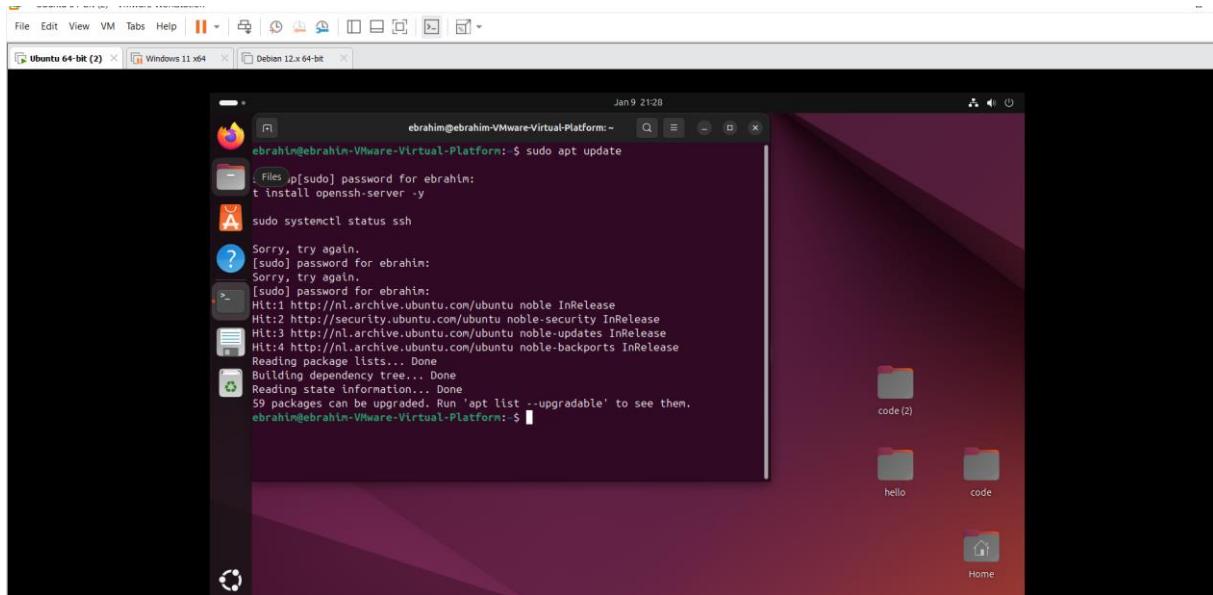


Template Week 6 – Networking

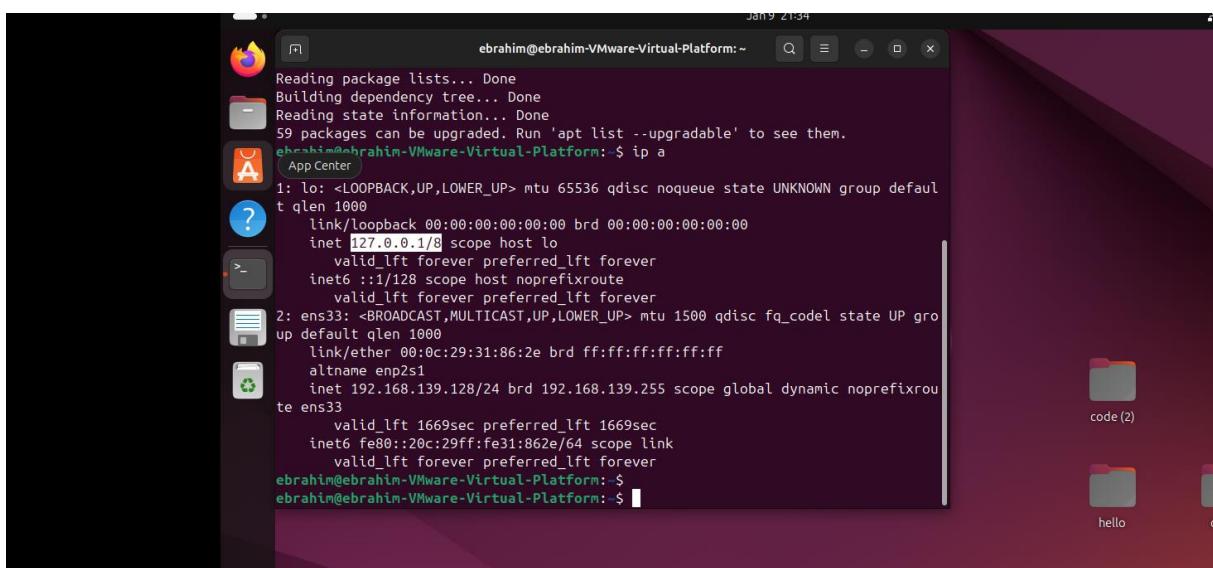
Student number: 577534 Ebrahim Amin

Assignment 6.1: Working from home

Screenshot installation openssh-server:



Screenshot successful SSH command execution:



```

Ubuntu 64-bit (2) | Windows 11 x64 | Debian 12.x 64-bit |
ebrahim@ebrahim:~$ scp test.txt ebrahim@192.168.139.128:/home/ebrahim/
The authenticity of host '192.168.139.128 (192.168.139.128)' can't be established.
ED25519 key fingerprint is SHA256:nzjM0mQSCGUpn1fEMdAqHmctsNS4jeRlt8.
This key is not known by any other names.
Are you sure you want to connect (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.139.128' (ED25519) to the list of known hosts.
ebrahim@192.168.139.128's password:
Permission denied, please try again.
ebrahim@192.168.139.128's password:
Permission denied, please try again.
ebrahim@192.168.139.128's password:
ebrahim@192.168.139.128: Permission denied (publickey,password).
ebrahim@192.168.139.128's password:
ebrahim@192.168.139.128's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-37-generic x86_64)

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

Expanded Security Maintenance for Applications is not enabled.

53 updates can be applied immediately.
To see these additional updates run: apt list --upgradable
6 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ebrahim@ebrahim-Virtual-Platform:~$ 

```

Activate Windows
Go to Settings to activate Windows.

