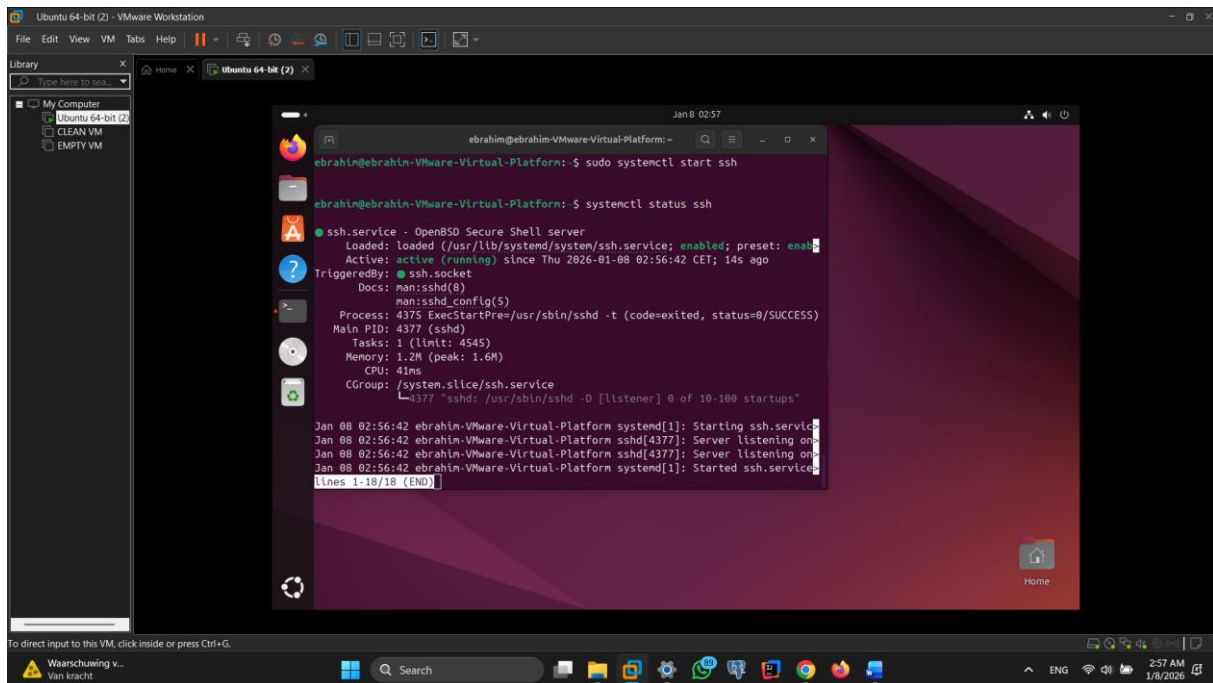


# Template Week 6 – Networking

Student number: 546746

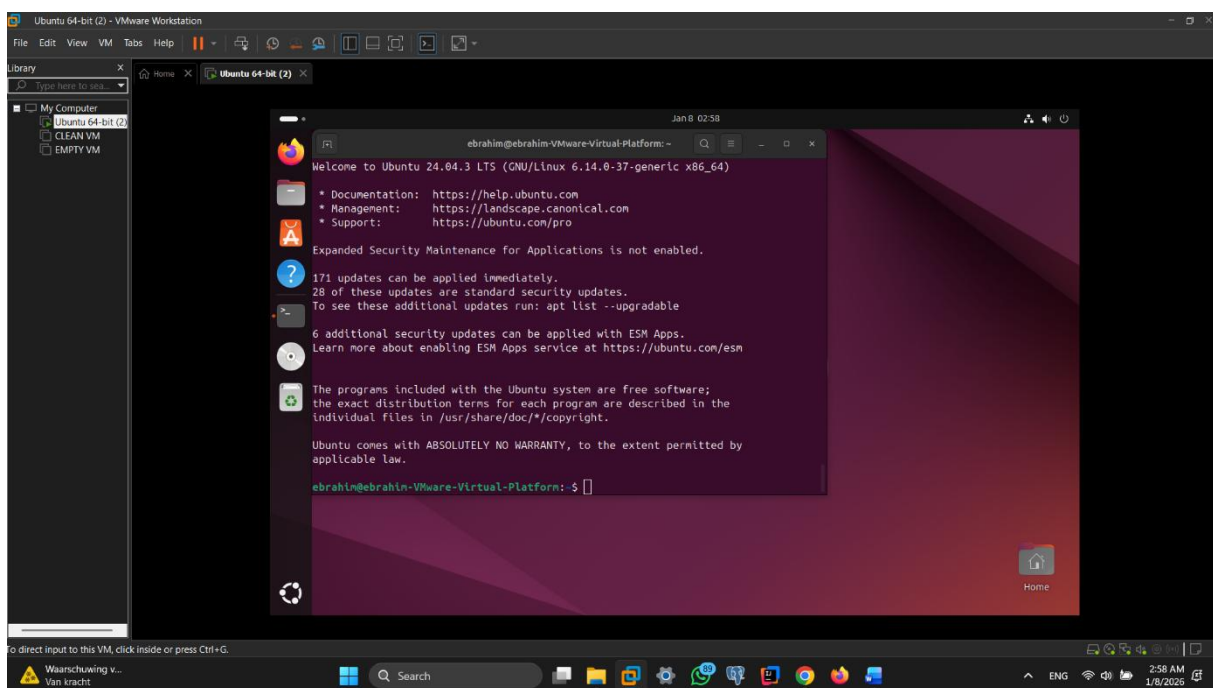
## Assignment 6.1: Working from home

Screenshot installation openssh-server:



```
ebrahim@ebrahim-Virtual-Platform: ~  
$ sudo systemctl start ssh  
ebrahim@ebrahim-Virtual-Platform: ~  
$ systemctl status ssh  
● ssh.service - OpenSSH Secure Shell server  
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: enabled)  
   Active: active (running) since Thu 2026-01-08 02:56:42 CET; 14s ago  
   TriggeredBy: ● ssh.socket  
     Docs: man:sshd(8)  
           man:sshd_config(5)  
   Process: 4375 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)  
   Main PID: 4377 (sshd)  
     Tasks: 1 (limit: 4545)  
    Memory: 1.2M (peak: 1.6M)  
       CPU: 41ms  
   CGroup: /system.slice/ssh.service  
           └─4377 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"  
  
Jan 08 02:56:42 ebrahim-Virtual-Platform systemd[1]: Starting ssh.service:  
Jan 08 02:56:42 ebrahim-Virtual-Platform sshd[4377]: Server listening on  
Jan 08 02:56:42 ebrahim-Virtual-Platform sshd[4377]: Server listening on  
Jan 08 02:56:42 ebrahim-Virtual-Platform systemd[1]: Started ssh.service.  
Lines 1-10/18 (END)
```

