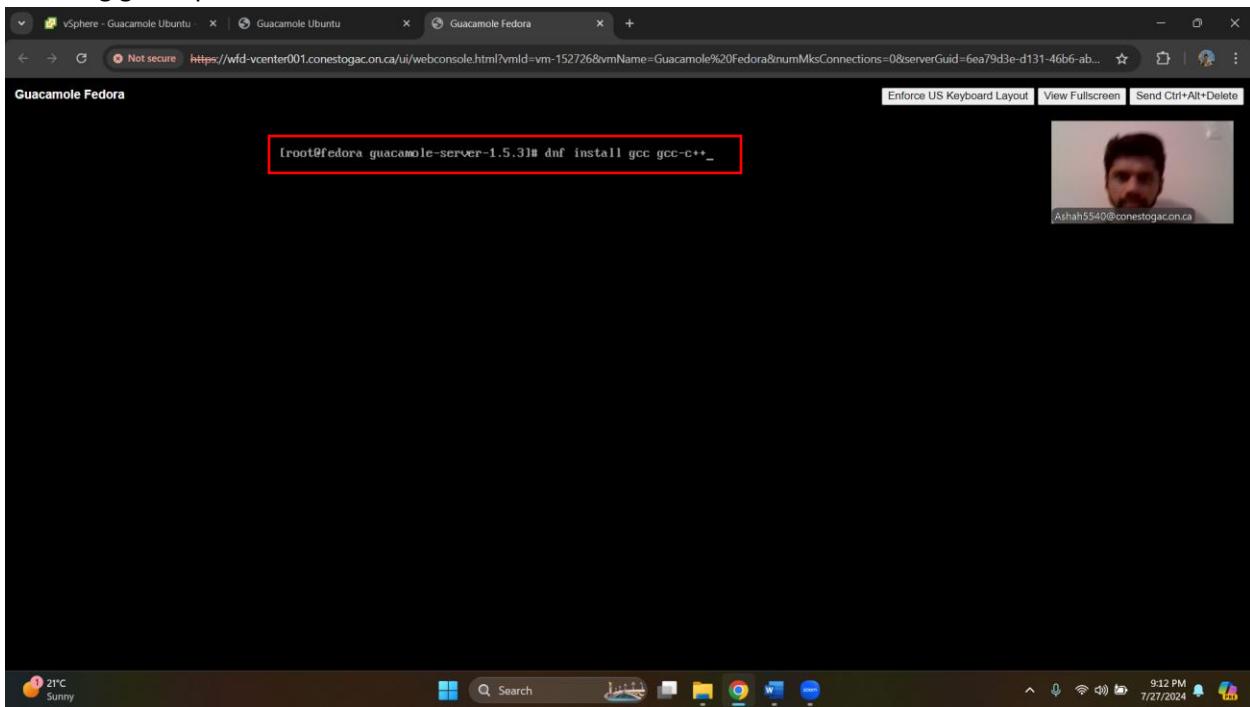
```
[root@fedora ~]# tar -xvf guacamole-server-1.5.3.tar.gz
```

Entering into guacamole folder



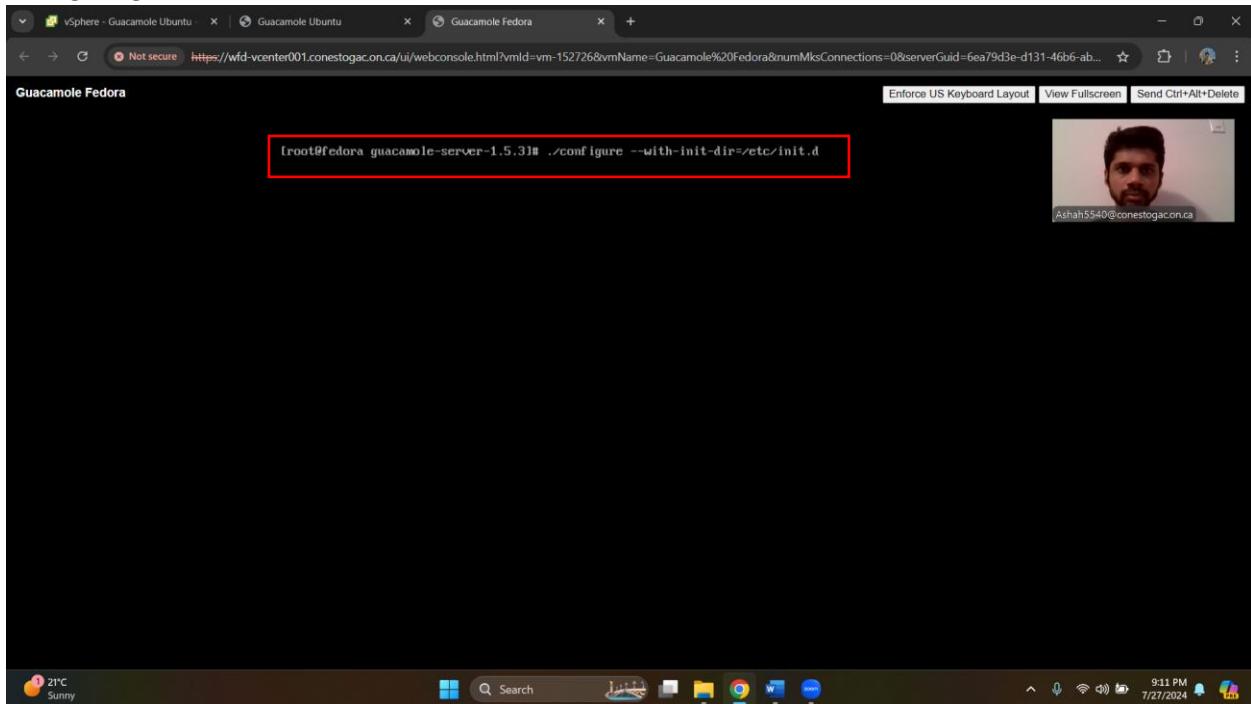
```
froot@fedora ~]# ls  
anaconda-ks.cfg  guacamole-server-1.5.3  guacamole-server-1.5.3.tar.gz  
froot@fedora ~]# cd guacamole-server-1.5.3/  
froot@fedora guacamole-server-1.5.3]# _
```

Installing gcc dependencies

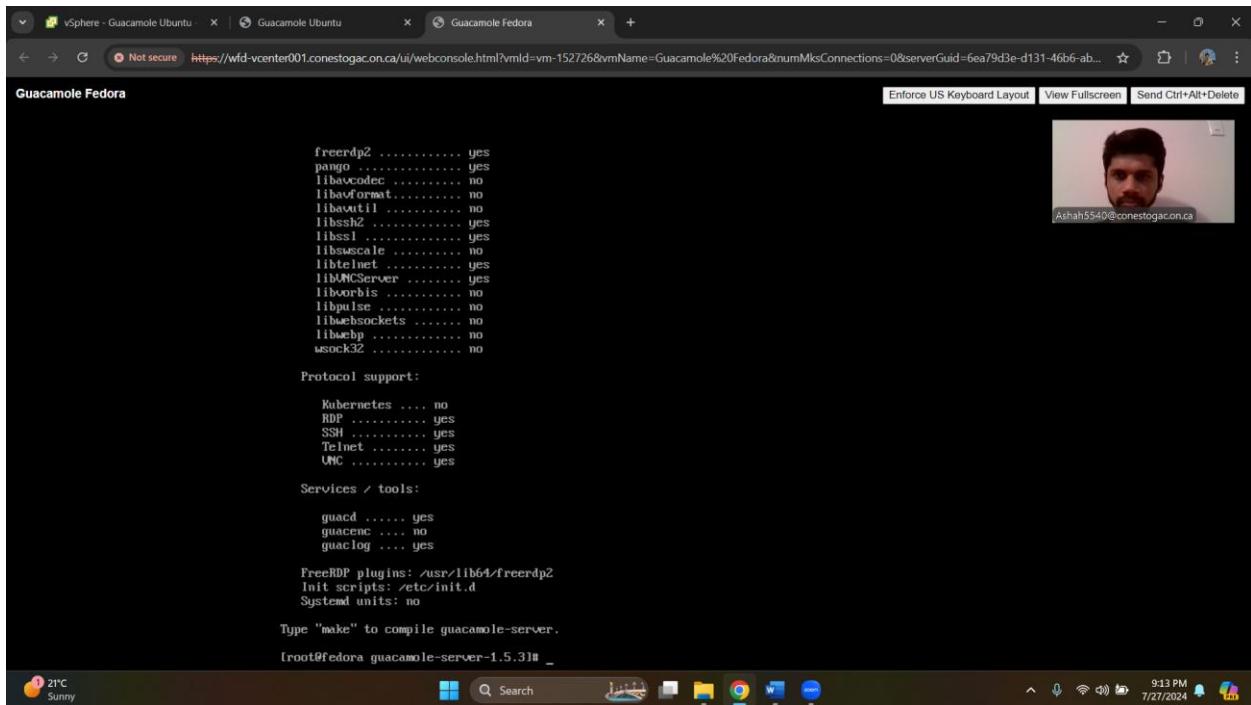


```
froot@fedora guacamole-server-1.5.3]# dnf install gcc gcc-c++ _
```

Configuring init.d



```
root@fedora guacamole-server-1.5.31# ./configure --with-init-dir=/etc/init.d
```



```
freerdp2 ..... yes
pango ..... yes
libavcodec ..... no
libavformat ..... no
libavutil ..... no
libssh2 ..... yes
libssl ..... yes
libsusecale ..... no
libtelnet ..... yes
libtunCServer ..... yes
libvorbis ..... no
libpulse ..... no
libwebsockets ..... no
libwebp ..... no
wssock32 ..... no

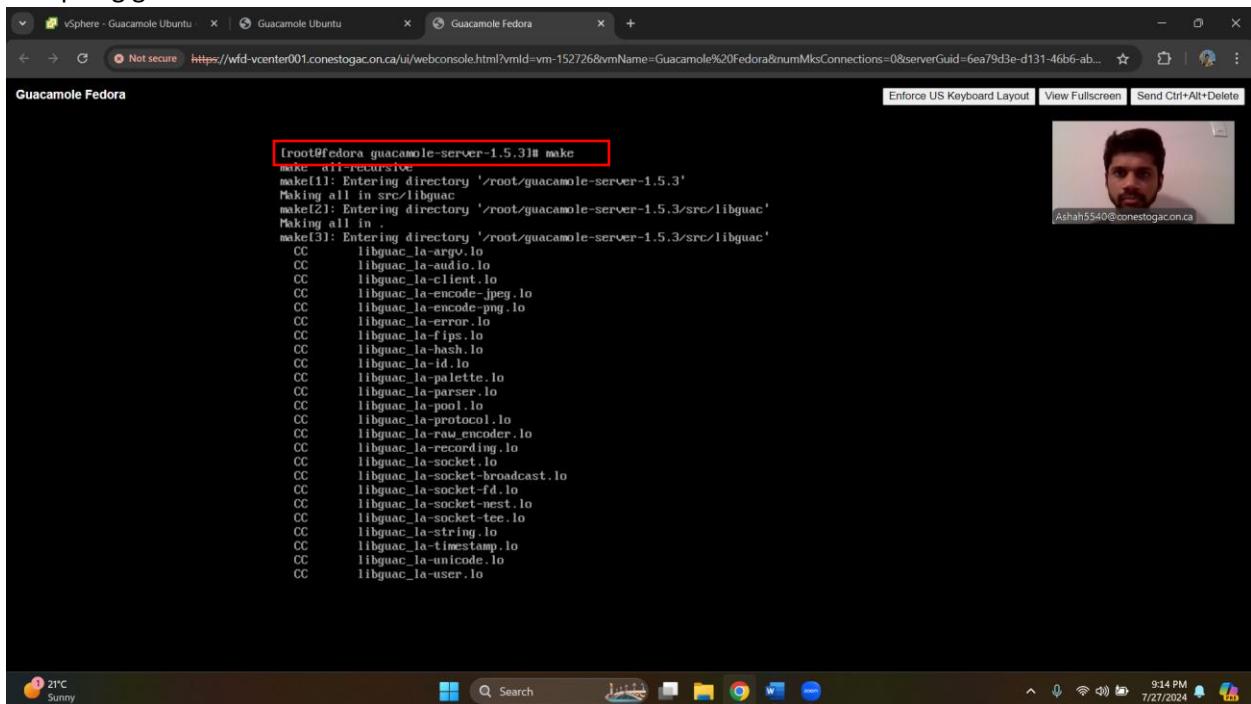
Protocol support:
Kubernetes .... no
RDP ..... yes
SSH ..... yes
Telnet ..... yes
UNC ..... yes

Services / tools:
guacd ..... yes
guacem ..... no
guaclog ..... yes

FreeRDP plugins: /usr/lib64/freerdp2
Init scripts: /etc/init.d
Systemd units: no

Type "make" to compile guacamole-server.
[root@fedora guacamole-server-1.5.31] #
```