Screenshot successful execution SCP command:

```

Ubuntu 64-bit (2) | Windows 11 x64 | Debian 12.x 64-bit |
ebrahim@ebrahim:~$ scp test.txt ebrahim@192.168.139.128:/home/ebrahim/
The authenticity of host '192.168.139.128 (192.168.139.128)' can't be established.
ED25519 key fingerprint is SHA256:nzjM0mQSCGUpn1fEMdAqHmctsNS4jeRlt8.
This key is not known by any other names.
Are you sure you want to connect (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.139.128' (ED25519) to the list of known hosts.
ebrahim@192.168.139.128's password:
Permission denied, please try again.
ebrahim@192.168.139.128's password:
Permission denied, please try again.
ebrahim@192.168.139.128's password:
ebrahim@192.168.139.128: Permission denied (publickey,password).
ebrahim@192.168.139.128's password:
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Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-37-generic x86_64)

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individual files in /usr/share/doc/*copyright.

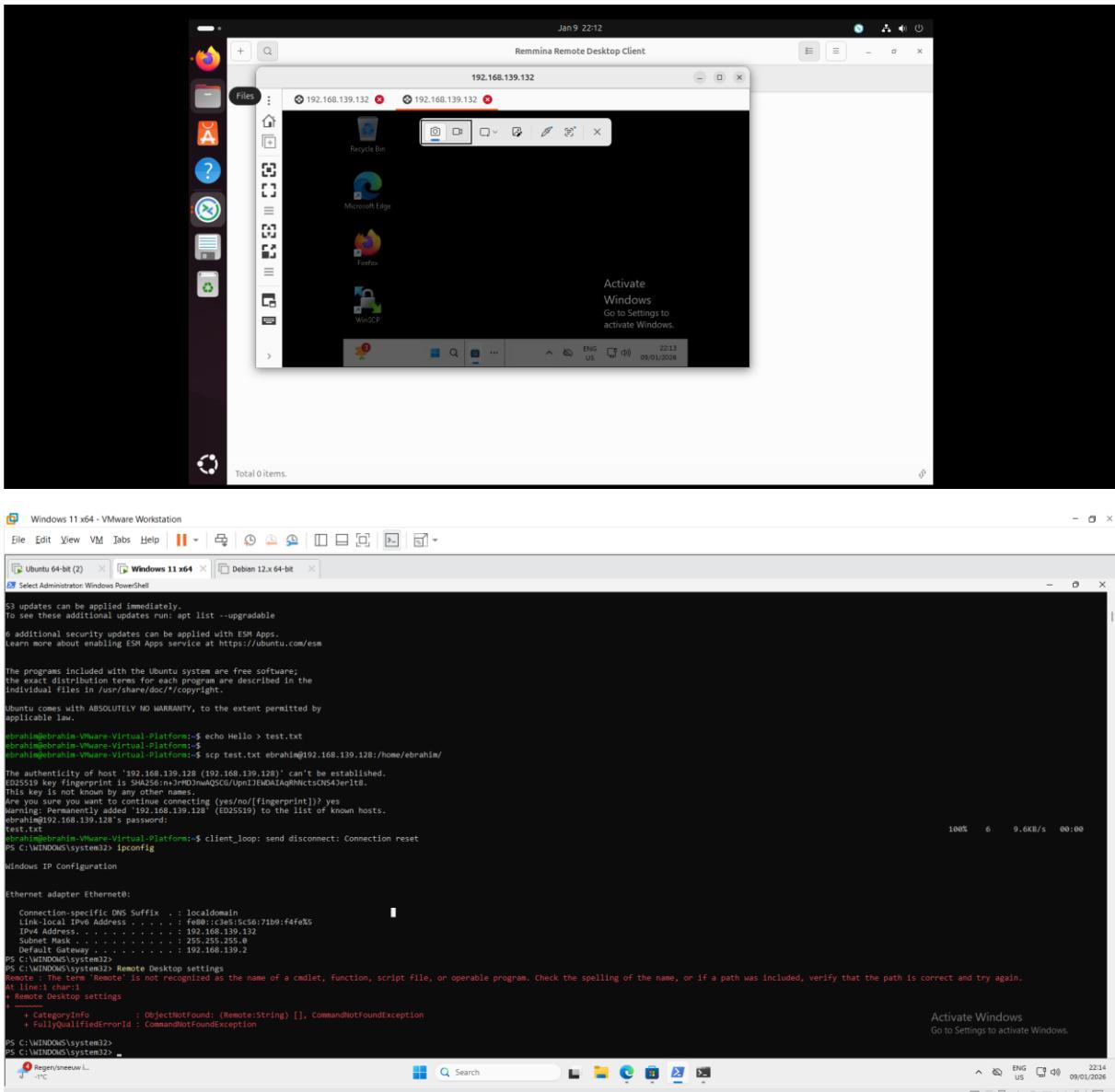
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ebrahim@ebrahim-Virtual-Platform:~$ echo Hello > test.txt
ebrahim@ebrahim-Virtual-Platform:~$ scp test.txt ebrahim@192.168.139.128:/home/ebrahim/
The authenticity of host '192.168.139.128 (192.168.139.128)' can't be established.
ED25519 key fingerprint is SHA256:nzjM0mQSCGUpn1fEMdAqHmctsNS4jeRlt8.
This key is not known by any other names.
Are you sure you want to connect (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.139.128' (ED25519) to the list of known hosts.
ebrahim@192.168.139.128's password:
test.txt
ebrahim@ebrahim-Virtual-Platform:~$ 

```

Activate Windows
Go to Settings to activate Windows.

Screenshot remmina:



Assignment 6.2: IP addresses websites

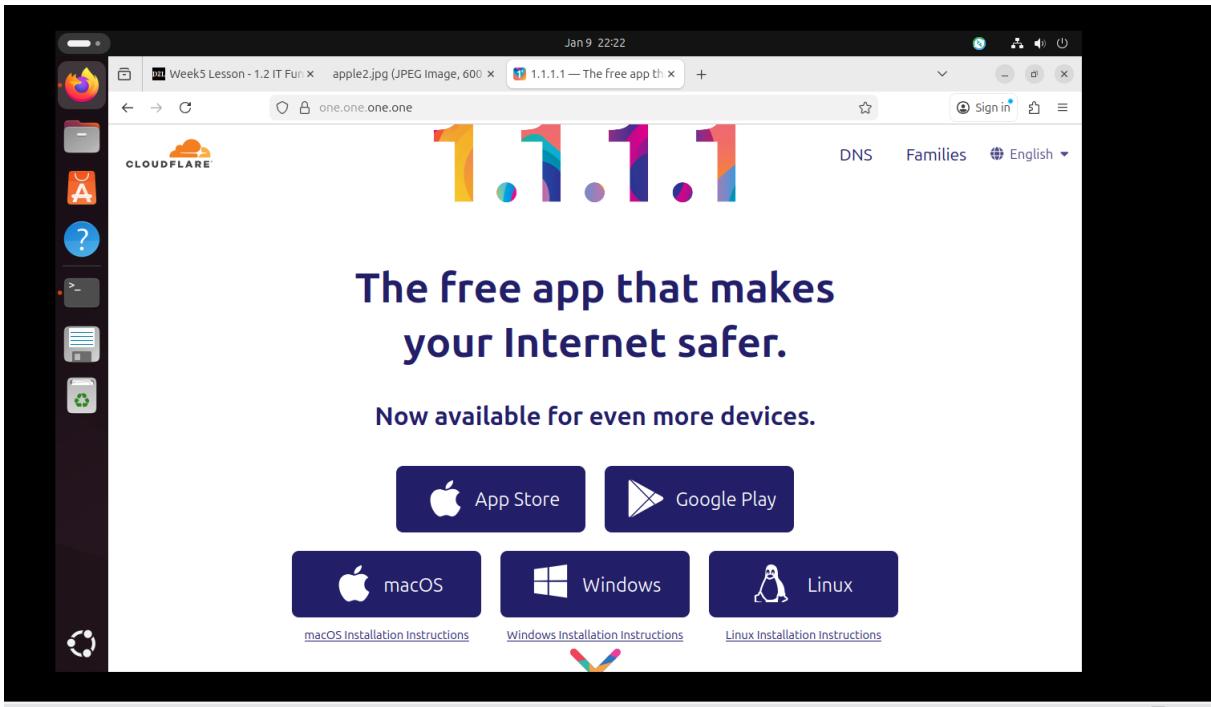
Relevant screenshots nslookup command:

```
Firefox ebrahim@ebrahim-VMware-Virtual-Platform:~ > dns.google.com
Server: 127.0.0.53
Address: 127.0.0.53#53
Non-authoritative answer:
Name: dns.google.com
Address: 8.8.4.4
Name: dns.google.com
Address: 8.8.8.8
Name: dns.google.com
Address: 2001:4860:4860::8888
Name: dns.google.com
Address: 2001:4860:4860::8844
>
> bol.com
Server: 127.0.0.53
Address: 127.0.0.53#53
Non-authoritative answer:
Name: bol.com
Address: 79.170.100.62
>
> w3schools.com
Server: 127.0.0.53
Address: 127.0.0.53#53
Non-authoritative answer:
Name: w3schools.com
Address: 76.223.115.82
Name: w3schools.com
```

inside or press Ctrl+G.

```
Non-authoritative answer:
Name: amazon.com
Address: 98.82.161.185
Name: amazon.com
Address: 98.87.170.71
AppCenter azon.com
Address: 98.87.170.74
> google.com
Server: 127.0.0.53
Address: 127.0.0.53#53
Non-authoritative answer:
Name: google.com
Address: 142.250.179.174
Name: google.com
Address: 2a00:1450:400e:801::200e
> one.one.one.one
Server: 127.0.0.53
Address: 127.0.0.53#53
Non-authoritative answer:
Name: one.one.one.one
Address: 1.0.0.1
Name: one.one.one.one
Address: 1.1.1.1
Name: one.one.one.one
Address: 2606:4700:4700::1111
Name: one.one.one.one
Address: 2606:4700:4700::1001
>
> dns.google.com
```

Screenshot website visit via IP address:



Assignment 6.3: subnetting

How many IP addresses are in this network configuration 192.168.110.128/25?

A /25 subnet leaves 7 bits for host addresses. This gives $2^7 = \mathbf{128 \text{ total IP addresses}}$.

What is the usable IP range to hand out to the connected computers?

The network address is **192.168.110.128** and the broadcast address is **192.168.110.255**.

These two cannot be used by devices.

The usable IP range is:

192.168.110.129 – 192.168.110.254

This gives **126 usable host addresses**.

