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VM info: Using the Azure VM

IP: 74.161.32.26

The screenshot shows the Azure portal's VM details page for a Linux Ubuntu 20.04 VM named CSE311jcasanova. The page includes sections for Essentials, Virtual machine, Networking, Size, and Source image details. It also shows tabs for Properties, Monitoring, Capabilities (7), Recommendations (3), and Tutorials.

**Essentials**

Resource group	(move) : CSE311jcasanova_group_03051709
Status	: Running
Location	: Switzerland North (Zone 1)
Subscription	(move) : Azure for Students
Subscription ID	: 3798533d-3a94-498e-b9c3-ed199e896e65
Availability zone	: 1
Operating system	: Linux (Ubuntu 20.04)
Size	: Standard B1ms (1 vcpu, 2 GiB memory)
Public IP address	: 74.161.32.26
Virtual network/subnet	: CSE311jcasanova-vnet/default
DNS name	: jcasanovinuxser.switzerlandnorth.cloudapp.azure.com
Health state	: -
Time created	: 3/5/2025, 10:18 PM UTC

**Tags (edit) : Add tags**

**Properties**   **Monitoring**   **Capabilities (7)**   **Recommendations (3)**   **Tutorials**

**Virtual machine**

Computer name	CSE311jcasanova
Operating system	Linux (Ubuntu 20.04)
VM generation	V2
VM architecture	x64
Agent status	Ready
Agent version	2.12.0.2
Hibernation	Disabled
Host group	-
Host	-
Proximity placement group	-
Colocation status	N/A
Capacity reservation group	-
Disk controller type	SCSI

**Azure Spot**

**Networking**

Public IP address	74.161.32.26 ( Network interface cse311jcasanova960_z1 )
Public IP address (IPv6)	-
Private IP address	10.1.0.4
Private IP address (IPv6)	-
Virtual network/subnet	CSE311jcasanova-vnet/default
DNS name	jcasanovinuxser.switzerlandnorth.cloudapp.azure.com

**Size**

Size	Standard B1ms
vCPUs	1
RAM	2 GiB

**Source image details**

Source image publisher	canonical
Source image offer	0001-com-ubuntu-server-focal
Source image plan	20_04-lts-gen2

TA account

Password will be Ta@cse311

**Exercise 1:**

The terminal window shows a MySQL session where the user connects as root and runs a query to select users and hosts from the mysql.user table. The browser window shows a successful response to a testsql.php script.

```

[2]+  Stopped                 sudo mysql -u root -p
[jcasanova@CSE311j:casanova:~]
[jcasanova@CSE311j:casanova:~]$ sudo nano /var/www/jcasanova/wp-config.php
[jcasanova@CSE311j:casanova:~]$ sudo nano /var/www/jcasanova/wp-config.php
[jcasanova@CSE311j:casanova:~]$ sudo mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 32
Server version: 8.0.41-Ubuntu0.20.04.1 (Ubuntu)

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql> SELECT User, Host FROM mysql.user;
+-----+-----+
| User      | Host     |
+-----+-----+
| example_user | %       |
| tester     | %       |
| wordpressuser | localhost |
| debian-sys-maint | localhost |
| mysql.infoschema | localhost |
| mysql.session | localhost |
| mysql.sys    | localhost |
| root       | localhost |
| wordpress   | localhost |
+-----+-----+
9 rows in set (0.00 sec)

mysql> EXIT
Bye
[jcasanova@CSE311j:casanova:~]$ sudo nano /var/www/jcasanova/testsql.php
[jcasanova@CSE311j:casanova:~]$ 
```

What is the IP address of the client accessing this page?

Localhost in my case the VM IP is 10.1.0.4 but the public IP is 74.161.32.26

Which HTTP protocol did the client use? Which port did the client use to send this request?

Protocol: HTTPS/1.1 Port: 443

What version of PHP is the server using?

PHP Version 7.4.3-4ubuntu2.29

What is the database connection timeout value?

60 seconds

What version of JSON is supported?