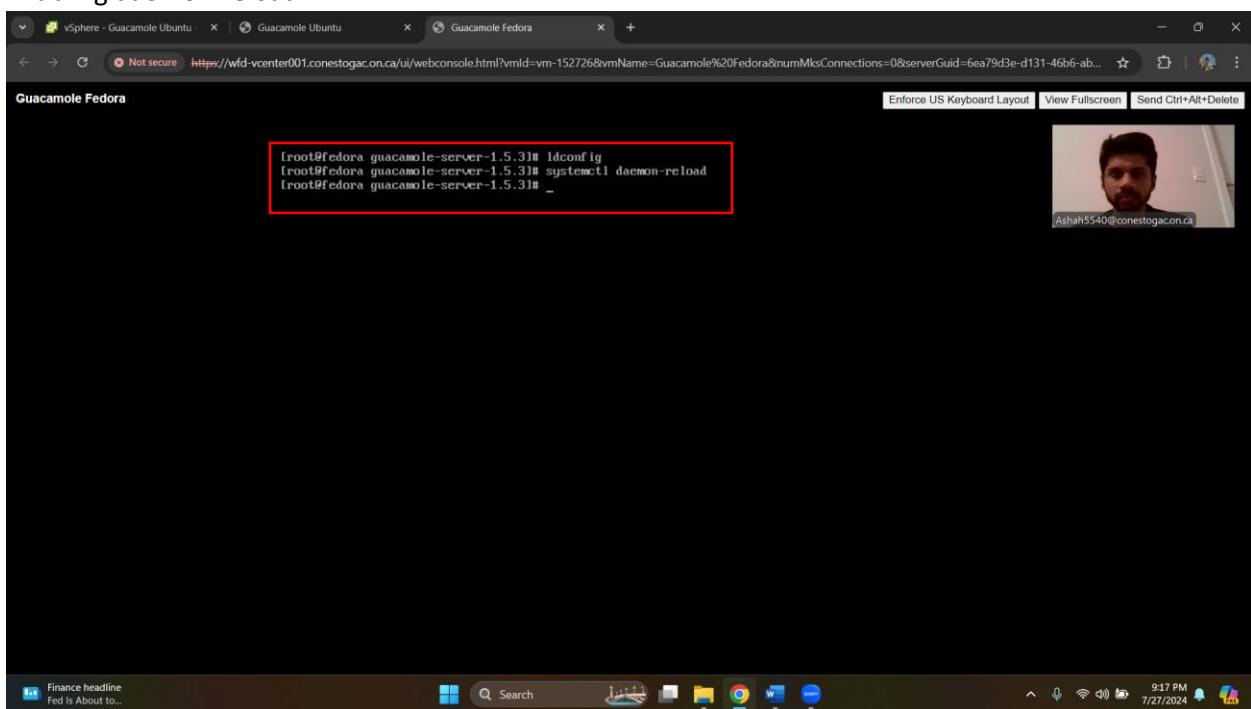
Compiling guacamole server with make



```
root@fedora guacamole-server-1.5.3# make
make all-recursive
make[1]: Entering directory '/root/guacamole-server-1.5.3'
  Making all in src/libguac
make[2]: Entering directory '/root/guacamole-server-1.5.3/src/libguac'
  Making all in .
make[3]: Entering directory '/root/guacamole-server-1.5.3/src/libguac'
    CC libguac_la-args.lo
    CC libguac_la-audio.lo
    CC libguac_la-client.lo
    CC libguac_la-encode-jpeg.lo
    CC libguac_la-encode-png.lo
    CC libguac_la-error.lo
    CC libguac_la-fips.lo
    CC libguac_la-hash.lo
    CC libguac_la-id.lo
    CC libguac_la-palette.lo
    CC libguac_la-parser.lo
    CC libguac_la-pool.lo
    CC libguac_la-protocol.lo
    CC libguac_la-raw_encoder.lo
    CC libguac_la-recording.lo
    CC libguac_la-socket.lo
    CC libguac_la-socket-broadcast.lo
    CC libguac_la-socket-fd.lo
    CC libguac_la-socket-nest.lo
    CC libguac_la-socket-tee.lo
    CC libguac_la-string.lo
    CC libguac_la-timestamp.lo
    CC libguac_la-unicode.lo
    CC libguac_la-user.lo
```



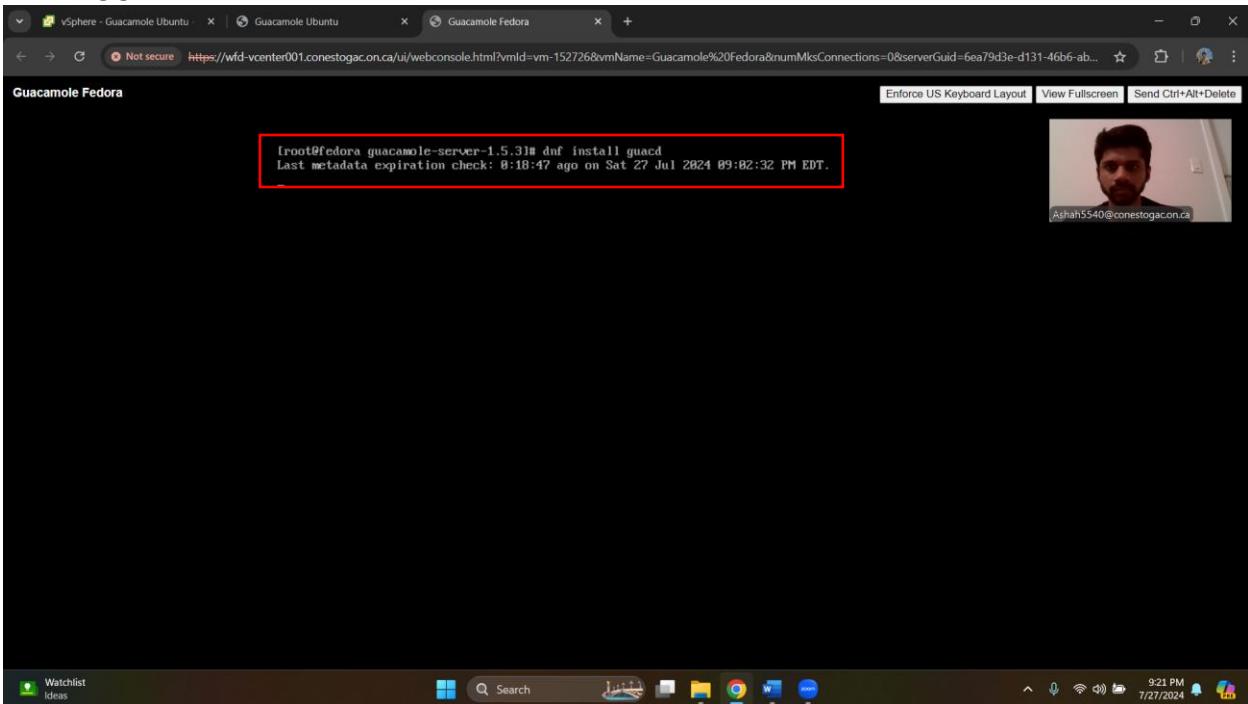
Enabling daemon-reload



```
root@fedora guacamole-server-1.5.3# ldconfig
root@fedora guacamole-server-1.5.3# systemctl daemon-reload
root@fedora guacamole-server-1.5.3# _
```