Screenshot successful SSH command execution:



```
ebrahim@ebrahim-Virtual-Platform: ~  
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.  
  
171 updates can be applied immediately.  
28 of these updates are standard security updates.  
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: ~
```

The screenshot shows a Windows terminal window titled 'ebrahim@ebrahim-VMware-1'. The user has executed the following commands and received the following output:

```
(c) Microsoft Corporation. All rights reserved.

C:\Users\xenon>ip a
'ip' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\xenon>ssh ebrahim@192.168.2.19
The authenticity of host '192.168.2.19 (192.168.2.19)' can't be established.
ED25519 key fingerprint is SHA256:zQpwYF8ABMHE6FDrrnu/mNYP4a07JtwNjkl+cvOC9WPw.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.2.19' (ED25519) to the list of known hosts.
ebrahim@192.168.2.19'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.

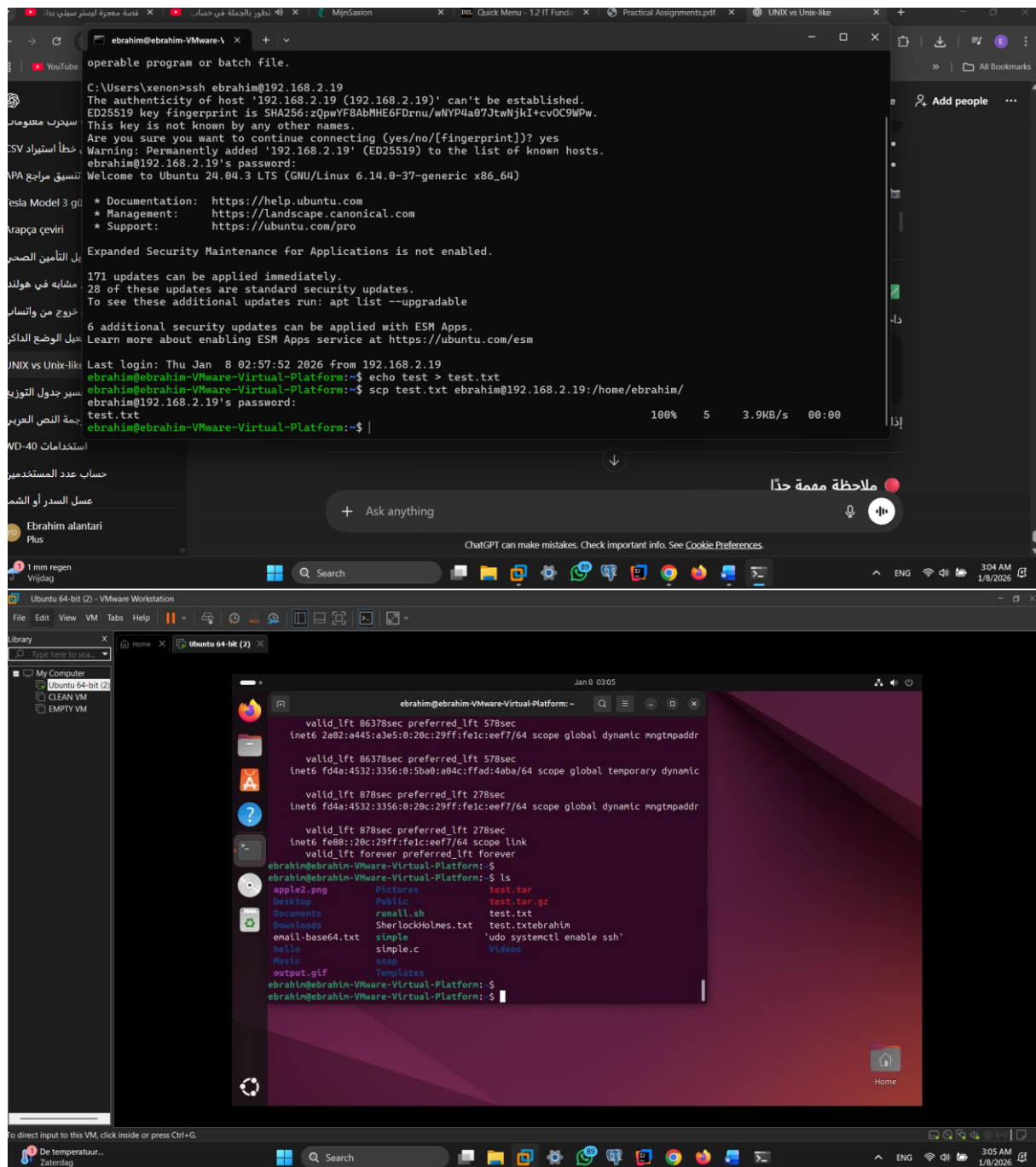
171 updates can be applied immediately.
28 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

6 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

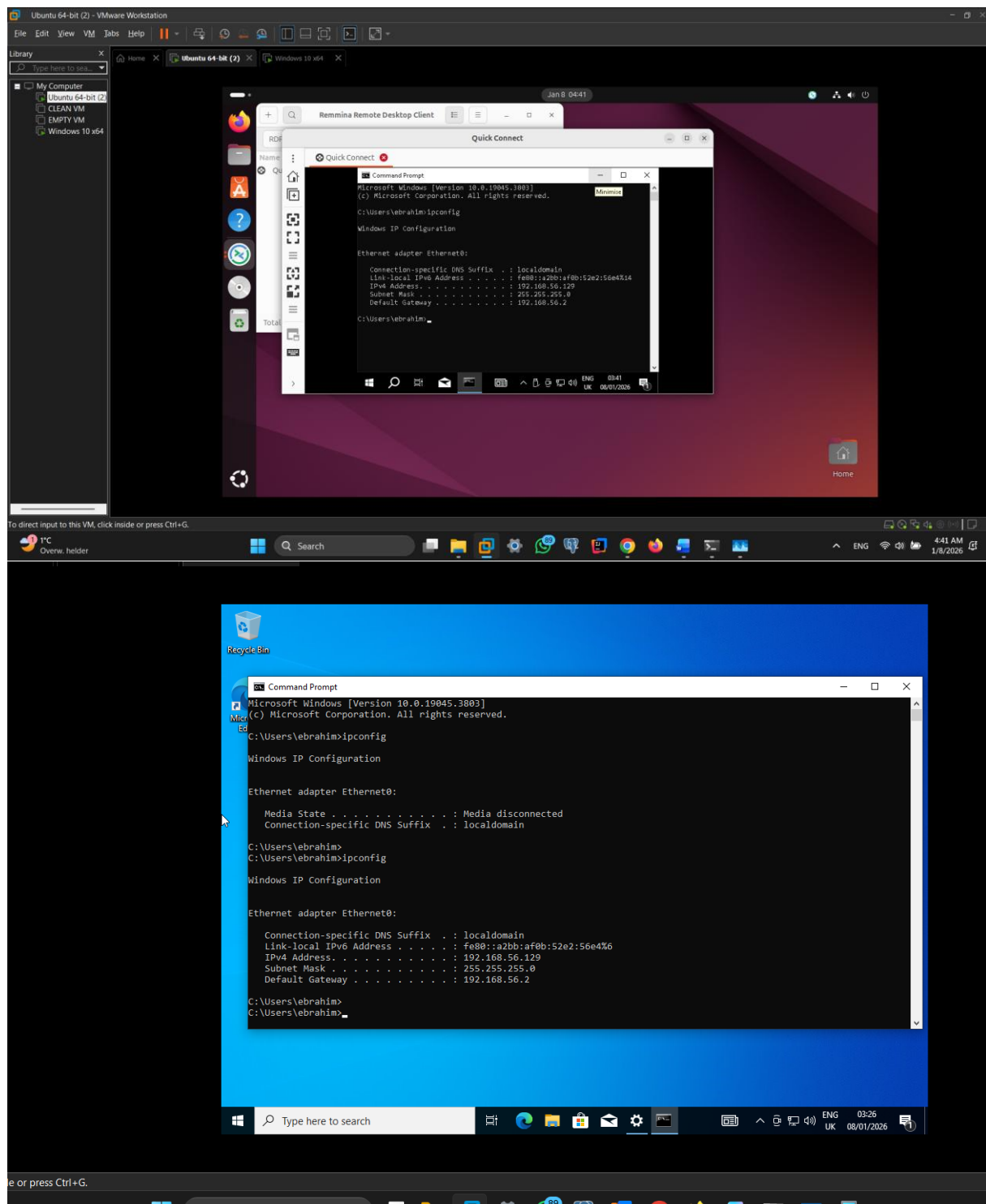
Last login: Thu Jan  8 02:57:52 2026 from 192.168.2.19
ebrahim@ebrahim-VMware-Virtual-Platform:~$
```