JSON support is enabled (bundled with PHP 7.4.3)

What MySQL Client API version is being supported?

mysqlnd 7.4.3-4ubuntu2.29

## Exercise 2:

Made my domain jcasanova.edu

Passwords for this was Jcasanova@114958701

```
jcasanova@cse311jcasanova:/$ sudo ldapsearch -Q -LLL -Y EXTERNAL -H ldap:// -b cn=config
dn
dn: cn=config

dn: cn=module{0},cn=config

dn: cn=schema,cn=config

dn: cn={0}core,cn=schema,cn=config

dn: cn={1}cosine,cn=schema,cn=config

dn: cn={2}nis,cn=schema,cn=config

dn: cn={3}inetorgperson,cn=schema,cn=config

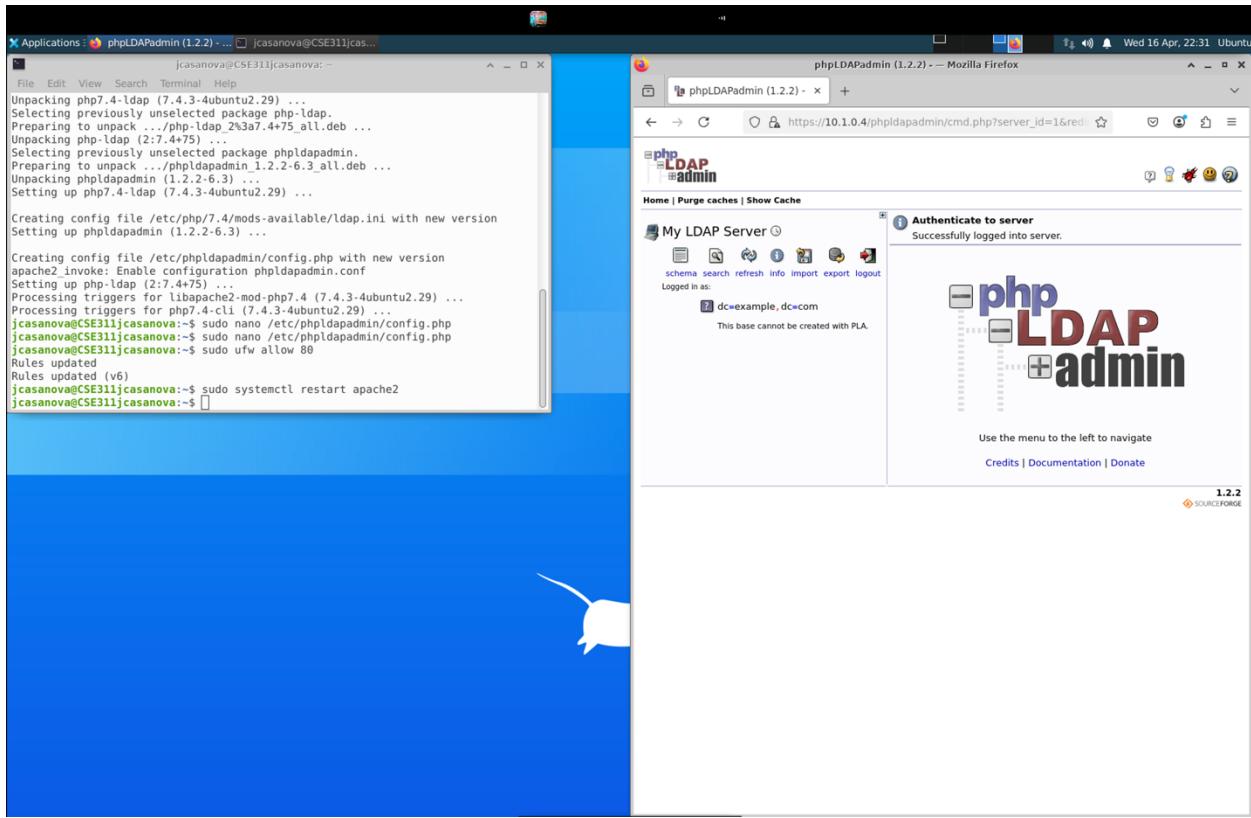
dn: olcDatabase={-1}frontend,cn=config

dn: olcDatabase={0}config,cn=config

dn: olcDatabase={1}mdb,cn=config

jcasanova@cse311jcasanova:/$ █
```