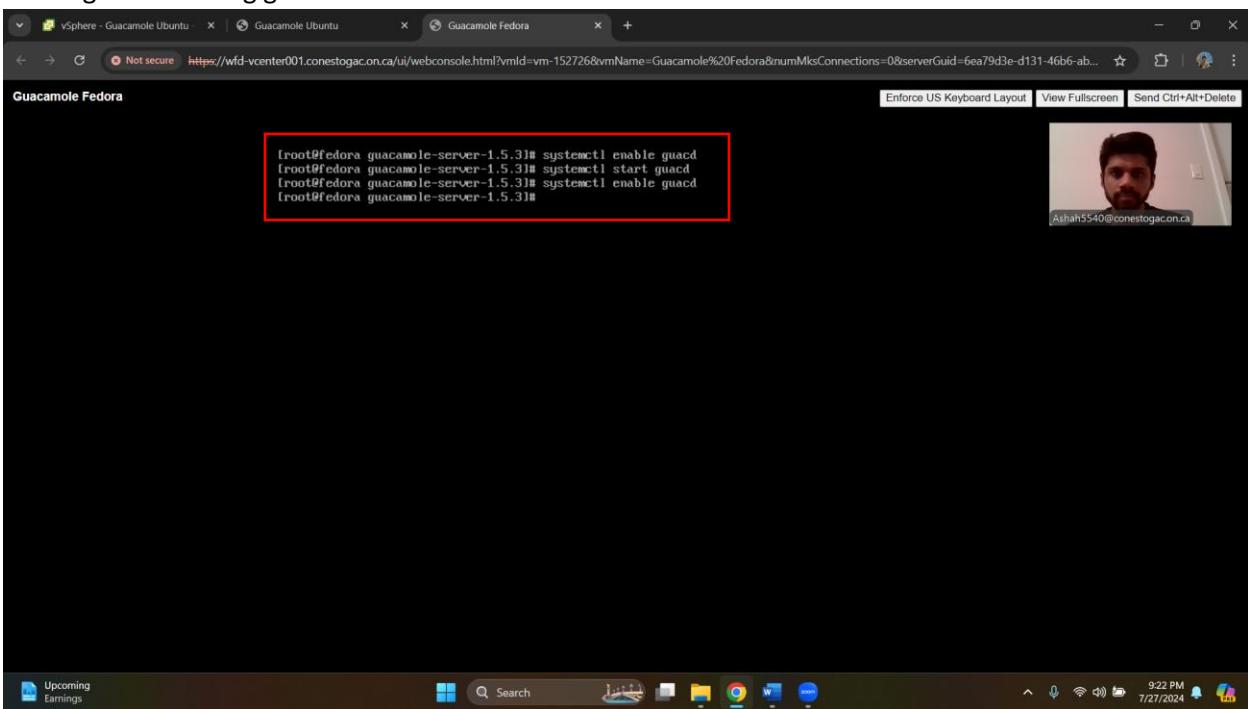


Installing guacd



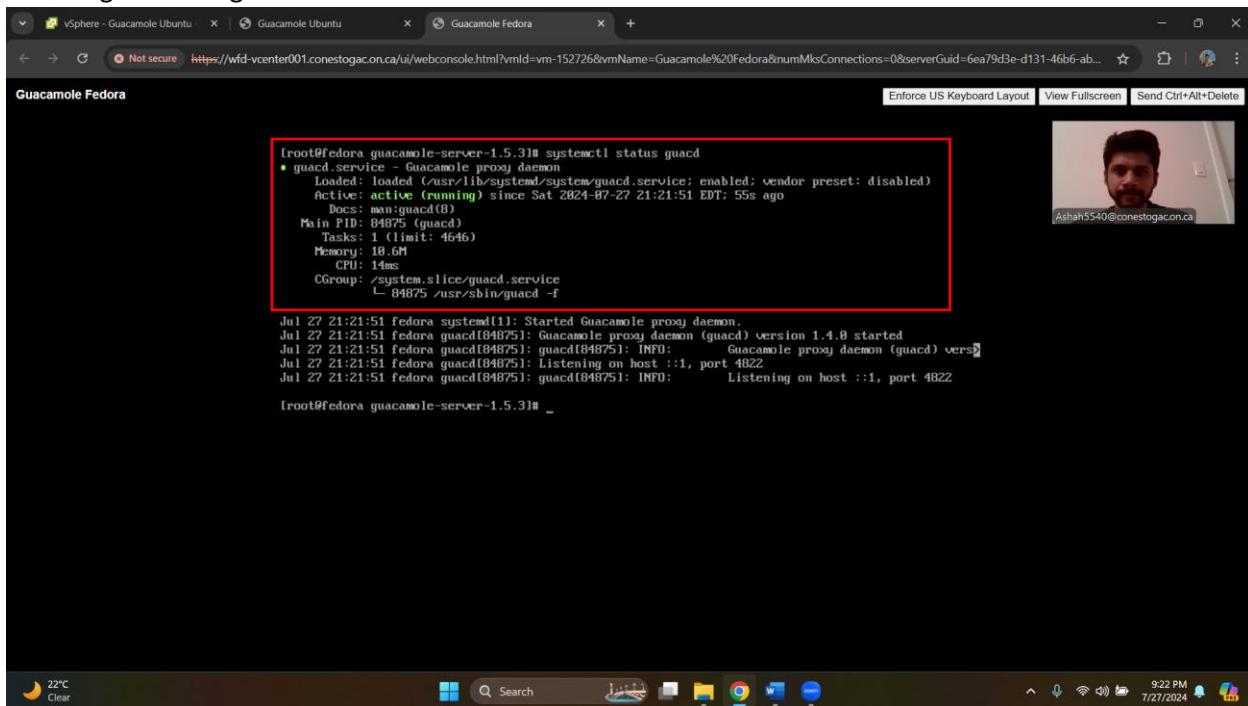
```
root@fedora guacamole-server-1.5.31# dnf install guacd
Last metadata expiration check: 8:18:47 ago on Sat 27 Jul 2024 09:02:32 PM EDT.
```

Starting and enabling guacd



```
root@fedora guacamole-server-1.5.31# systemctl enable guacd
root@fedora guacamole-server-1.5.31# systemctl start guacd
root@fedora guacamole-server-1.5.31# systemctl enable guacd
root@fedora guacamole-server-1.5.31#
```

Checking status of guacd



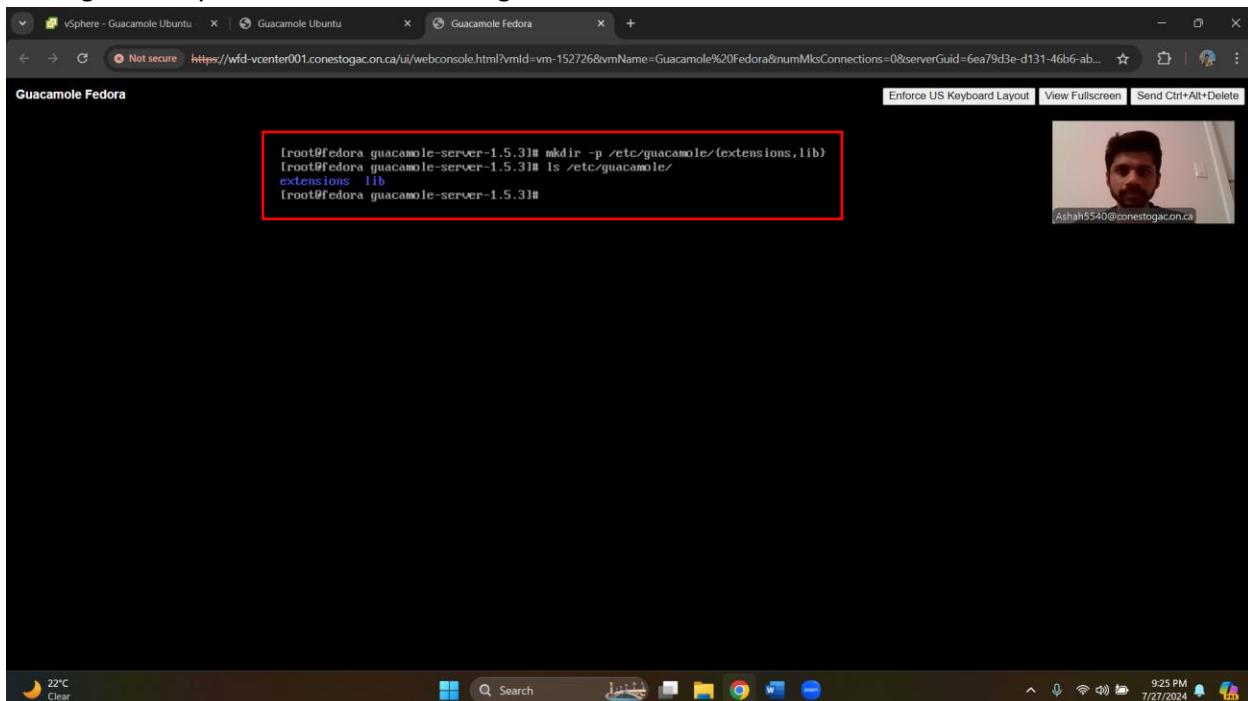
A screenshot of a Linux terminal window titled "Guacamole Fedora". The terminal shows the output of the command "systemctl status guacd". The output indicates that the guacd service is active (running) since Saturday, July 27, 2024, at 21:51 EDT. It provides details about the process, including its main PID (84875), memory usage (10.6M), CPU usage (14ms), and the group it belongs to (/system.slice/guacd.service). Below this, several log messages from the guacd daemon are listed, indicating it started and began listening on port 4822.

```
root@fedora guacamole-server-1.5.31# systemctl status guacd
● guacd.service - Guacamole proxy daemon
   Loaded: loaded (/usr/lib/systemd/system/guacd.service; enabled; vendor preset: disabled)
   Active: active (running) since Sat 2024-07-27 21:51:51 EDT; 55s ago
     Docs: man:guacd(8)
 Main PID: 84875 (guacd)
   Tasks: 1 (limit: 4646)
    Memory: 10.6M
      CPU: 14ms
       CPU: 14ms
      CGroup: /system.slice/guacd.service
              └─ 84875 /usr/sbin/guacd -f

Jul 27 21:51:51 fedora systemd[1]: Started Guacamole proxy daemon.
Jul 27 21:51:51 fedora guacd[84875]: Guacamole proxy daemon (guacd) version 1.4.0 started
Jul 27 21:51:51 fedora guacd[84875]: guacd[84875]: INFO: Guacamole proxy daemon (guacd) version 1.4.0 started
Jul 27 21:51:51 fedora guacd[84875]: Listening on host ::1, port 4822
Jul 27 21:51:51 fedora guacd[84875]: guacd[84875]: INFO: Listening on host ::1, port 4822

[root@fedora guacamole-server-1.5.31]#
```

Making directory of extensions and lib in guacamole



A screenshot of a Linux terminal window titled "Guacamole Fedora". The terminal shows the output of the commands "mkdir -p /etc/guacamole/{extensions,lib}" and "ls /etc/guacamole/". The first command creates two empty directories, "extensions" and "lib", in the "/etc/guacamole/" directory. The second command lists the contents of the "extensions" directory, which are the newly created sub-directories "extensions" and "lib".

```
root@fedora guacamole-server-1.5.31# mkdir -p /etc/guacamole/{extensions,lib}
root@fedora guacamole-server-1.5.31# ls /etc/guacamole/
extensions  lib
root@fedora guacamole-server-1.5.31#
```

Installing tomcat

vSphere - Guacamole Ubuntu | Guacamole Ubuntu | Guacamole Fedora | +

Not secure https://wfd-vcenter001.conestogac.on.ca/ui/webconsole.html?vmId=vm-152726&vmName=Guacamole%20Fedora&numMksConnections=0&serverGuid=6ea79d3e-d131-46b6-ab... ☆ 🌐 🔍 ⌂

Guacamole Fedora

root@fedora guacamole-server-1.5.31# dnf install -y tomcat tomcat-admin-webapps tomcat-webapps_

Enforce US Keyboard Layout View Fullscreen Send Ctrl+Alt+Delete



Ashah5540@conestogacon.ca

22°C Clear 9:27 PM 7/27/2024

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Not secure https://wfd-vcenter001.conestogac.on.ca/ui/webconsole.html?vmId=vm-152726&vmName=Guacamole%20Fedora&numMksConnections=0&serverGuid=6ea79d3e-d131-46b6-ab... ☆ 🌐 🔍 ⌂

Guacamole Fedora

Last metadata expiration check: 0:24:37 ago on Sat 27 Jul 2024 09:02:32 PM EDT.
Package tomcat-1:9.0.68-1.fc35.noarch is already installed.
Dependencies resolved.

Package	Architecture	Version	Repository	Size
tomcat-admin-webapps	noarch	1:9.0.68-1.fc35	updates	78 k
tomcat-webapps	noarch	1:9.0.68-1.fc35	updates	77 k

Transaction Summary

Install 2 Packages

Total download size: 147 k
Installed size: 399 k
Downloading Packages:
(1/2): tomcat-admin-webapps-9.0.68-1.fc35.noarch.rpm 228 kB/s | 78 kB 00:00
(2/2): tomcat-webapps-9.0.68-1.fc35.noarch.rpm 241 kB/s | 77 kB 00:00

Total 321 kB/s | 147 kB 00:00

Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Installing : tomcat-webapps-1:9.0.68-1.fc35.noarch 1/2
Installing : tomcat-admin-webapps-1:9.0.68-1.fc35.noarch 2/2
Verifying : tomcat-admin-webapps-1:9.0.68-1.fc35.noarch 1/2
Verifying : tomcat-webapps-1:9.0.68-1.fc35.noarch 2/2