Check your two previous answers with this Linux command: `ipcalc 192.168.110.128/25`

```

Reading state information... Done
The following package was automatically installed and is no longer required:
  libl1m19
Use 'sudo apt autoremove' to remove it.
A The following NEW packages will be installed:
  ipcalc
0 upgraded, 1 newly installed, 0 to remove and 59 not upgraded.
Need to get 24.5 kB of archives.
After this operation, 72.7 kB of additional disk space will be used.
Get:1 http://nl.archive.ubuntu.com/ubuntu noble/universe amd64 ipcalc all 0.51-1 [24.5 kB]
24.5 kB in 0s (171 kB/s)
Selecting previously unselected package ipcalc.
(Reading database ... 203874 files and directories currently installed.)
Preparing to unpack .../archives/ipcalc_0.51-1_all.deb ...
Unpacking ipcalc (0.51-1) ...
Setting up ipcalc (0.51-1) ...
Processing triggers for man-db (2.12.0-4build2) ...
ebrahim@ebrahim-VMware-Virtual-Platform: $ ipcalc 192.168.110.128/25
Address: 192.168.110.128      11000000.10101000.01101110.1 00000000
Netmask: 255.255.255.128 = 25 11111111.11111111.11111111.0 00000000
Wildcard: 0.0.0.127          00000000.00000000.00000000.0 11111111
=>
Network: 192.168.110.128/25  11000000.10101000.01101110.1 00000000
HostMin: 192.168.110.129    11000000.10101000.01101110.1 00000001
HostMax: 192.168.110.254    11000000.10101000.01101110.1 11111100
Broadcast: 192.168.110.255   11000000.10101000.01101110.1 11111111
Hosts/Net: 126               Class C, Private Internet
ebrahim@ebrahim-VMware-Virtual-Platform: $
```

ect input to this VM, click inside or press Ctrl+G.

Explain the above calculation in your own words.

The first address is the network address and the last address is the broadcast address, so they cannot be used by devices.

This leaves **126 usable IP addresses**, ranging from **192.168.110.129** to **192.168.110.254**.

The network address is **192.168.110.128** and the broadcast address is **192.168.110.255**.

The result was confirmed using the **ipcalc 192.168.110.128/25** command.