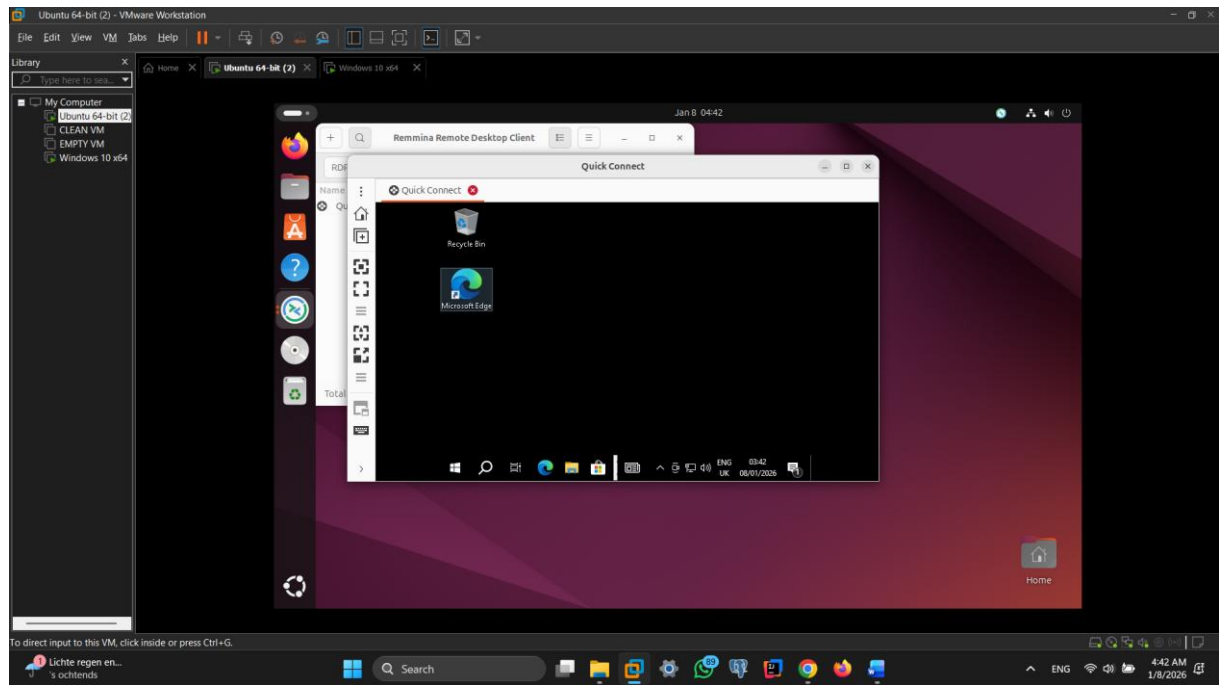
The terminal window is part of a desktop environment with a taskbar at the bottom showing various application icons and system status information (3:03 AM, 1/8/2026).