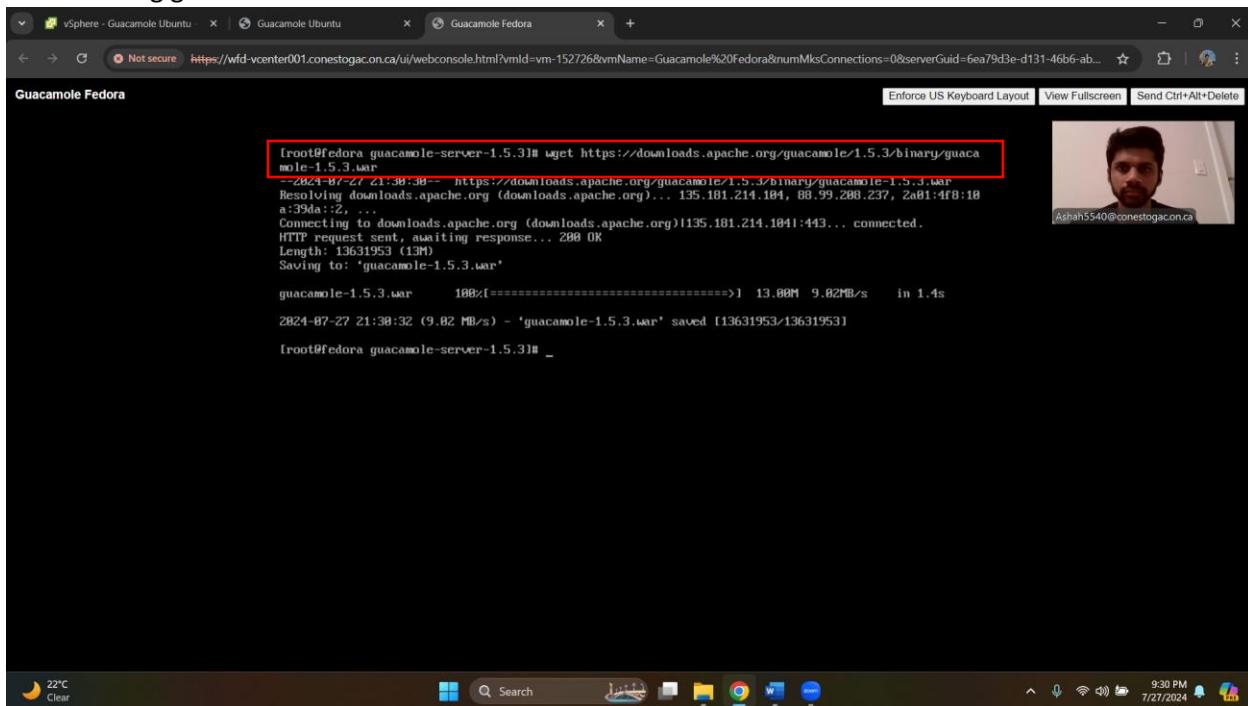
Installed:
tomcat-admin-webapps-1:9.0.68-1.fc35.noarch tomcat-webapps-1:9.0.68-1.fc35.noarch

Completed!

root@fedora guacamole-server-1.5.31#

22°C Clear 9:27 PM 7/27/2024

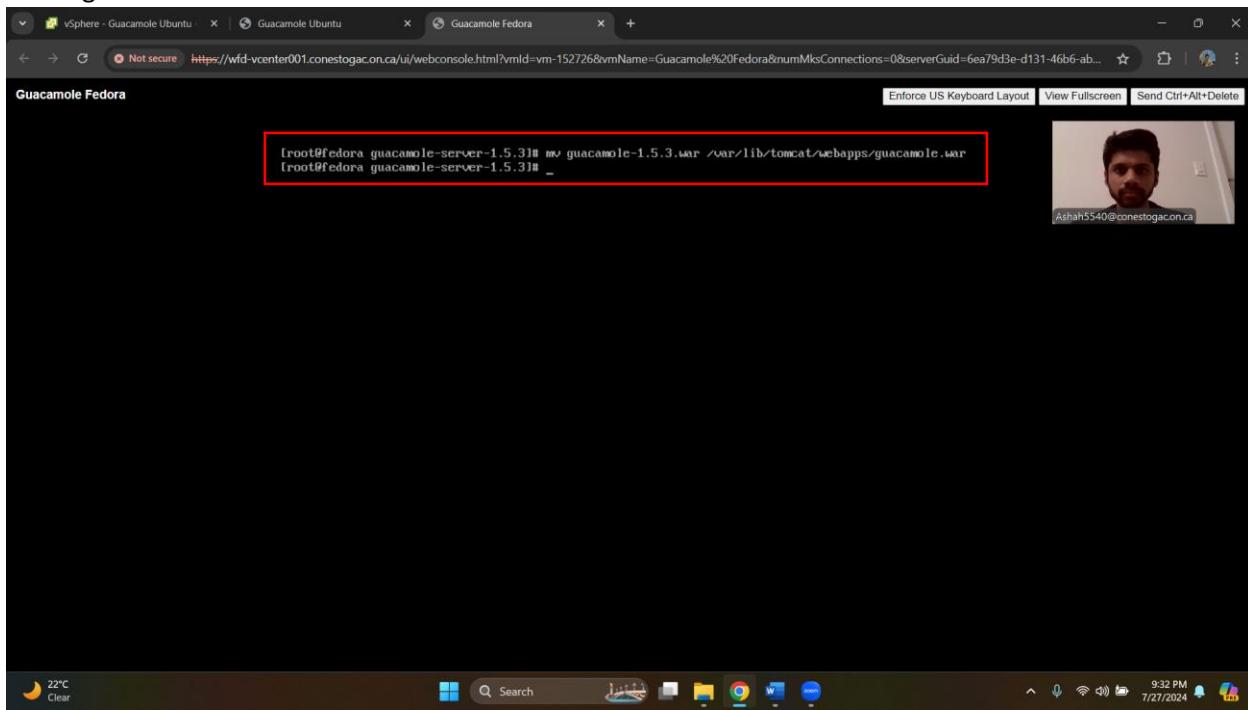
Downloading guacamole



```
root@fedora guacamole-server-1.5.31# wget https://downloads.apache.org/guacamole/1.5.3/binary/guacamole-1.5.3.war
--2024-07-27 21:38:30-- https://downloads.apache.org/guacamole/1.5.3/binary/guacamole-1.5.3.war
Resolving downloads.apache.org (downloads.apache.org) ... 135.181.214.104, 88.99.288.237, 2a01:4f8:18
a:39da::2, ...
Connecting to downloads.apache.org (downloads.apache.org)|135.181.214.104|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 13631953 (13M)
Saving to: 'guacamole-1.5.3.war'

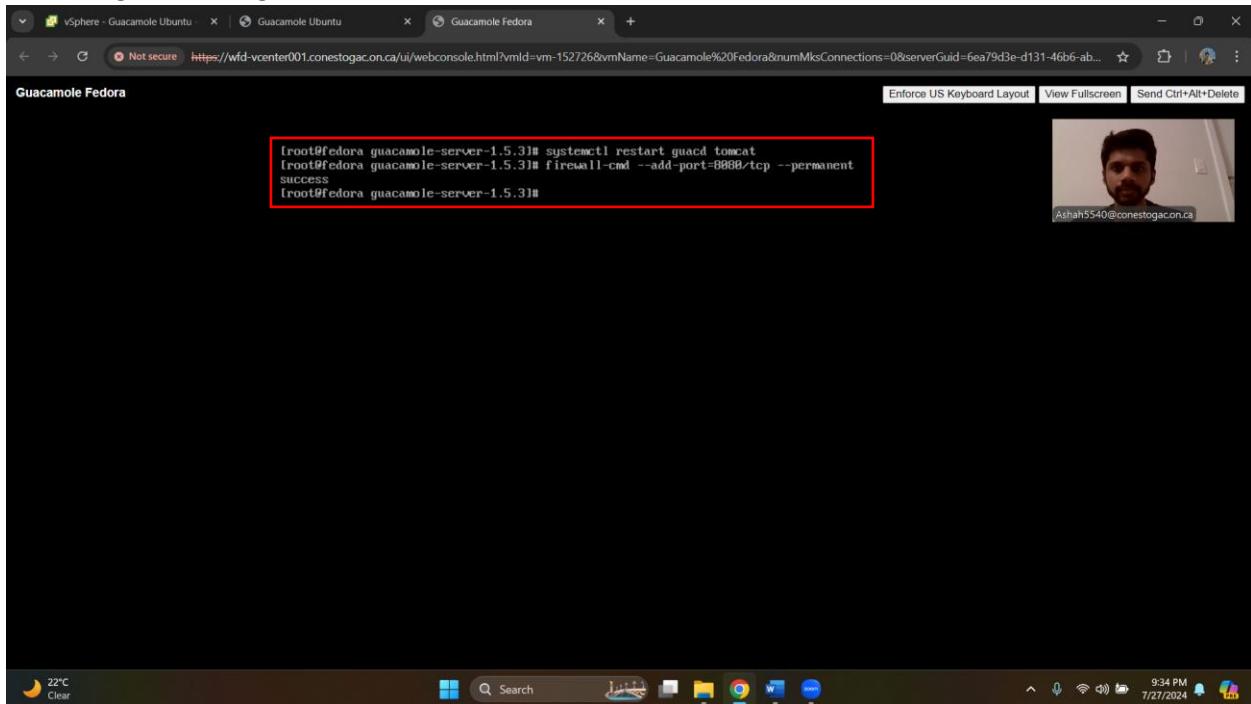
guacamole-1.5.3.war      100%[=====] 13.00M  9.82MB/s   in 1.4s
2024-07-27 21:38:32 (9.82 MB/s) - 'guacamole-1.5.3.war' saved [13631953/13631953]
root@fedora guacamole-server-1.5.31# _
```

Moving downloaded file



```
root@fedora guacamole-server-1.5.31# mv guacamole-1.5.3.war /var/lib/tomcat/webapps/guacamole.war
root@fedora guacamole-server-1.5.31# _
```

Restarting service of guacd and tomcat

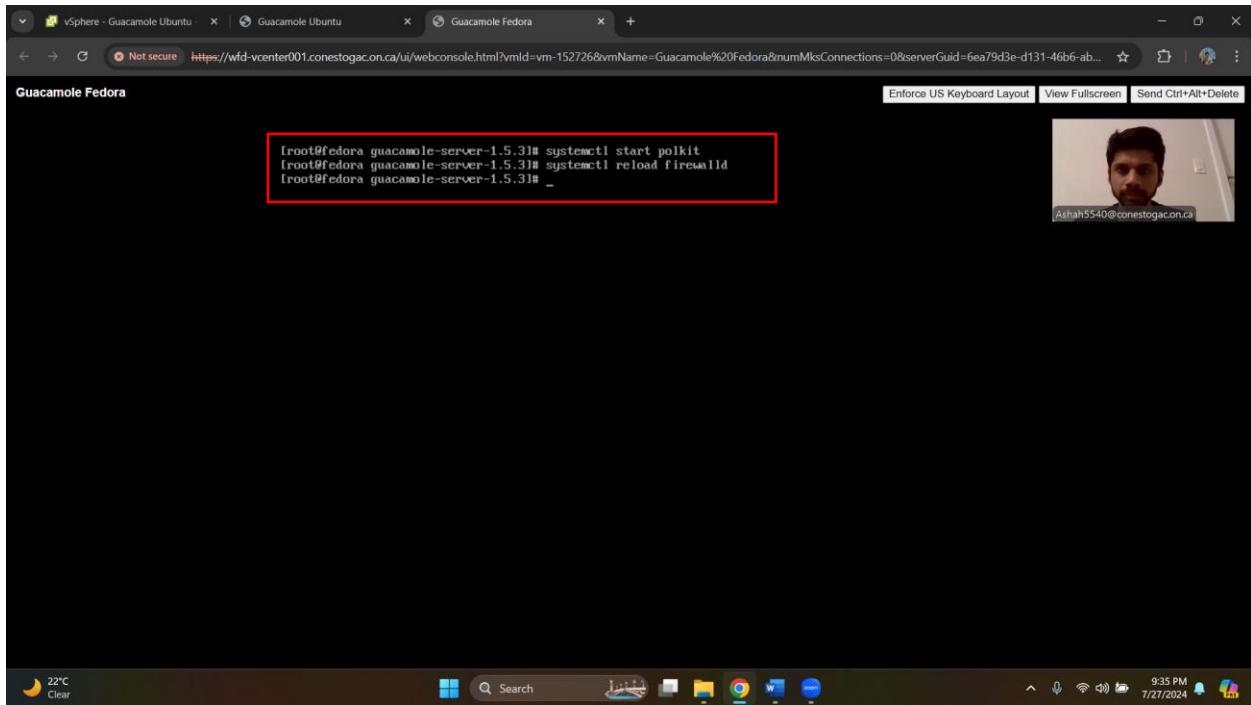


A screenshot of a Linux terminal window titled "Guacamole Fedora". The window shows a root shell session. A red box highlights the following commands:

```
froot@fedora guacamole-server-1.5.3]# systemctl restart guacd tomcat
froot@fedora guacamole-server-1.5.3]# firewall-cmd --add-port=8888/tcp --permanent
success
froot@fedora guacamole-server-1.5.3]#
```

The terminal window has tabs for "vSphere - Guacamole Ubuntu", "Guacamole Ubuntu", and "Guacamole Fedora". At the top right, there are buttons for "Enforce US Keyboard Layout", "View Fullscreen", and "Send Ctrl+Alt+Delete". On the right side of the terminal, there is a small video feed of a person's face with the text "Ashah5540@conestogac.on.ca". The desktop taskbar at the bottom shows icons for weather (22°C), search, file explorer, browser, and other applications, along with system status icons.