Assignment 6.4: HTML

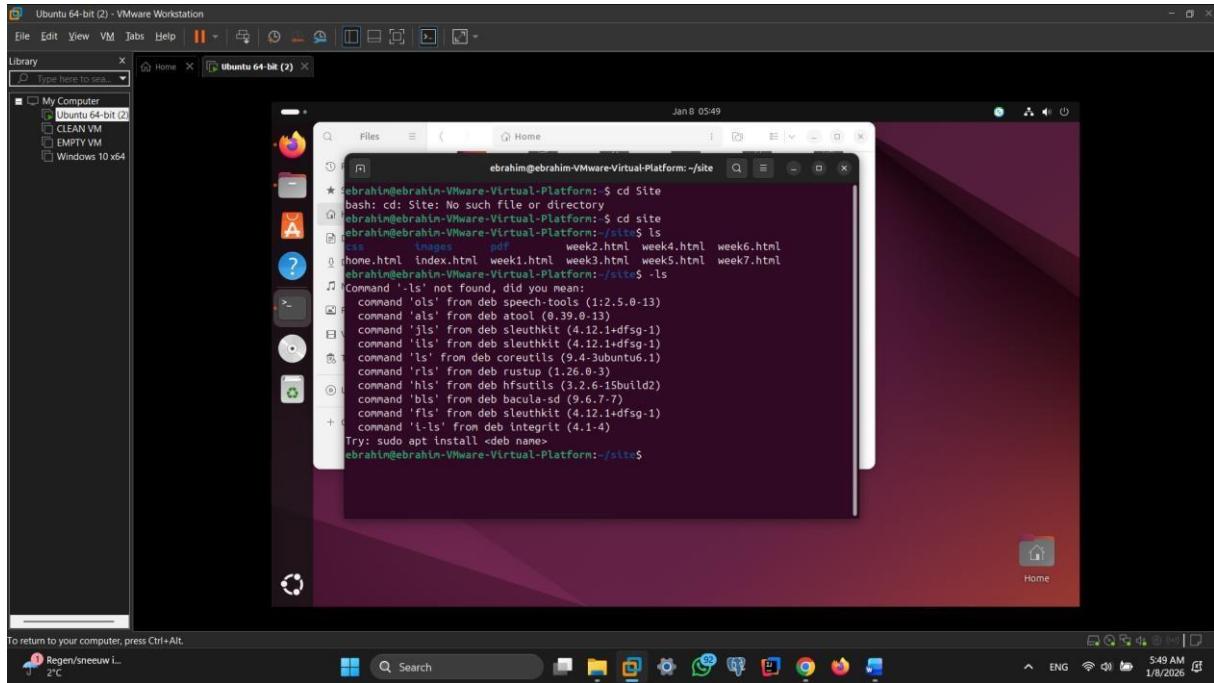
Screenshot IP address Ubuntu VM:

```

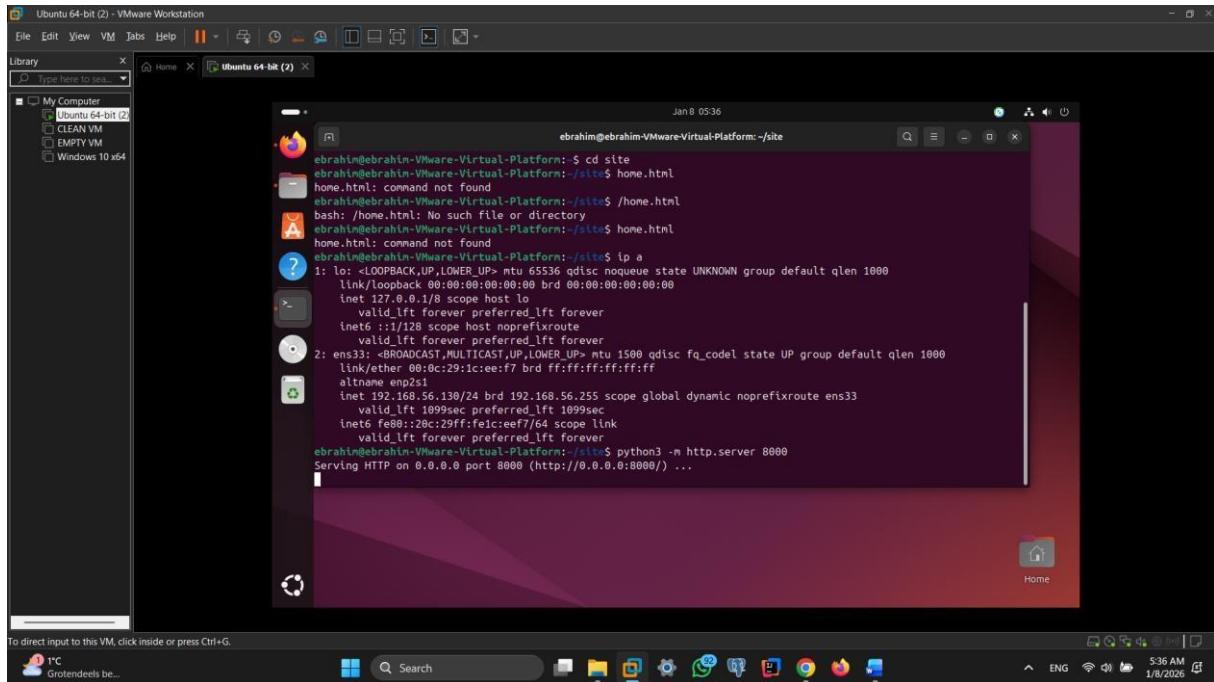
ebrahim@ebrahim-VMware-Virtual-Platform: ~
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
        App Center ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:9c:29:31:86:2e brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.139.128/24 brd 192.168.139.255 scope global dynamic noprefixroute ens33
        valid_lft 1444sec preferred_lft 1444sec
        inet6 fe80::20c:29ff:fe31:862e/64 scope link
            valid_lft forever preferred_lft forever
ebrahim@ebrahim-VMware-Virtual-Platform: ~
```

his VM, click inside or press Ctrl+G.