Jxplorer was not working so I used phpldapadmin logged and made sure it work



### Exercise 3:

Users:

John Doe ----- Developer

User: Jdoe

Password: Jdoe123

Alex Miller ----- Admins

User: Amiller

Password: Amiller123

Maria Smith ----- Wordpress

User: Msmith

Password: Msmith123

**php**  
**LDAP**  
**admin**

Home | Purge caches | Show Cache

**My LDAP Server**

schema search refresh info import export logout

Logged in as: cn=admin,dc=jcasanova,dc=edu

- dc=jcasanova,dc=edu (2)
  - ou=groups (3)
    - cn=admins
    - cn=developers
    - cn=wordpress
  - ou=users (3)
    - cn=Alex Miller
    - cn=John doe
    - cn=Maria Smith
- ★ Create new entry here
- ★ Create new entry here
- ★ Create new entry here

**Authenticate to server**  
Successfully logged into server.

**php**  
**LDAP**  
**admin**

Use the menu to the left to navigate

Credits | Documentation | Donate

**1.2.2**  
SOURCEFORGE

#### Exercise 4:

```
jcasanova@CSE311jcasanova: ~
File Edit View Search Terminal Help
GNU nano 4.8          /etc/nsswitch.conf
# /etc/nsswitch.conf
#
# Example configuration of GNU Name Service Switch functionality.
# If you have the `glibc-doc-reference` and `info` packages installed, try:
# `info libc "Name Service Switch"` for information about this file.

passwd:      files ldap systemd
group:       files ldap systemd
shadow:      files ldap
gshadow:     files

hosts:        files mdns4_minimal [NOTFOUND=return] dns
networks:    files

protocols:   db files
services:    db files
ethers:      db files
rpc:         db files

netgroup:    nis
[ Read 20 lines ]
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit     ^R Read File ^\ Replace   ^U Paste Text^T To Spell ^_ Go To Line
```

```
jcasanova@CSE311jcasanova: ~
File Edit View Search Terminal Help
nscd -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
libnss-ldap is already the newest version (265-5ubuntu1).
libpam-ldap is already the newest version (186-4ubuntu1).
ldap-utils is already the newest version (2.4.49+dfsg-2ubuntu1.10).
nscd is already the newest version (2.31-0ubuntu9.17).
0 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
jcasanova@CSE311jcasanova:~$ sudo nano /etc/nsswitch.conf
jcasanova@CSE311jcasanova:~$ sudo nano /etc/nsswitch.conf
jcasanova@CSE311jcasanova:~$ sudo systemctl restart nscd
jcasanova@CSE311jcasanova:~$ getent passwd jdoe
jdoe:*:1000:500:John doe:/home/users/jdoe:
jcasanova@CSE311jcasanova:~$ sudo pam-auth-update
[sudo] password for jdoe:
jcasanova@CSE311jcasanova:~$ su - jdoe
Password:
su: warning: cannot change directory to /home/users/jdoe: No such file or direct
ory
$ exit
jcasanova@CSE311jcasanova:~$ getent passwd jdoe
jdoe:*:1000:500:John doe:/home/users/jdoe:
jcasanova@CSE311jcasanova:~$
```

## Exercise 5:

The screenshot shows a Mozilla Firefox browser window with the title "LDAP/AD Login for Intranet < cseise311server — WordPress — Mozilla Firefox". The URL in the address bar is [https://10.1.0.4/wp-admin/admin.php?page=mo\\_ldap\\_local\\_login](https://10.1.0.4/wp-admin/admin.php?page=mo_ldap_local_login). The page displays the "LDAP/Active Directory Integration" plugin configuration. On the left sidebar, there are several icons and links: Import/Export Configuration, Authentication Report, Premium (highlighted), Advance Sync, Multiple Directories, Add-ons, and Our Other products. The main content area has tabs for Configuration, LDAP Configuration (selected), Role Mapping, Attribute Mapping, and Login Settings. The LDAP Configuration tab shows a flow: LDAP Connection Configuration → LDAP User Mapping Configuration → Test Authentication. The "Test Authentication" step is currently active, showing fields for Username (msmith) and Password (Enter Password). Below these fields are "Test Authentication" and "Troubleshooting" buttons.