Starting service of polkit

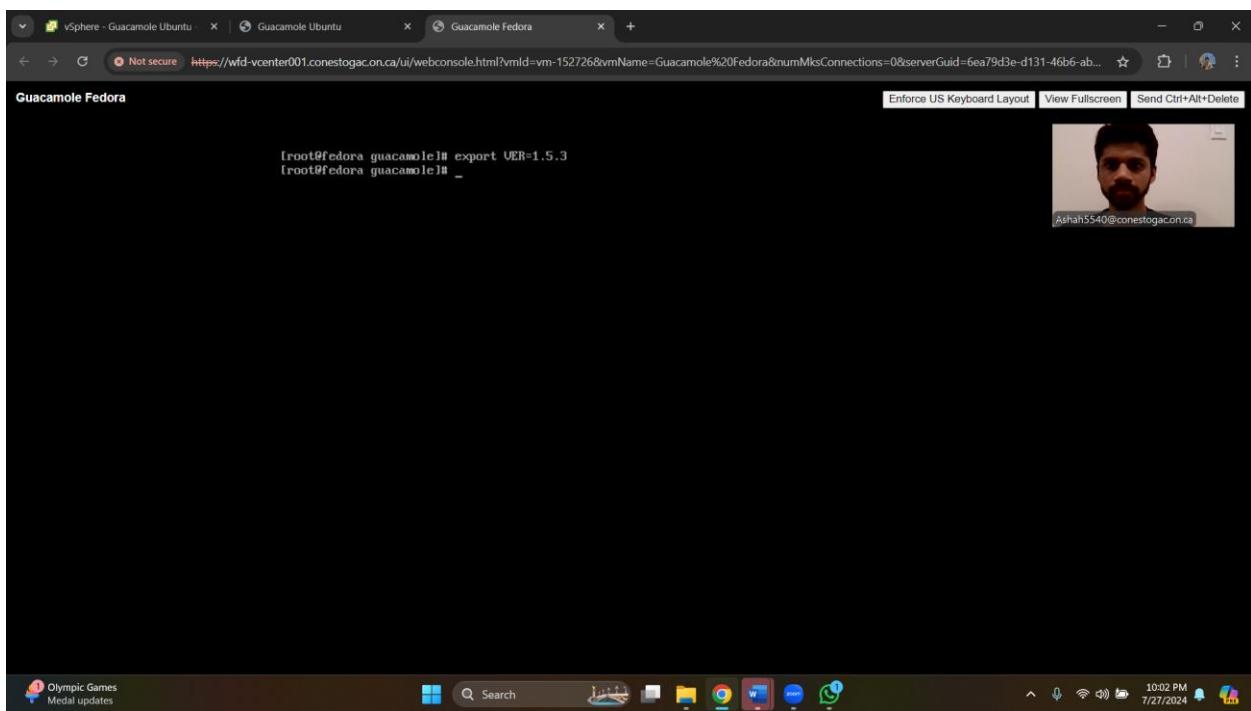
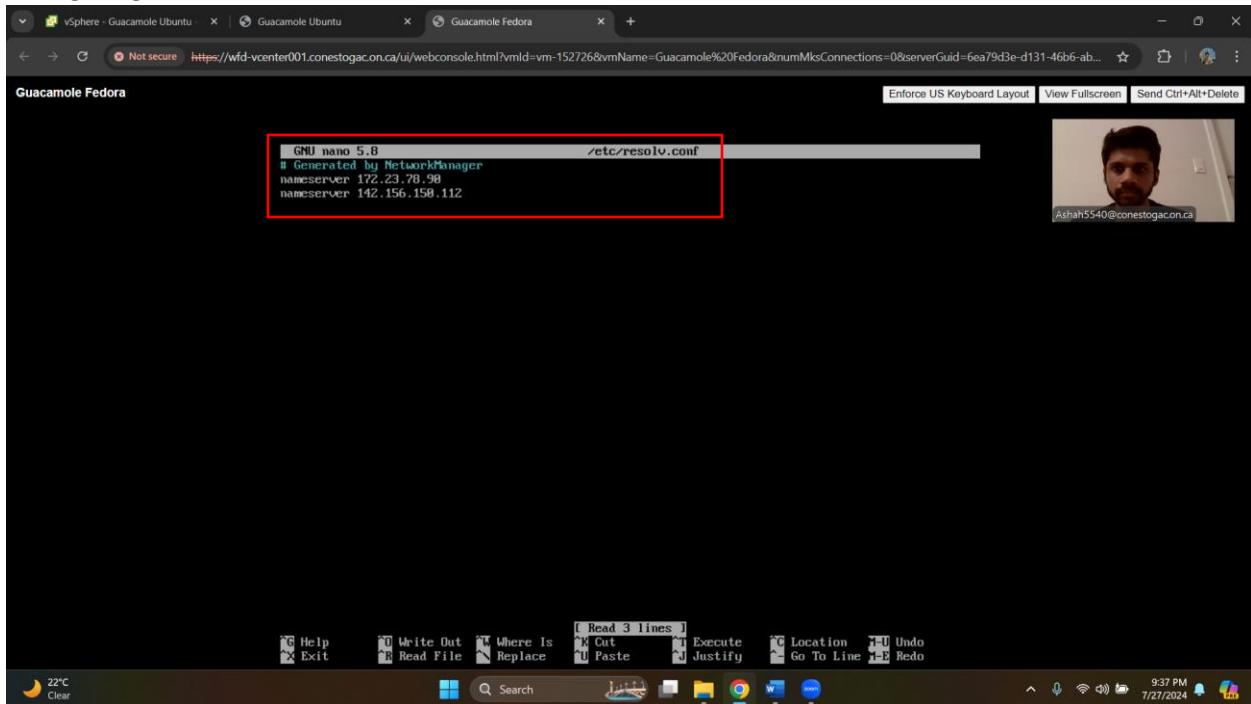


A screenshot of a Linux terminal window titled "Guacamole Fedora". The window shows a root shell session. A red box highlights the following commands:

```
froot@fedora guacamole-server-1.5.3]# systemctl start polkit
froot@fedora guacamole-server-1.5.3]# systemctl reload firewalld
froot@fedora guacamole-server-1.5.3]# _
```

The terminal window has tabs for "vSphere - Guacamole Ubuntu", "Guacamole Ubuntu", and "Guacamole Fedora". At the top right, there are buttons for "Enforce US Keyboard Layout", "View Fullscreen", and "Send Ctrl+Alt+Delete". On the right side of the terminal, there is a small video feed of a person's face with the text "Ashah5540@conestogac.on.ca". The desktop taskbar at the bottom shows icons for weather (22°C), search, file explorer, browser, and other applications, along with system status icons.

Configuring /etc/resolv.conf



Downloading LDAP of guacamole

A screenshot of a Linux terminal window titled "Guacamole Fedora". The terminal shows the command `wget https://dlcdn.apache.org/guacamole/1.5.3/binaries/guacamole-auth-ldap-1.5.3.tar.gz` being run. The output of the command is displayed in a red box:

```
[root@fedora guacamole]# wget https://dlcdn.apache.org/guacamole/1.5.3/binaries/guacamole-auth-ldap-1.5.3.tar.gz
--2024-07-27 22:04:58 -- https://dlcdn.apache.org/guacamole/1.5.3/binaries/guacamole-auth-ldap-1.5.3.tar.gz
ar.gz
Resolving dlcdn.apache.org (dlcdn.apache.org)... 151.101.2.132, 2a04:4e42::644
Connecting to dlcdn.apache.org (dlcdn.apache.org)|151.101.2.132|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 13108655 (12M) [application/x-gzip]
Saving to: 'guacamole-auth-ldap-1.5.3.tar.gz'

guacamole-auth-ldap-1.5.3. 100%[=====] 12.49M  --.-KB/s   in 0.1s
2024-07-27 22:04:59 (87.6 MB/s) - 'guacamole-auth-ldap-1.5.3.tar.gz' saved [13108655/13108655]

[root@fedora guacamole]#
```

The terminal window also shows a video feed of a person's face in the top right corner.

Extracting tar file

A screenshot of a Linux terminal window titled "Guacamole Fedora". The terminal shows the command `tar -xzvf guacamole-auth-ldap-1.5.3.tar.gz` being run. The output of the command is displayed in a red box:

```
[root@fedora guacamole]# tar -xzvf guacamole-auth-ldap-1.5.3.tar.gz
```

The terminal window also shows a video feed of a person's face in the top right corner.

vSphere - Guacamole Ubuntu - | Guacamole Ubuntu | Guacamole Fedora | +

Not secure https://wfd-vcenter001.conestogac.on.ca/ui/webconsole.html?vmId=vm-152726&vmName=Guacamole%20Fedora&numMksConnections=0&serverGuid=6ea79d3e-d131-46b6-ab... ☆ | View Fullscreen | Send Ctrl+Alt+Delete

Guacamole Fedora

```
[root@fedora guacamole]# ls  
extensions guacamole-auth-ldap-1.5.3 guacamole-auth-ldap-1.5.3.tar.gz lib  
[root@fedora guacamole]# cd guacamole-auth-ldap-1.5.3/  
[root@fedora guacamole-auth-ldap-1.5.3]#
```



Enforce US Keyboard Layout | View Fullscreen | Send Ctrl+Alt+Delete

USD/CNY +0.27% | Search | File Explorer | Edge | Chrome | WPS Office | Microsoft Word | Microsoft Excel | Microsoft Powerpoint | Microsoft OneDrive | Microsoft Teams | 10:06 PM 7/27/2024

vSphere - Guacamole Ubuntu - | Guacamole Ubuntu | Guacamole Fedora | +

Not secure https://wfd-vcenter001.conestogac.on.ca/ui/webconsole.html?vmId=vm-152726&vmName=Guacamole%20Fedora&numMksConnections=0&serverGuid=6ea79d3e-d131-46b6-ab... ☆ | View Fullscreen | Send Ctrl+Alt+Delete