Screenshot successful execution SCP command:



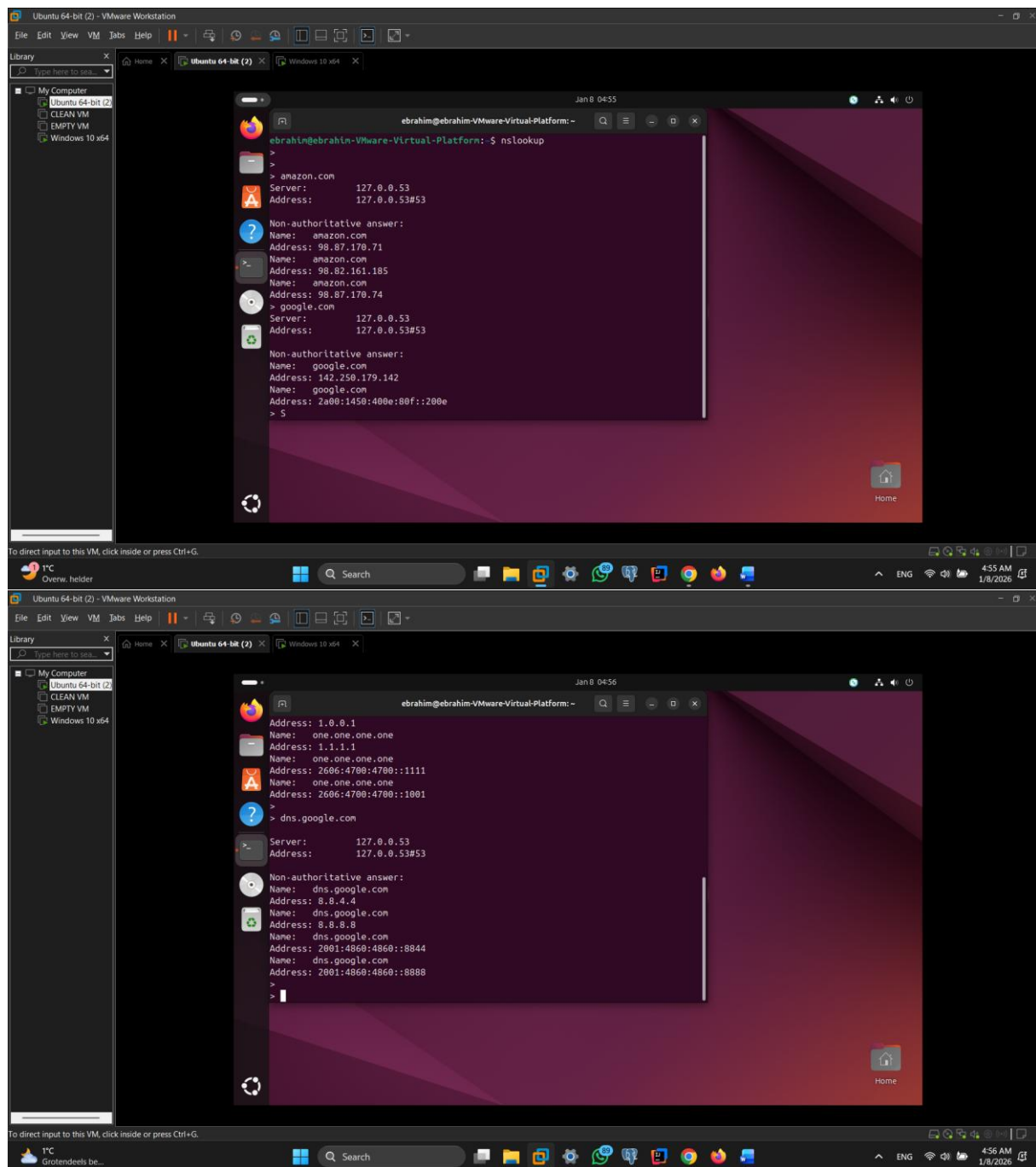
Screenshot remmina:

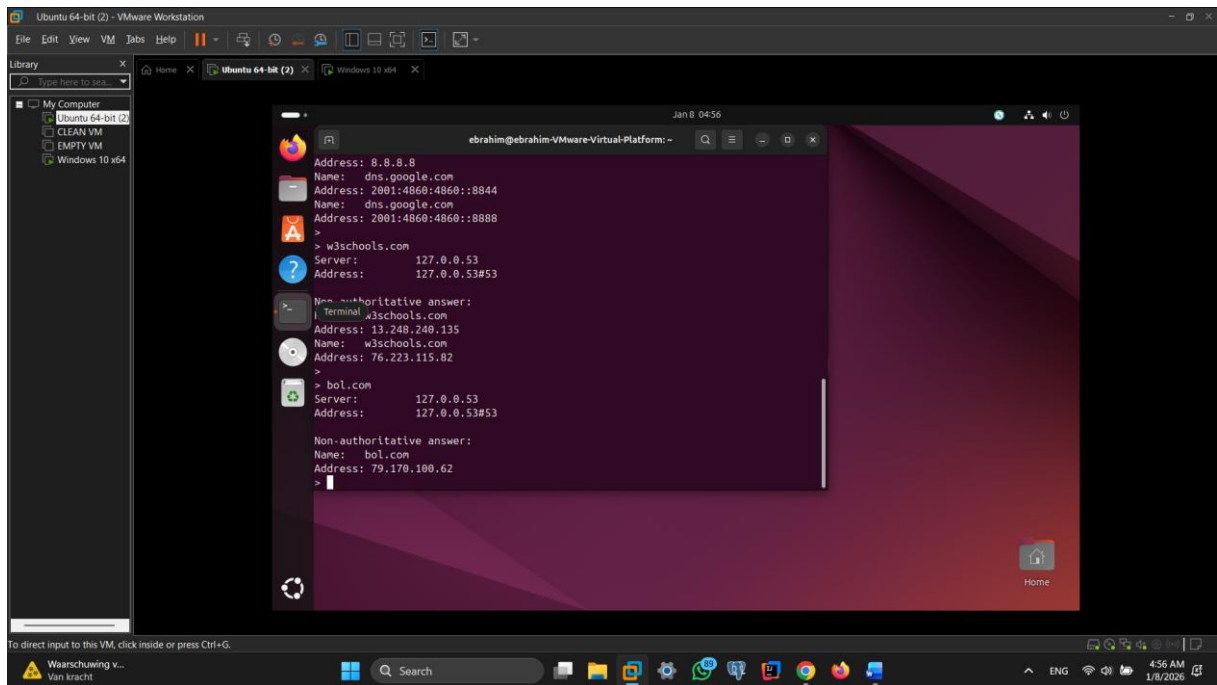




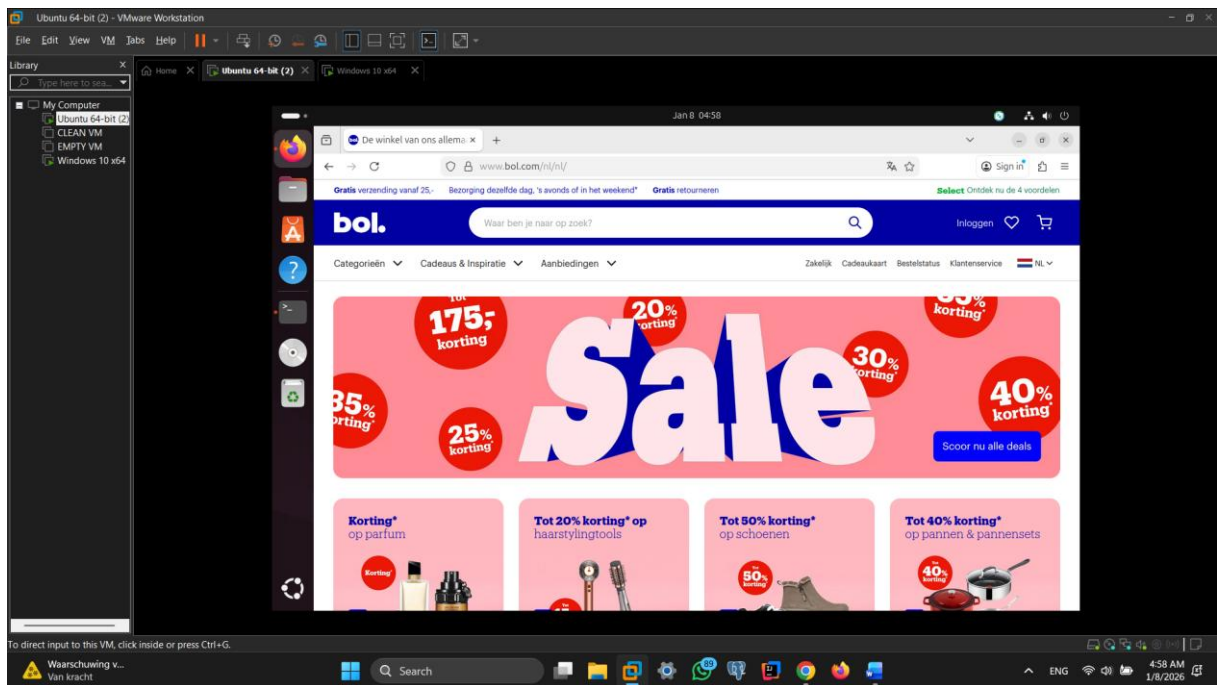
## Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:





Screenshot website visit via IP address:



### Assignment 6.3: subnetting

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

The network 192.168.110.128/25 uses 25 bits for the network and 7 bits for hosts.

This results in  $2^7 = 128$  total IP addresses.