The screenshot shows the WordPress admin dashboard with the URL [https://10.1.0.4/wp-admin/admin.php?page=mo\\_ldap\\_local](https://10.1.0.4/wp-admin/admin.php?page=mo_ldap_local). The page title is "LDAP/Active Directory Integration". The main content area has tabs for "LDAP Configuration", "Role Mapping", "Attribute Mapping", and "Login Settings". The "Login Settings" tab is active. It contains several configuration options:

- Enable Login Using LDAP**: A toggle switch that is turned on. A tooltip explains: "This will enable users to login to this WordPress site using their LDAP/Active Directory credentials. Please check this only after you have successfully tested your configuration as the default WordPress login will stop working."
- Authenticate Administrators from both LDAP and WordPress**: A turned-on toggle switch.
- Enable Auto Registering users if they do not exist in WordPress**: A turned-on toggle switch.

A purple box labeled "Premium Features" contains three additional options, all of which are turned off:

- Authenticate WP Users from both LDAP and WordPress
- Enable Kerberos/NTLM Auto-Login
- Protect all website content by login

A section titled "Restrict User login by Role" contains a single option:

- Enable Restrict User login by Role

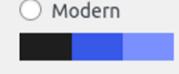
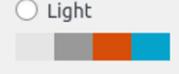
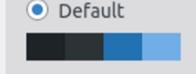
After I logged in using the Msmith information and it worked

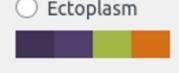
W cseise311server Howdy, msmith Help ▾

## Profile

### Personal Options

**Admin Color Scheme**

Default       Light       Modern       Blue  


Coffee       Ectoplasm       Midnight       Ocean  


Sunrise  


**Toolbar**  Show Toolbar when viewing site

**Name**

Username  Usernames cannot be changed.

First Name

Last Name

Nickname (required)

Display name publicly as

**Contact Info**

After simulating a LDAP by turning it off, trying to login to Msmith didn't work but when I logged into my Jcasanova account it worked perfectly fine.