Guacamole Fedora

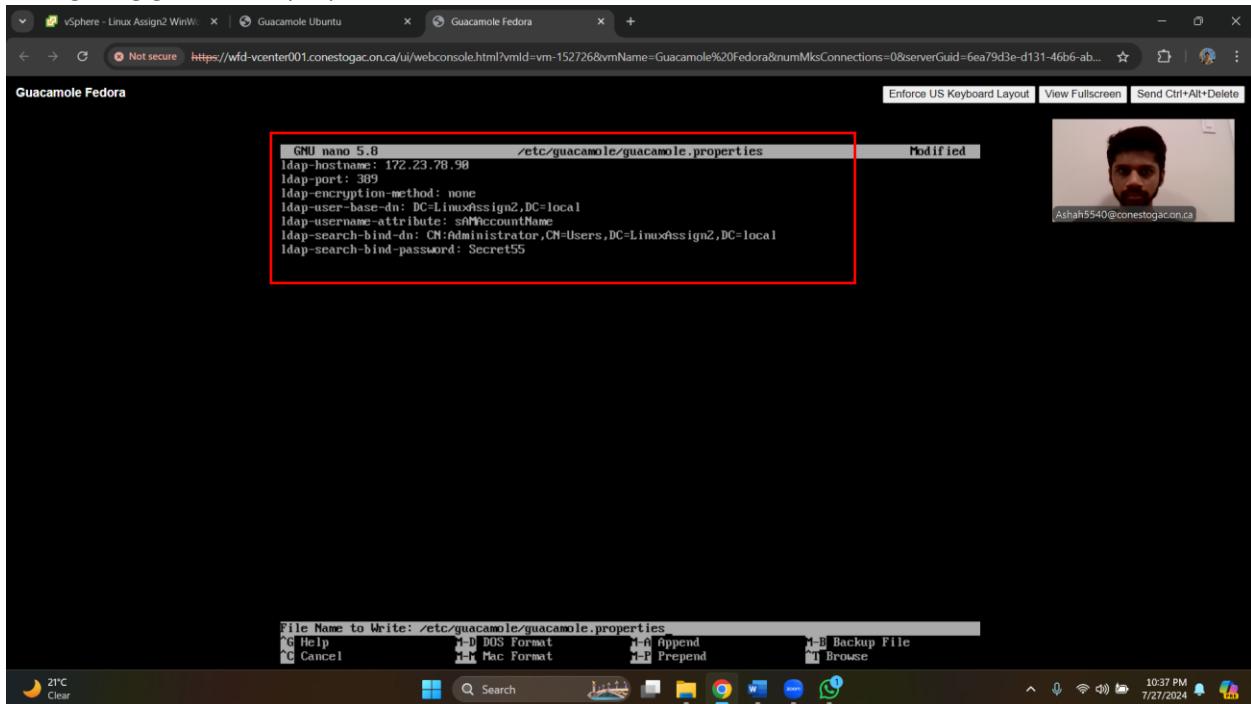
```
[root@fedora guacamole-auth-ldap-1.5.3]# sudo cp guacamole-auth-ldap-$USER.jar /etc/guacamole/extensions/  
[root@fedora guacamole-auth-ldap-1.5.3]#
```



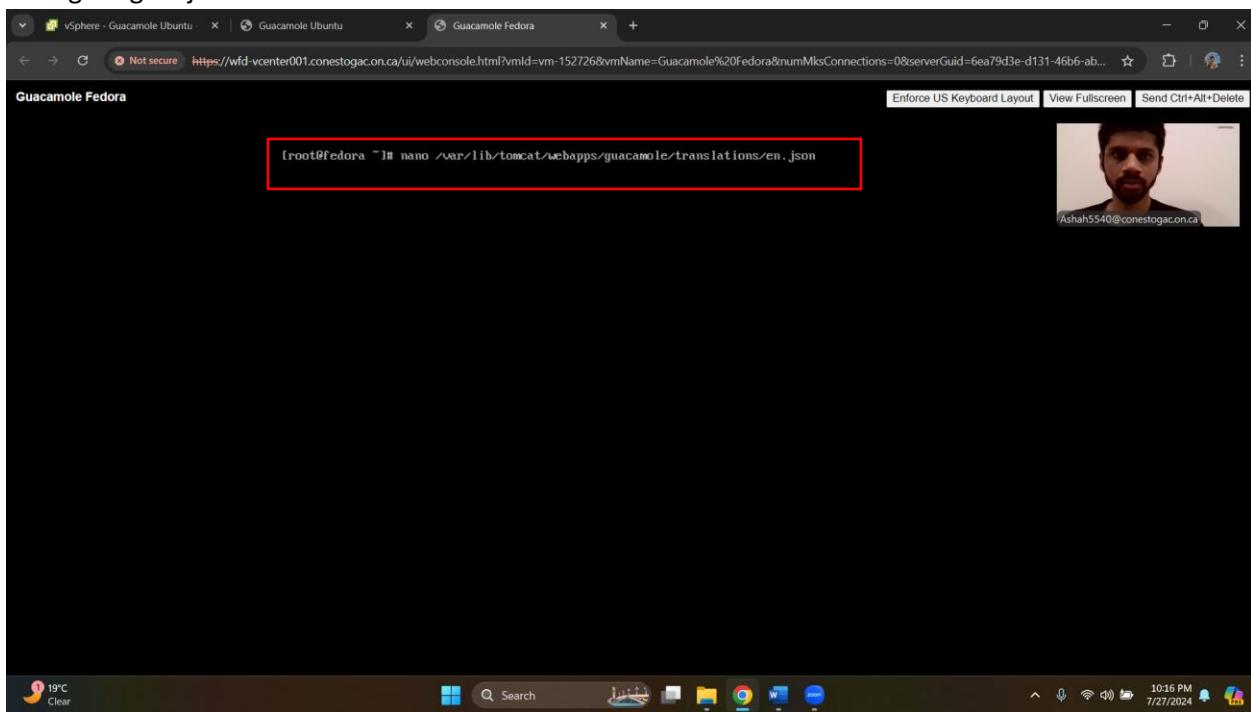
Enforce US Keyboard Layout | View Fullscreen | Send Ctrl+Alt+Delete

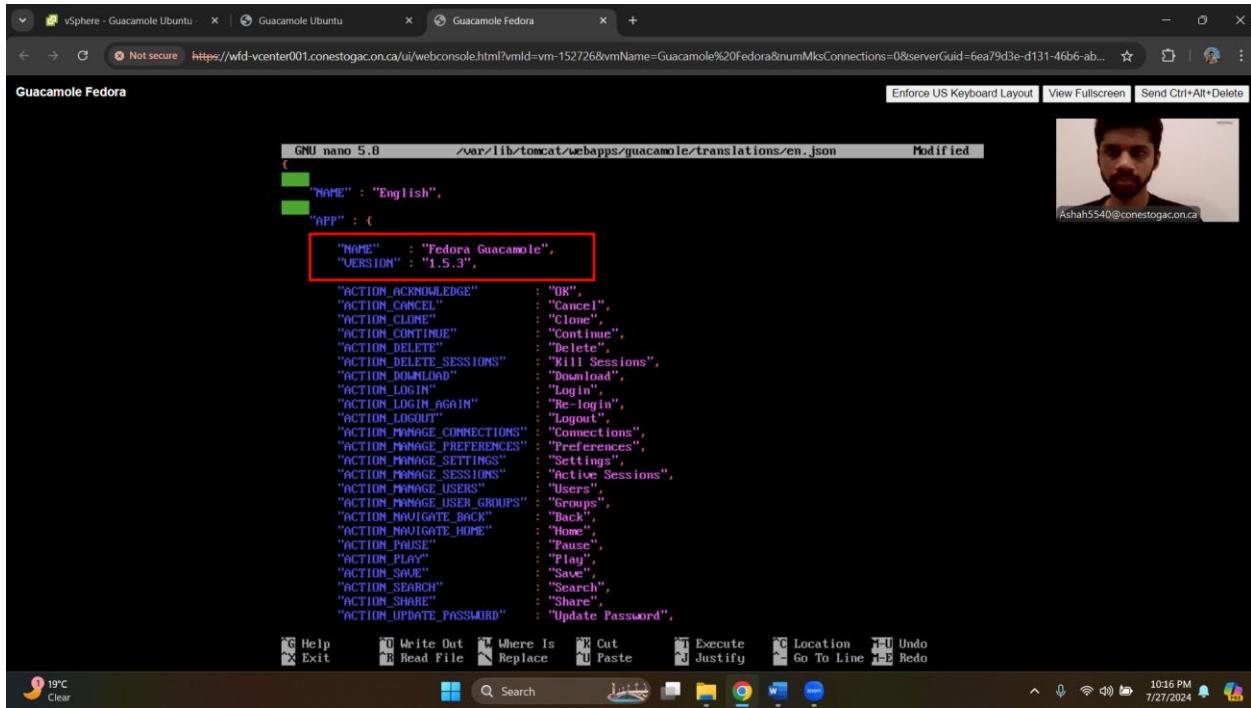
19°C Clear | Search | File Explorer | Edge | Chrome | WPS Office | Microsoft Word | Microsoft Excel | Microsoft Powerpoint | Microsoft OneDrive | Microsoft Teams | 10:08 PM 7/27/2024