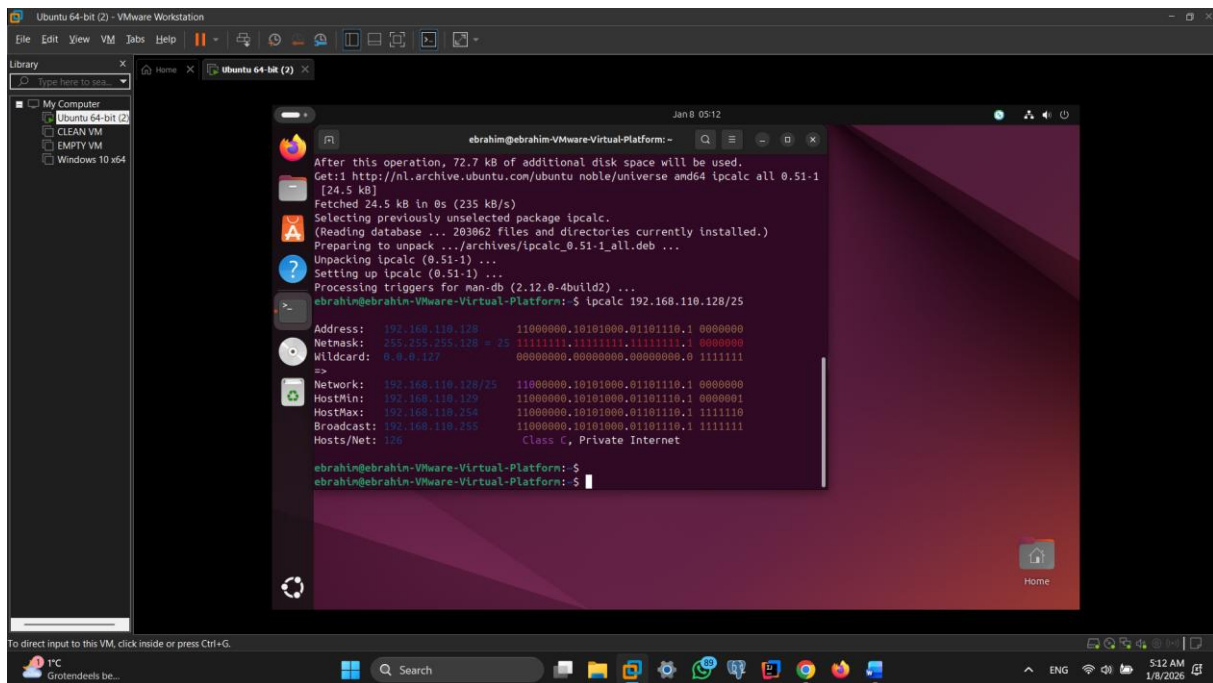
The first address is the network address and the last address is the broadcast address, so they cannot be assigned to hosts



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

the usable IP range is from 192.168.110.129 to 192.168.110.254, providing 126 usable host addresses.

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



```
ebrahim@ebrahim-Virtual-Platform: ~$ ipcalc 192.168.110.128/25
Address: 192.168.110.128 11000000.10101000.01101110.1 00000000
Netmask: 255.255.255.128 = 25 11111111.11111111.11111111.1 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 11111110
Broadcast: 192.168.110.255 11000000.10101000.01101110.1 11111111
Hosts/Net: 126 Class C, Private Internet

ebrahim@ebrahim-Virtual-Platform: ~$
```

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.

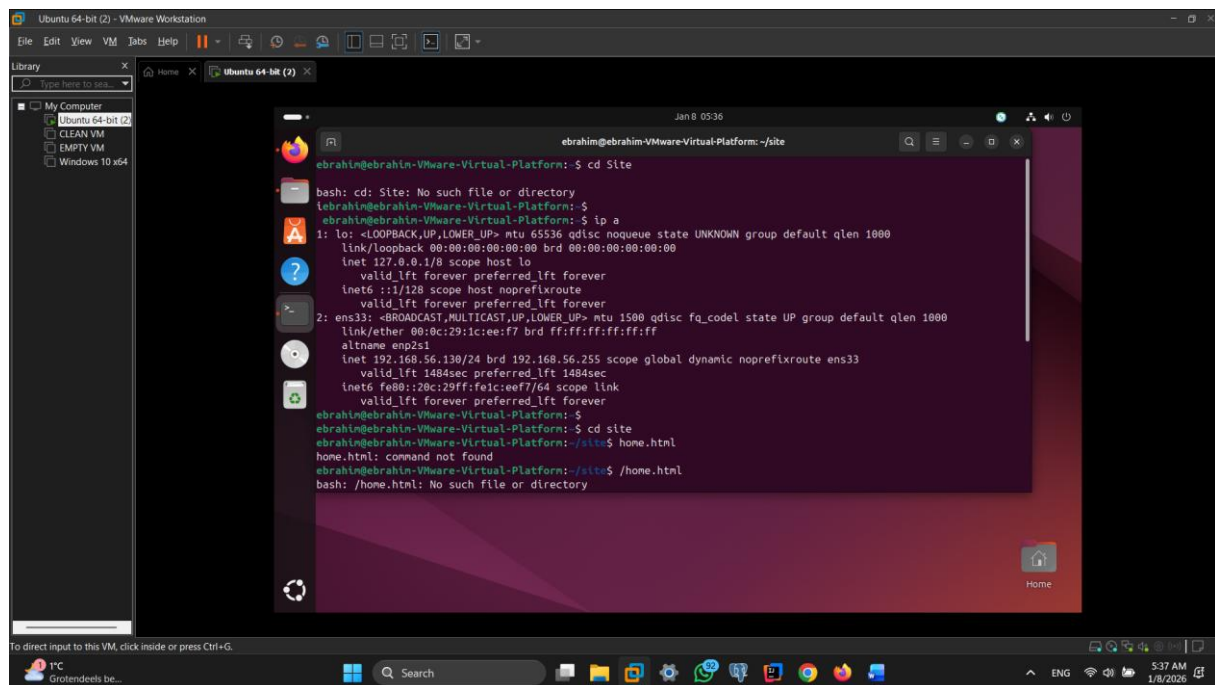
This leaves **126 usable IP addresses**, ranging from **192.168.110.129** to **192.168.110.254**.