### Exercise 6:

```
jcasanova@CSE311jcasanova:/usr/share/easy-rsa$ sudo ./easyrsa sign-req server server
Using SSL: openssl OpenSSL 1.1.1f  31 Mar 2020

You are about to sign the following certificate.
Please check over the details shown below for accuracy. Note that this request
has not been cryptographically verified. Please be sure it came from a trusted
source or that you have verified the request checksum with the sender.

Request subject, to be signed as a server certificate for 1080 days:

subject=
    commonName          = jcasanova

Type the word 'yes' to continue, or any other input to abort.
Confirm request details: yes
Using configuration from /usr/share/easy-rsa/pki/safessl-easyrsa.cnf
Enter pass phrase for /usr/share/easy-rsa/pki/private/ca.key:
Check that the request matches the signature
Signature ok
The Subject's Distinguished Name is as follows
commonName      :ASN.1 12:'jcasanova'
Certificate is to be certified until Apr  1 14:55:04 2028 GMT (1080 days)

Write out database with 1 new entries
Data Base Updated

Certificate created at: /usr/share/easy-rsa/pki/issued/server.crt

jcasanova@CSE311jcasanova:/usr/share/easy-rsa$ sudo ./easyrsa gen-dh

Using SSL: openssl OpenSSL 1.1.1f  31 Mar 2020
Generating DH parameters, 2048 bit long safe prime, generator 2
This is going to take a long time
```

```
jcasanova@CSE311jcasanova:/usr/share/easy-rsa$ sudo ./easyrsa init-pki
init-pki complete; you may now create a CA or requests.
Your newly created PKI dir is: /usr/share/easy-rsa/pki

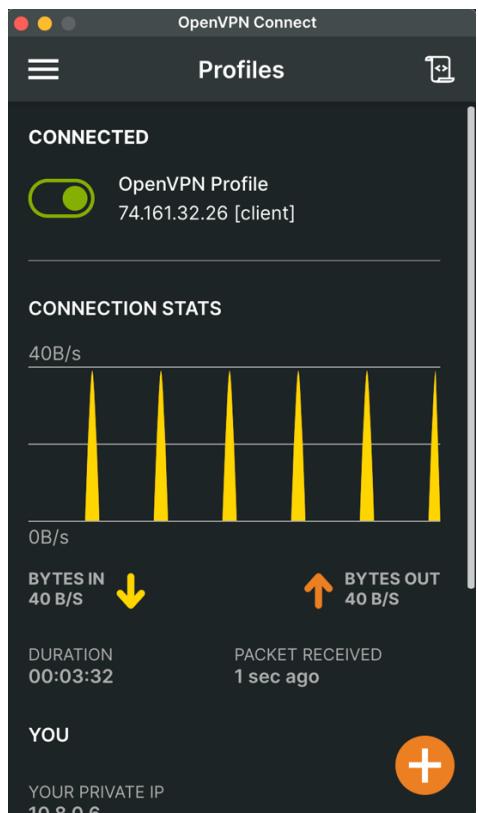
jcasanova@CSE311jcasanova:/usr/share/easy-rsa$ sudo ./easyrsa build-ca

Using SSL: openssl OpenSSL 1.1.1f  31 Mar 2020

Enter New CA Key Passphrase:
Re-Enter New CA Key Passphrase:
Generating RSA private key, 2048 bit long modulus (2 primes)
.....+++++
.....+++++
e is 65537 (0x010001)
Can't load /usr/share/easy-rsa/pki/.rnd into RNG
140347306349888:error:2406F079:random number generator:RAND_load_file:Cannot open file
e:../crypto/rand/randfile.c:98:Filename=/usr/share/easy-rsa/pki/.rnd
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Common Name (eg: your user, host, or server name) [Easy-RSA CA]:jcasanova

CA creation complete and you may now import and sign cert requests.
Your new CA certificate file for publishing is at:
/usr/share/easy-rsa/pki/ca.crt
```