Configuring guacamole properties

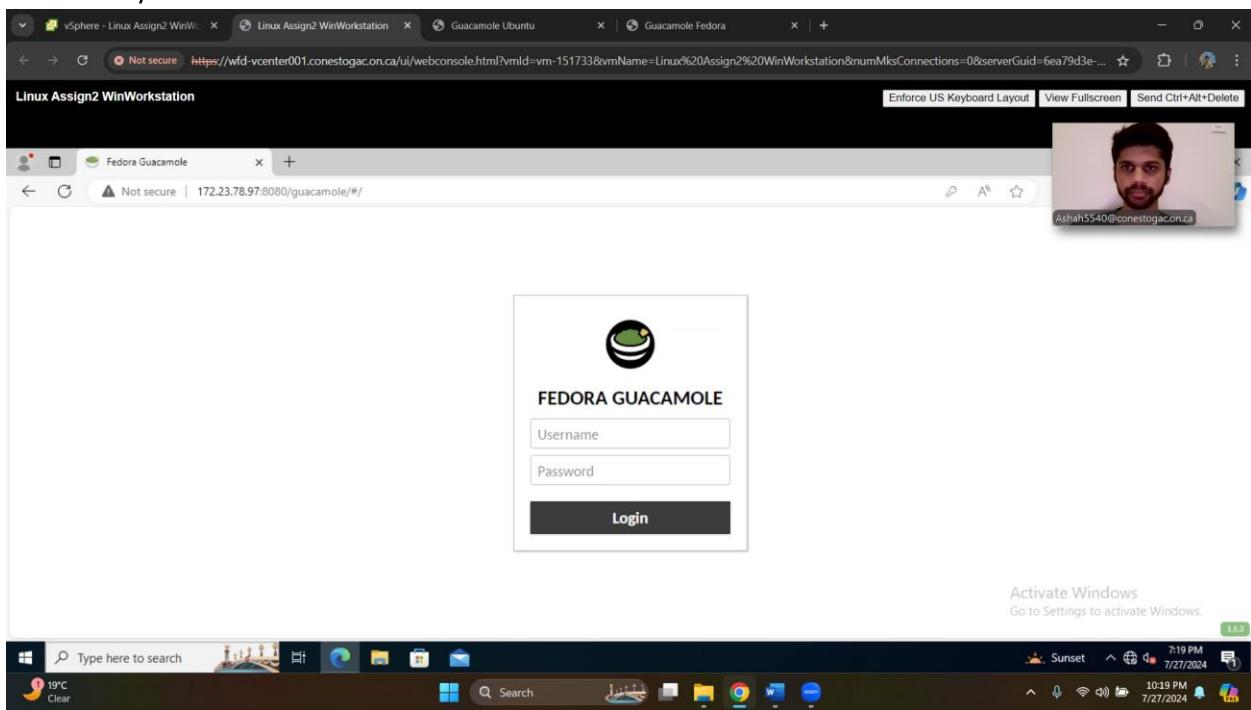


Configuring en.json file

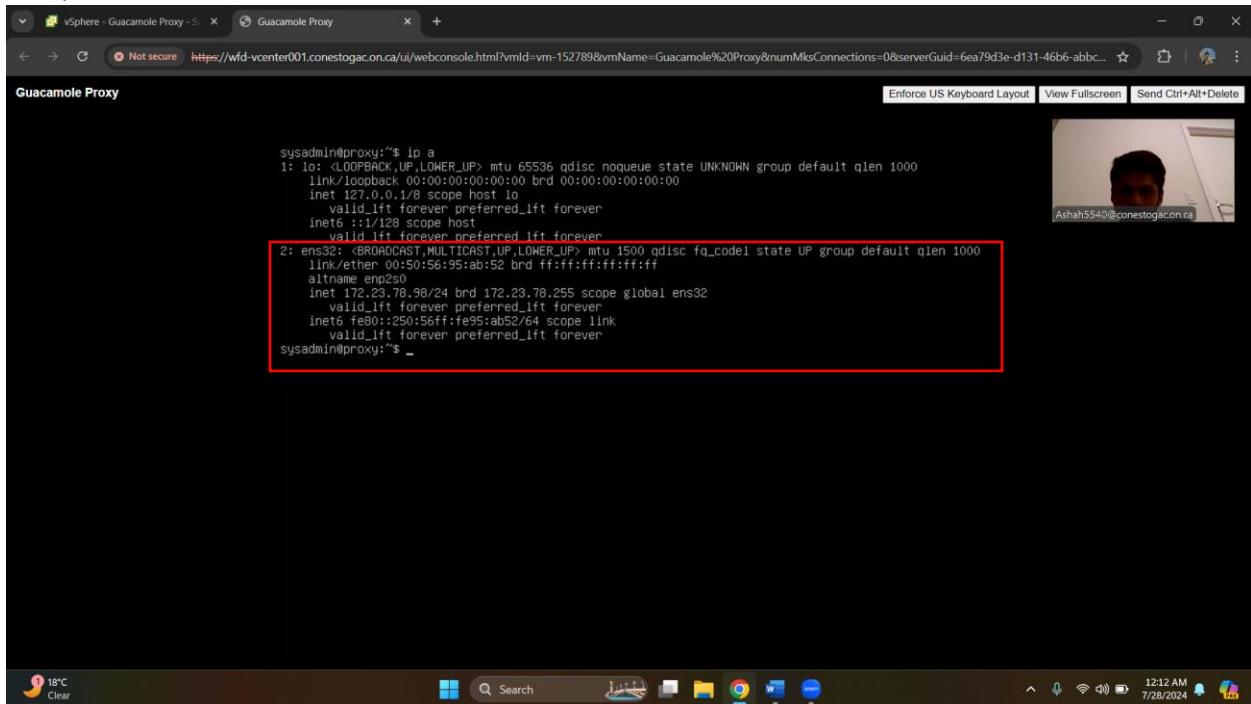




Successfully able to launch Fedora Guacamole

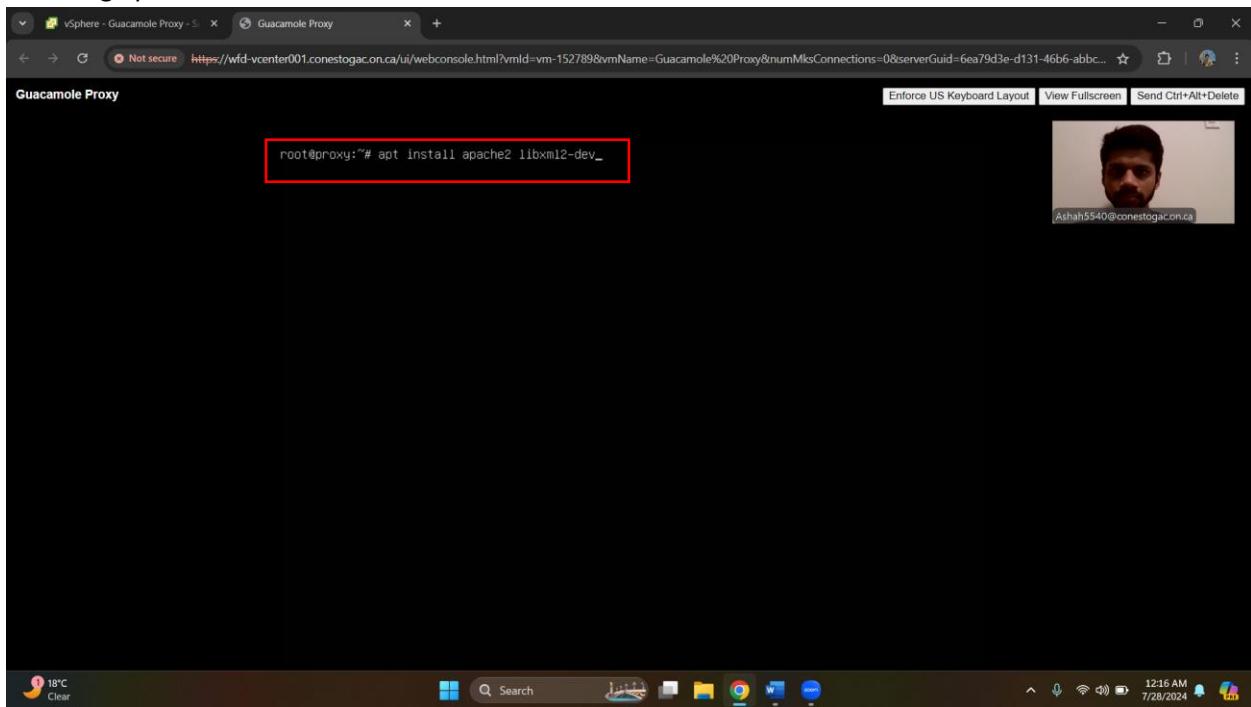


Proxy



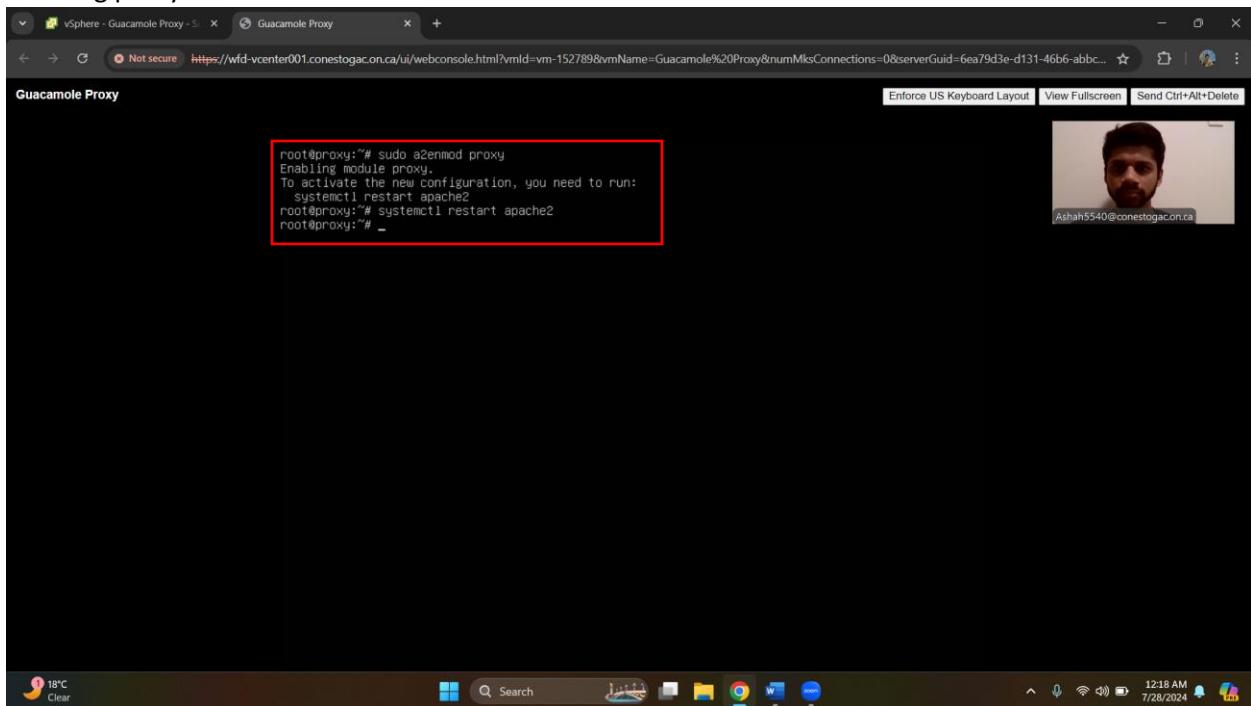
```
sysadmin@proxy:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
2: ens3: <NO-CARRIER,BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:50:56:95:ab:52 brd ff:ff:ff:ff:ff:ff
        altname enp2s0
        inet 172.23.78.98/24 brd 172.23.78.255 scope global ens3
            valid_lft forever preferred_lft forever
            inet6 fe80::250:56ff:fe95:ab52/64 scope link
                valid_lft forever preferred_lft forever
sysadmin@proxy:~$ _
```

Installing apache2 and libxml2



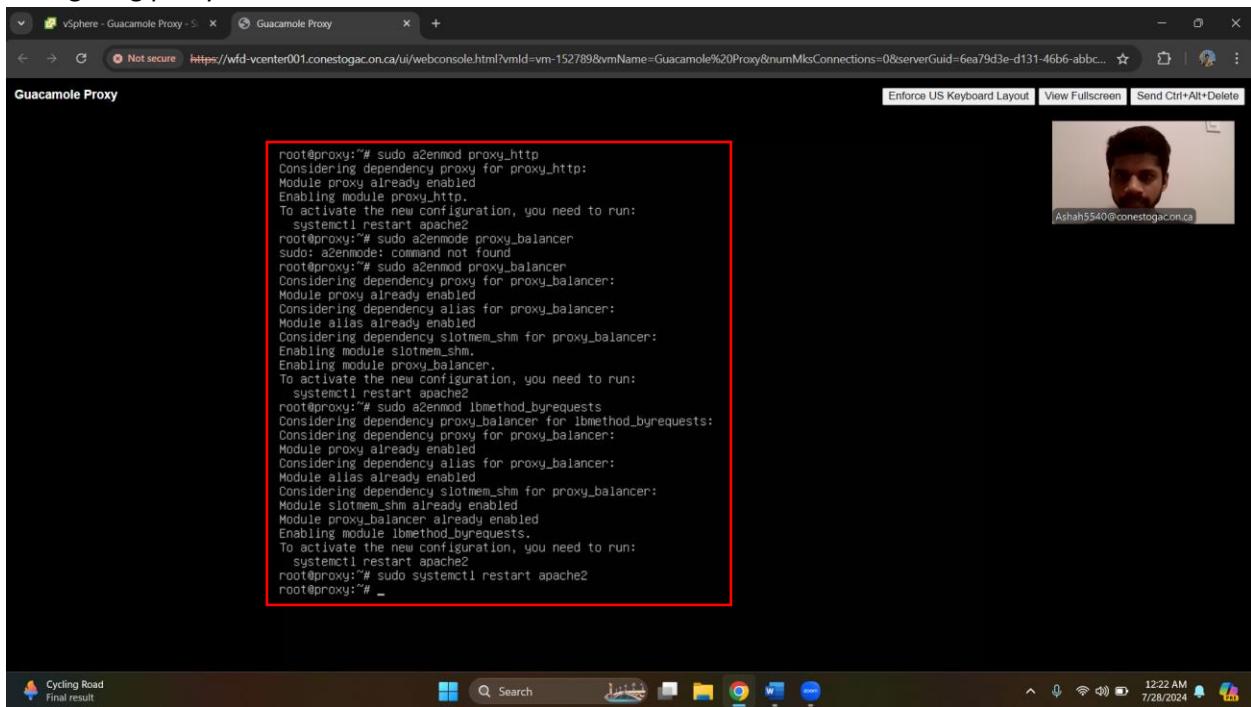
```
root@proxy:~# apt install apache2 libxml2-dev
```