The result was confirmed using the **ipcalc** command.

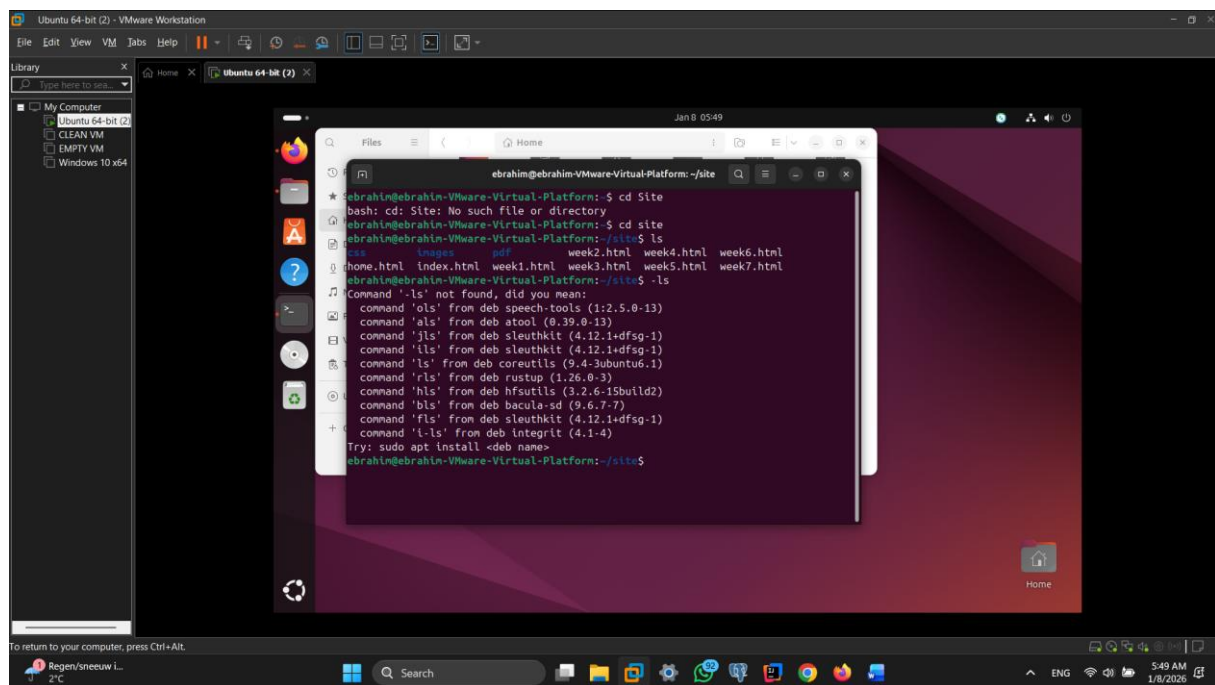
## Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