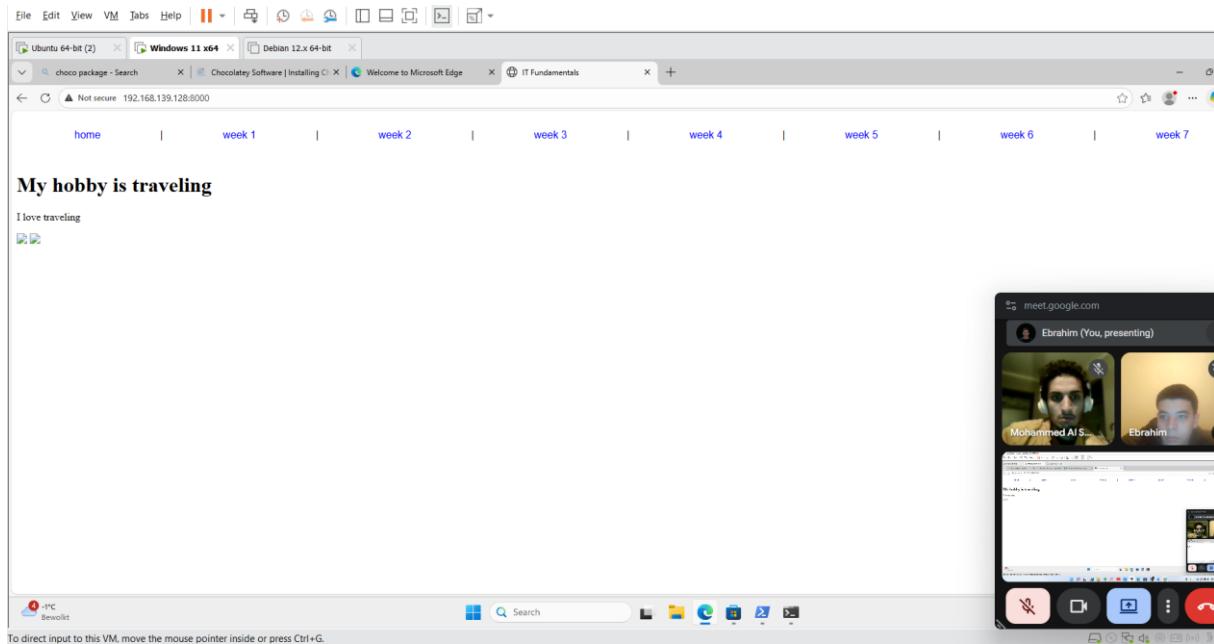
Screenshot of Site directory contents:



Screenshot python3 webserver command:



Screenshot web browser visits your site



Assignment 6.5: Network segment

Remember that bitwise java application you've made in week 2? Expand that application so that you can also calculate a network segment as explained in the PowerPoint slides of week 6. Use the bitwise & AND operator. You need to be able to input two Strings. An IP address and a subnet.

IP: 192.168.1.100 and subnet: 255.255.255.224 for /27

Example: 192.168.1.100/27

Calculate the network segment

IP Address: 11000000.10101000.00000001.01100100

Subnet Mask: 11111111.11111111.11111111.11100000

Network Addr: 11000000.10101000.00000001.01100000

This gives 192.168.1.96 in decimal as the network address.

For a /27 subnet, each segment (or subnet) has 32 IP addresses (2^5).

The range of this network segment is from 192.168.1.96 to 192.168.1.127.

Paste source code here, with a screenshot of a working application.

```
public class NetworkSegment {
```

```
    public static void main(String[] args) {
```

```
        String ip = "192.168.1.100";
```

```

String subnet = "255.255.255.224";

String[] ipParts = ip.split("\\.");

```

```

System.out.println("Network
Address:");

for (int i = 0; i < 4;
i++) {

    int ipOctet =
    Integer.parseInt(ipParts[i]);

    int subnetOctet =
    Integer.parseInt(subnetParts[i]);
}

```

The screenshot shows the IntelliJ IDEA interface with the NetworkSegment.java file open. The code prints the network address of an IP address. The output window shows the command run and the resulting output: "Network Address: 192.168.1.96". The status bar at the bottom right indicates the date and time as 1/8/2026, 6:03 AM.

```

public class NetworkSegment {
    public static void main(String[] args) {
        int ipOctet = Integer.parseInt(ipParts[0]);
        int subnetOctet = Integer.parseInt(subnetParts[0]);

        int networkOctet = ipOctet & subnetOctet;
        System.out.print(networkOctet);

        if (i < 3) System.out.print(".");
    }
}

```

Ready? Save this file and export it as a pdf file with the name: [week6.pdf](#)