Enabling proxy



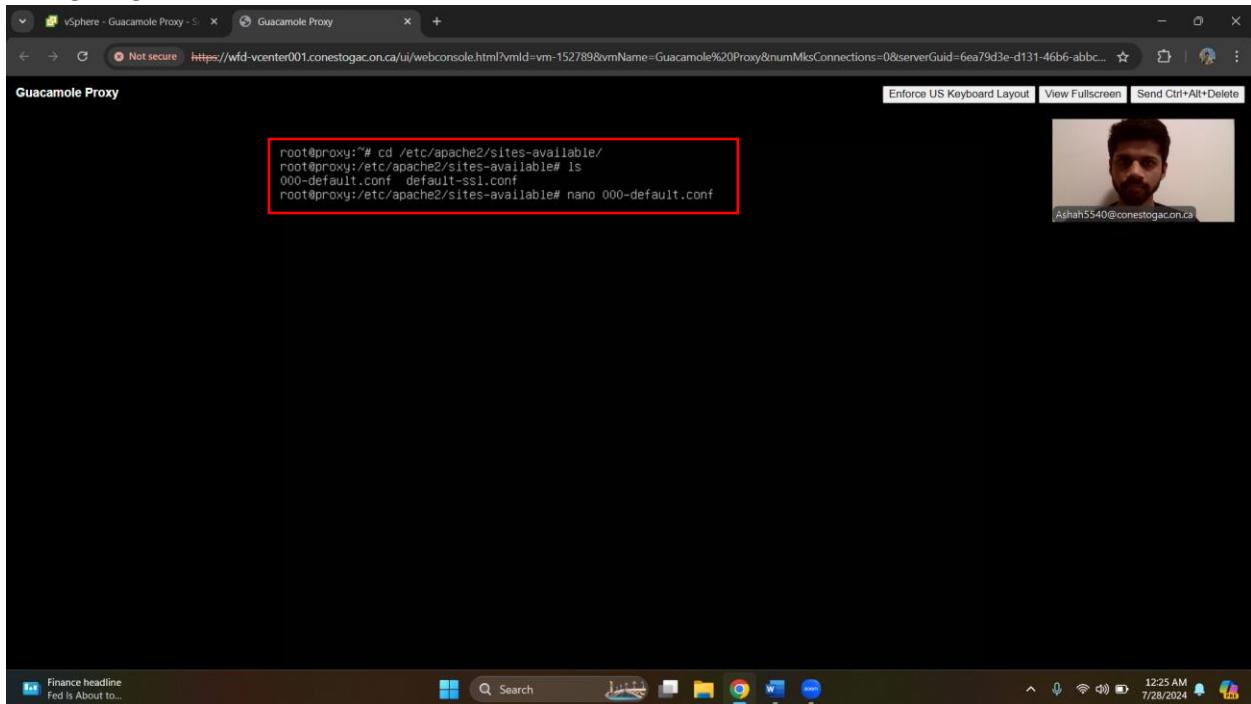
```
root@proxy:~# sudo a2enmod proxy
Enabling module proxy.
To activate the new configuration, you need to run:
    systemctl restart apache2
root@proxy:~# systemctl restart apache2
root@proxy:~# -
```

Configuring proxy



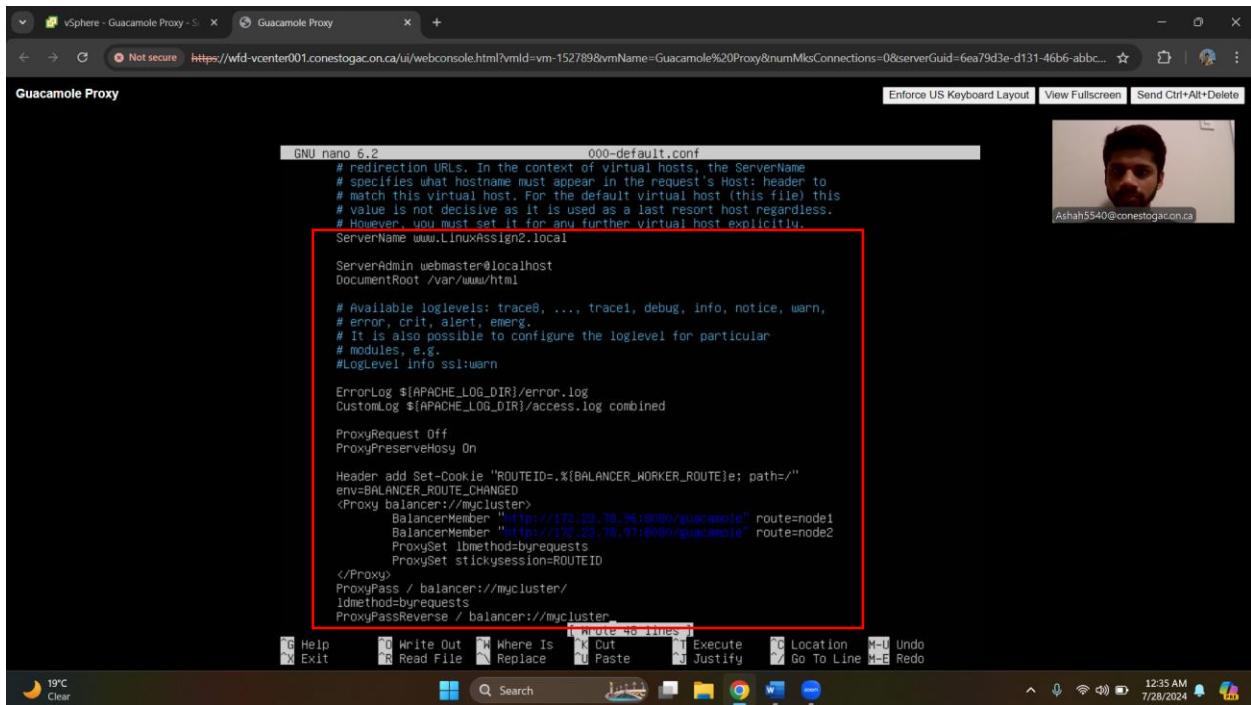
```
root@proxy:~# sudo a2enmod proxy_http
Considering dependency proxy for proxy_http:
Module proxy already enabled
Enabling module proxy_http.
To activate the new configuration, you need to run:
    systemctl restart apache2
root@proxy:~# sudo a2enmod proxy_balancer
sudo: a2enmod: command not found
root@proxy:~# sudo a2enmod proxy_balancer
Considering dependency proxy for proxy_balancer:
Module proxy already enabled
Considering dependency alias for proxy_balancer:
Module alias already enabled
Considering dependency slotmem_shm for proxy_balancer:
Enabling module slotmem_shm.
Enabling module proxy_balancer.
To activate the new configuration, you need to run:
    systemctl restart apache2
root@proxy:~# sudo a2enmod lbmethod_byrequests
Considering dependency proxy_balancer for lbmethod_byrequests:
Considering dependency proxy for proxy_balancer:
Module proxy already enabled
Considering dependency alias for proxy_balancer:
Module alias already enabled
Considering dependency slotmem_shm for proxy_balancer:
Module slotmem_shm already enabled
Module proxy_balancer already enabled
Enabling module lbmethod_byrequests.
To activate the new configuration, you need to run:
    systemctl restart apache2
root@proxy:~# sudo systemctl restart apache2
root@proxy:~# -
```

Configuring conf file



The screenshot shows a terminal window titled "Guacamole Proxy" running on a Linux system. The user is in the root shell, navigating to the Apache configuration directory and opening the default configuration file for editing.

```
root@proxy:~# cd /etc/apache2/sites-available/
root@proxy:/etc/apache2/sites-available# ls
000-default.conf  default-ssl.conf
root@proxy:/etc/apache2/sites-available# nano 000-default.conf
```



The screenshot shows a terminal window titled "Guacamole Proxy" running on a Windows system. The user is in the root shell, navigating to the Apache configuration directory and opening the default configuration file for editing.

```
GNU nano 6.2          000-default.conf
#
# redirection URLs. In the context of virtual hosts, the ServerName
# specifies what hostname must appear in the request's Host: header to
# match this virtual host. For the default virtual host (this file) this
# value is used as it is used as a last resort host regardless.
# However, you must set it for any further virtual host explicitly.
ServerName www.LinuxAssIngn.local

ServerAdmin webmaster@localhost
DocumentRoot /var/www/html

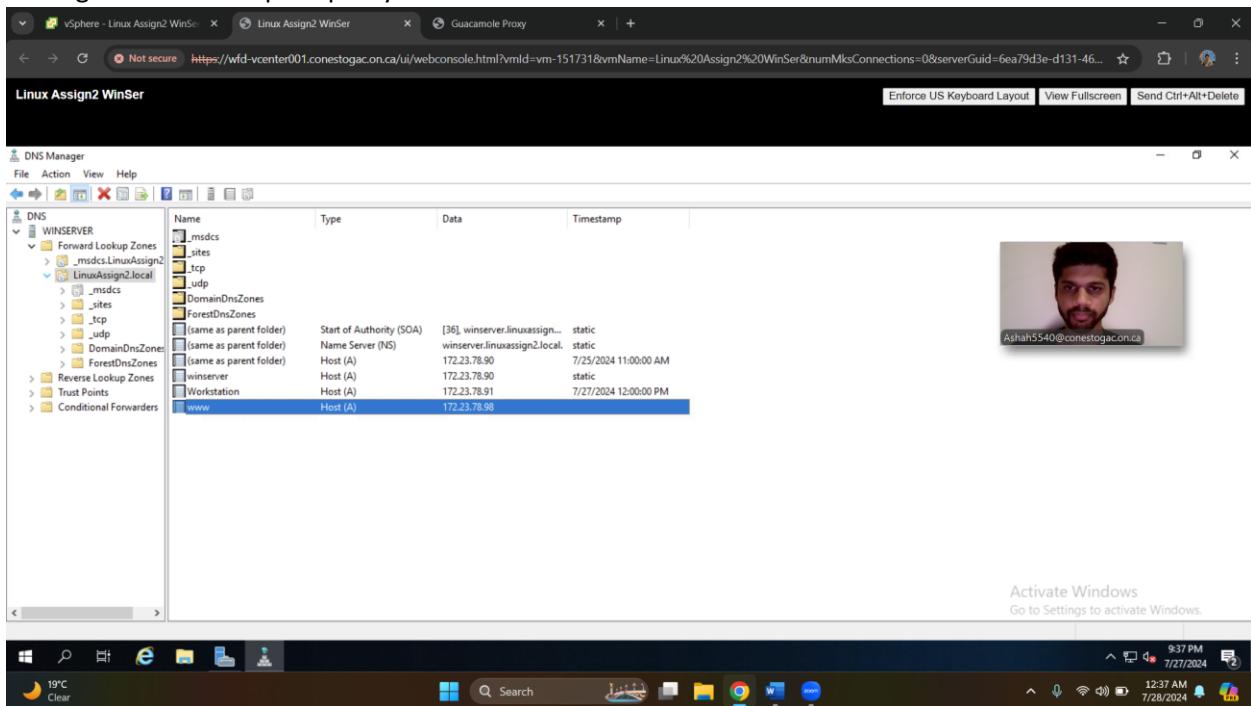
# Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
# error, crit, alert, emerg.
# It is also possible to configure the loglevel for particular
# modules, e.g.
#LogLevel info ssl:warn

ErrorLog ${APACHE_LOG_DIR}/error.log
CustomLog ${APACHE_LOG_DIR}/access.log combined

ProxyRequest Off
ProxyPreserveHosts On

Header add Set-Cookie "ROUTEID=%{BALANCER_WORKER_ROUTE}e; path=/"
env=BALANCER_ROUTE_CHANGED
<Proxy balancer://mycluster>
    BalancerMember "http://172.23.76.96:8080/guacamole/</" route=node1
    BalancerMember "http://172.23.76.91:8080/guacamole/<" route=node2
    ProxySet lbmethod=byrequests
    ProxySet stickysession=ROUTEID
</Proxy>
ProxyPass / balancer://mycluster/
lbmethod=byrequests
ProxyPassReverse / balancer://mycluster/
```

Adding forward lookup for proxy



Opening www.linuxassign2.local on windows workstation