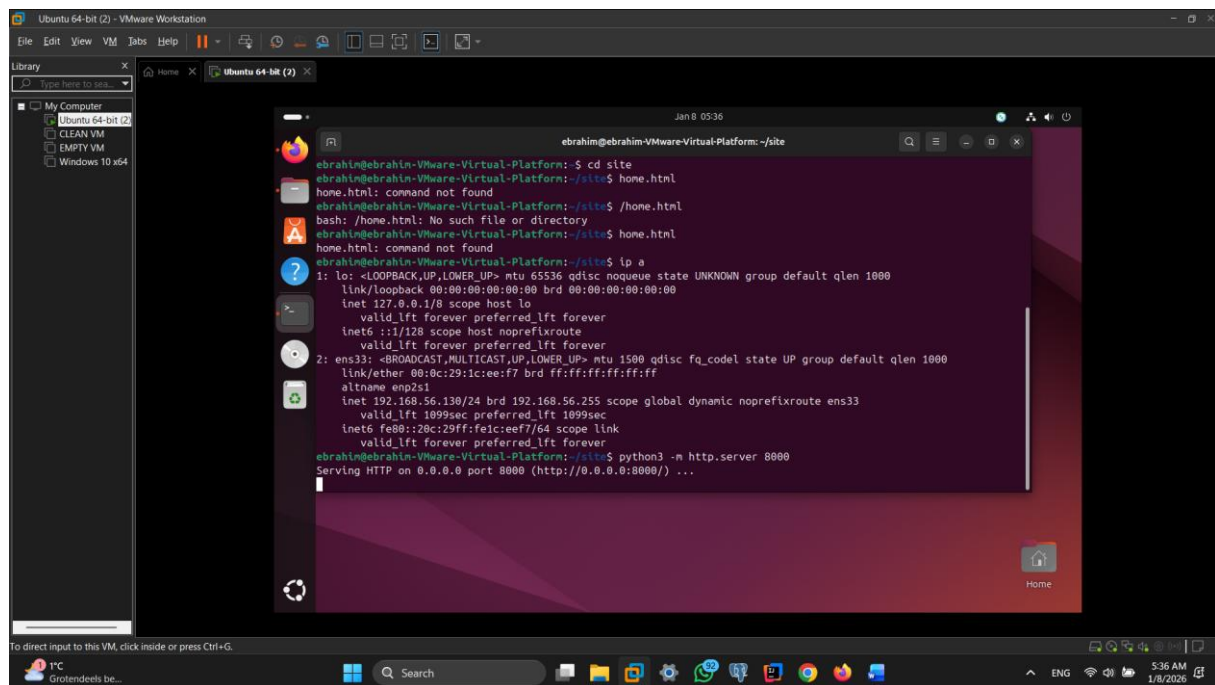




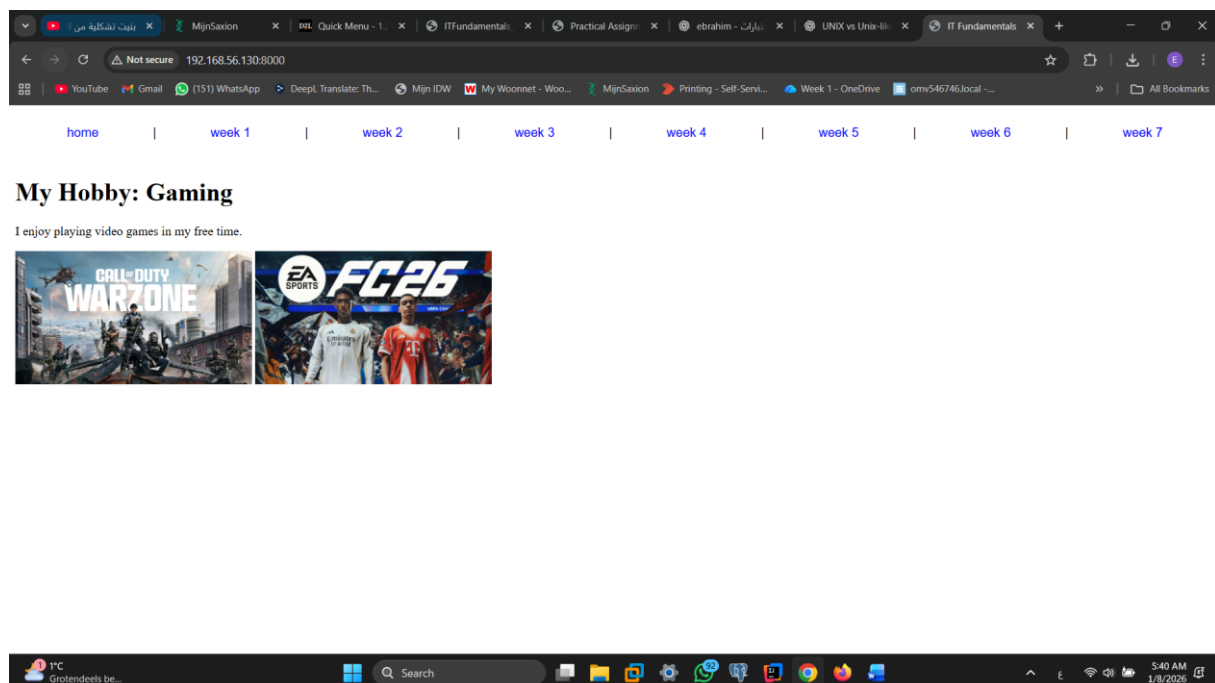
Screenshot of Site directory contents:



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";

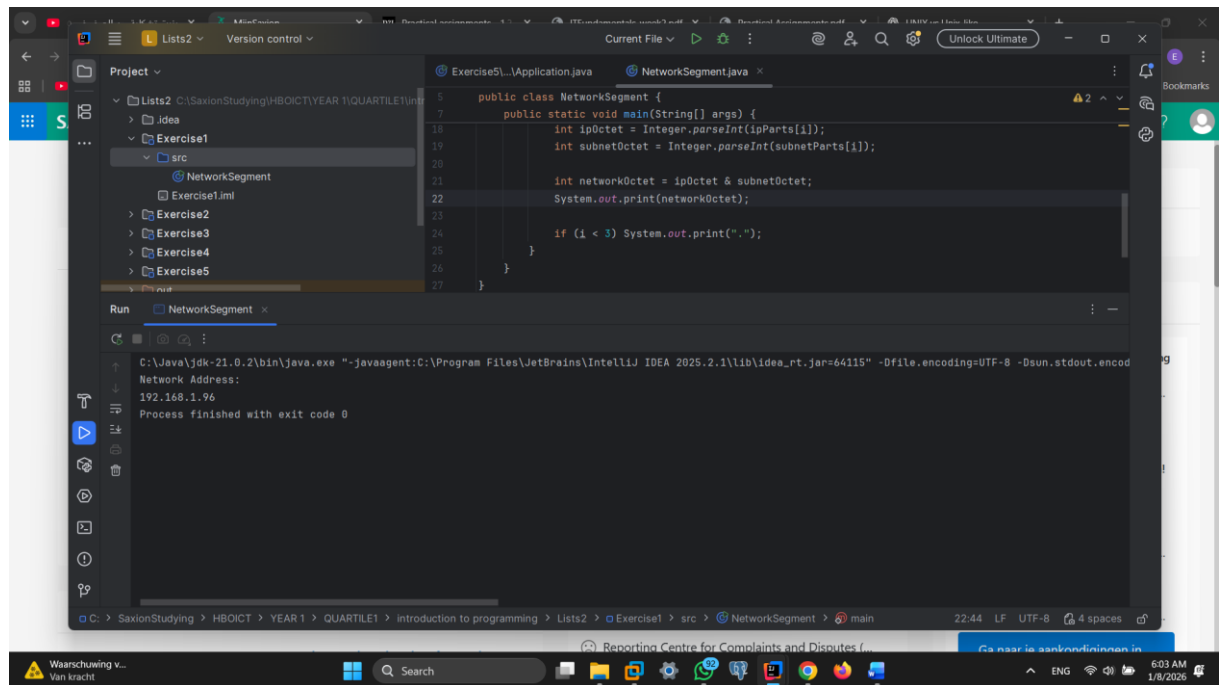
        String[] ipParts = ip.split("\\.");
        String[] subnetParts =
            subnet.split("\\.");

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

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

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

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



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