Gave the ta a key with this command: sudo openvpn --genkey --secret ta.key



```
jcasanova@CSE311jcasanova:/$ ping 10.8.0.6
PING 10.8.0.6 (10.8.0.6) 56(84) bytes of data.
64 bytes from 10.8.0.6: icmp_seq=1 ttl=64 time=110 ms
64 bytes from 10.8.0.6: icmp_seq=2 ttl=64 time=123 ms
64 bytes from 10.8.0.6: icmp_seq=3 ttl=64 time=167 ms
64 bytes from 10.8.0.6: icmp_seq=4 ttl=64 time=110 ms
64 bytes from 10.8.0.6: icmp_seq=5 ttl=64 time=311 ms
64 bytes from 10.8.0.6: icmp_seq=6 ttl=64 time=110 ms
64 bytes from 10.8.0.6: icmp_seq=7 ttl=64 time=150 ms
64 bytes from 10.8.0.6: icmp_seq=8 ttl=64 time=182 ms
64 bytes from 10.8.0.6: icmp_seq=9 ttl=64 time=108 ms
64 bytes from 10.8.0.6: icmp_seq=10 ttl=64 time=115 ms
64 bytes from 10.8.0.6: icmp_seq=11 ttl=64 time=111 ms
64 bytes from 10.8.0.6: icmp_seq=12 ttl=64 time=112 ms
64 bytes from 10.8.0.6: icmp_seq=13 ttl=64 time=117 ms
64 bytes from 10.8.0.6: icmp_seq=14 ttl=64 time=206 ms
64 bytes from 10.8.0.6: icmp_seq=15 ttl=64 time=228 ms
64 bytes from 10.8.0.6: icmp_seq=16 ttl=64 time=109 ms
64 bytes from 10.8.0.6: icmp_seq=17 ttl=64 time=174 ms
64 bytes from 10.8.0.6: icmp_seq=18 ttl=64 time=196 ms
64 bytes from 10.8.0.6: icmp_seq=19 ttl=64 time=119 ms
64 bytes from 10.8.0.6: icmp_seq=20 ttl=64 time=109 ms
64 bytes from 10.8.0.6: icmp_seq=21 ttl=64 time=108 ms
64 bytes from 10.8.0.6: icmp_seq=22 ttl=64 time=109 ms
64 bytes from 10.8.0.6: icmp_seq=23 ttl=64 time=110 ms
64 bytes from 10.8.0.6: icmp_seq=24 ttl=64 time=111 ms
64 bytes from 10.8.0.6: icmp_seq=25 ttl=64 time=157 ms
^C
--- 10.8.0.6 ping statistics ---
25 packets transmitted, 25 received, 0% packet loss, time 24033ms
rtt min/avg/max/mdev = 108.074/142.491/311.140/49.484 ms
```

```
[jeffriecasanova@Mac ~ % ping 10.8.0.1
PING 10.8.0.1 (10.8.0.1): 56 data bytes
64 bytes from 10.8.0.1: icmp_seq=0 ttl=64 time=114.061 ms
64 bytes from 10.8.0.1: icmp_seq=1 ttl=64 time=109.807 ms
64 bytes from 10.8.0.1: icmp_seq=2 ttl=64 time=115.200 ms
64 bytes from 10.8.0.1: icmp_seq=3 ttl=64 time=121.328 ms
64 bytes from 10.8.0.1: icmp_seq=4 ttl=64 time=167.194 ms
64 bytes from 10.8.0.1: icmp_seq=5 ttl=64 time=107.360 ms
64 bytes from 10.8.0.1: icmp_seq=6 ttl=64 time=147.900 ms
64 bytes from 10.8.0.1: icmp_seq=7 ttl=64 time=191.626 ms
64 bytes from 10.8.0.1: icmp_seq=8 ttl=64 time=114.623 ms
64 bytes from 10.8.0.1: icmp_seq=9 ttl=64 time=110.858 ms
64 bytes from 10.8.0.1: icmp_seq=10 ttl=64 time=114.741 ms
64 bytes from 10.8.0.1: icmp_seq=11 ttl=64 time=109.935 ms
64 bytes from 10.8.0.1: icmp_seq=12 ttl=64 time=109.527 ms
64 bytes from 10.8.0.1: icmp_seq=13 ttl=64 time=108.094 ms
64 bytes from 10.8.0.1: icmp_seq=14 ttl=64 time=111.759 ms
64 bytes from 10.8.0.1: icmp_seq=15 ttl=64 time=124.362 ms
64 bytes from 10.8.0.1: icmp_seq=16 ttl=64 time=167.345 ms
64 bytes from 10.8.0.1: icmp_seq=17 ttl=64 time=109.684 ms
^X64 bytes from 10.8.0.1: icmp_seq=18 ttl=64 time=148.196 ms
64 bytes from 10.8.0.1: icmp_seq=19 ttl=64 time=191.973 ms
64 bytes from 10.8.0.1: icmp_seq=20 ttl=64 time=112.985 ms
```

```
--- 10.8.0.1 ping statistics ---
21 packets transmitted, 21 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 107.360/128.979/191.973/27.359 ms
jeffriecasanova@Mac ~ %
```

Was about to test the VPN connection and also ping each other and provided the screenshots above

### Exercise 7:

- Interfaces: lo, eth0, tun0. IPs: 127.0.0.1, 10.1.0.4, 10.8.0.1. MAC: N/A, 60:45:bd:2a:cc:fc, no MAC

Subnet Mask: 255.255.255.0 Network Address: 10.1.0.0 Host Address Portion: 4. The first three octets (10.1.0) are the network part. The last octet (.4) is the host part

CIDR Notion: 10.1.0.4/24

4 subnets: 10.1.0.0/26, 10.1.0.64/26, 10.1.0.128/26, 10.1.0.192/26, Each subnet supports 62 usable hosts.

b)

The image shows two terminal windows side-by-side. The left window displays the output of a `tcpdump` command capturing ICMP traffic on interface `eth0`. The right window shows a series of `ping` commands to `8.8.8.8`, followed by an `ssh` session to the local host, and finally a system status report.

```
jcasanova@cse311jcasanova:/$ sudo tcpdump -i eth0 icmp
File Edit View Search Terminal Help
File Edit View Search Terminal Help
jcasanova@cse311jcasanova:/$ ping 8.8.8.8 -c 4
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
44 bytes from 8.8.8.8: icmp_seq=1 ttl=16 time=1.66 ms
44 bytes from 8.8.8.8: icmp_seq=2 ttl=16 time=1.76 ms
44 bytes from 8.8.8.8: icmp_seq=3 ttl=16 time=1.60 ms
44 bytes from 8.8.8.8: icmp_seq=4 ttl=16 time=1.08 ms
--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 1.078/1.527/1.764/0.265 ms
jcasanova@cse311jcasanova:/$ ssh localhost
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ECDSA key fingerprint is SHA256:XiyH7qTkejy+qMOHVklawgum1TVnQzU95GdSbktpug.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts.
jcasanova@localhost's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1086-azure x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/pro

System information as of Sun Apr 20 21:16:28 UTC 2025
System load: 0.22 Processes: 214
Usage of /: 19.0% of 28.89GB Users logged in: 0
Memory usage: 72% IPv4 address for eth0: 10.1.0.4
Swap usage: 0%
* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s just raised the bar for easy, resilient and secure K8s cluster deployment.
https://ubuntu.com/engage/securing-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

8 updates can be applied immediately.
To see these additional updates run: apt list --upgradable
```

`jcasanova@cse311jcasanova:/$ sudo tcpdump -i eth0 port 22`

`jcasanova@cse311jcasanova:/$`

c)

```
jcasanova@CSE311jcasanova:$ dig . NS
; <>> DiG 9.18.30-0ubuntu0.20.04.2-Ubuntu <>> .
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 53595
;; flags: qr rd ra; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;.

;; ANSWER SECTION:
. 517663 IN NS d.root-servers.net.
. 517663 IN NS f.root-servers.net.
. 517663 IN NS c.root-servers.net.
. 517663 IN NS e.root-servers.net.
. 517663 IN NS h.root-servers.net.
. 517663 IN NS i.root-servers.net.
. 517663 IN NS a.root-servers.net.
. 517663 IN NS l.root-servers.net.
. 517663 IN NS k.root-servers.net.
. 517663 IN NS g.root-servers.net.
. 517663 IN NS j.root-servers.net.
. 517663 IN NS m.root-servers.net.
. 517663 IN NS b.root-servers.net.

;; Query time: 4 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Sun Apr 20 21:22:32 UTC 2025
;; MSG SIZE rcvd: 239
```

13 servers and the hosts name are above

```
jcasanova@CSE311jcasanova:$ dig www.ece.ust.hk
; <>> DiG 9.18.30-0ubuntu0.20.04.2-Ubuntu <>> www.ece.ust.hk
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 57724
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;www.ece.ust.hk. IN A

;; ANSWER SECTION:
www.ece.ust.hk. 1799 IN A 143.89.44.246

;; Query time: 384 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Sun Apr 20 21:24:46 UTC 2025
;; MSG SIZE rcvd: 59
```

IP Address: 143.89.14.4

The Type of DNS record returned is A

d)

```
jcasanova@cse311jcasanova:/$ traceroute www.google.com
traceroute to www.google.com (142.250.203.100), 30 hops max, 60 byte packets
 1 * * *
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 *^C
jcasanova@cse311jcasanova:/$ sudo tcptraceroute www.google.com 80
Selected device eth0, address 10.1.0.4, port 47265 for outgoing packets
Tracing the path to www.google.com (142.250.203.100) on TCP port 80 (http), 30 hops max
 1 * * *
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 zrh04s16-in-f4.1e100.net (142.250.203.100) [open] 1.463 ms 1.347 ms 1.643 ms
```

traceroute failed to map the path to www.google.com because ICMP packets were likely blocked by firewalls. However, tcptraceroute, which uses TCP SYN packets, was able to reach the destination successfully on port 80 (HTTP). This demonstrates that TCP-based probing is more effective when firewalls are configured to block ICMP but allow web traffic.