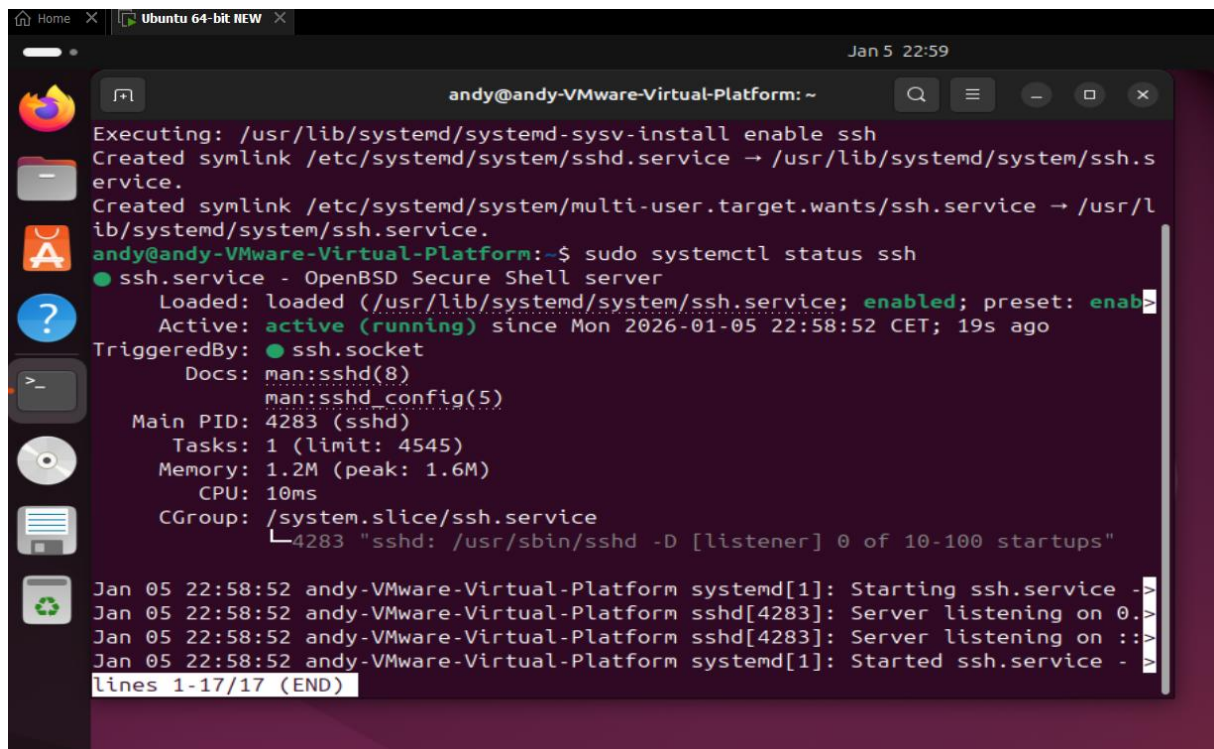


Template Week 6 – Networking

Student number:

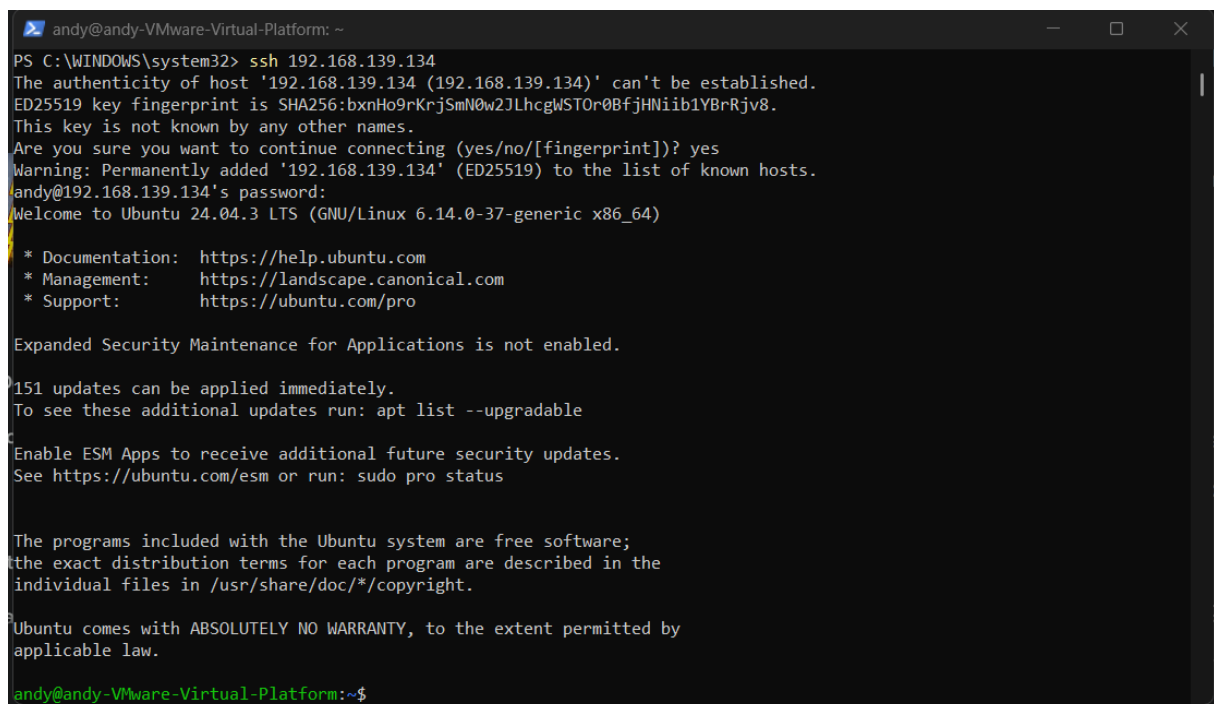
Assignment 6.1: Working from home

Screenshot installation openssh-server:



```
andy@andy-VMware-Virtual-Platform: ~  
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh  
Created symlink /etc/systemd/system/ssh.service → /usr/lib/systemd/system/ssh.s  
service.  
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /usr/l  
ib/systemd/system/ssh.service.  
andy@andy-VMware-Virtual-Platform:~$ sudo systemctl status ssh  
● ssh.service - OpenBSD Secure Shell server  
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: enab  
   Active: active (running) since Mon 2026-01-05 22:58:52 CET; 19s ago  
   TriggeredBy: ● ssh.socket  
     Docs: man:ssh(8)  
           man:ssh_config(5)  
    Main PID: 4283 (sshd)  
      Tasks: 1 (limit: 4545)  
     Memory: 1.2M (peak: 1.6M)  
        CPU: 10ms  
     CGroup: /system.slice/ssh.service  
            └─4283 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"  
  
Jan 05 22:58:52 andy-VMware-Virtual-Platform systemd[1]: Starting ssh.service ->  
Jan 05 22:58:52 andy-VMware-Virtual-Platform sshd[4283]: Server listening on 0.>  
Jan 05 22:58:52 andy-VMware-Virtual-Platform sshd[4283]: Server listening on ::>  
Jan 05 22:58:52 andy-VMware-Virtual-Platform systemd[1]: Started ssh.service ->  
lines 1-17/17 (END)
```

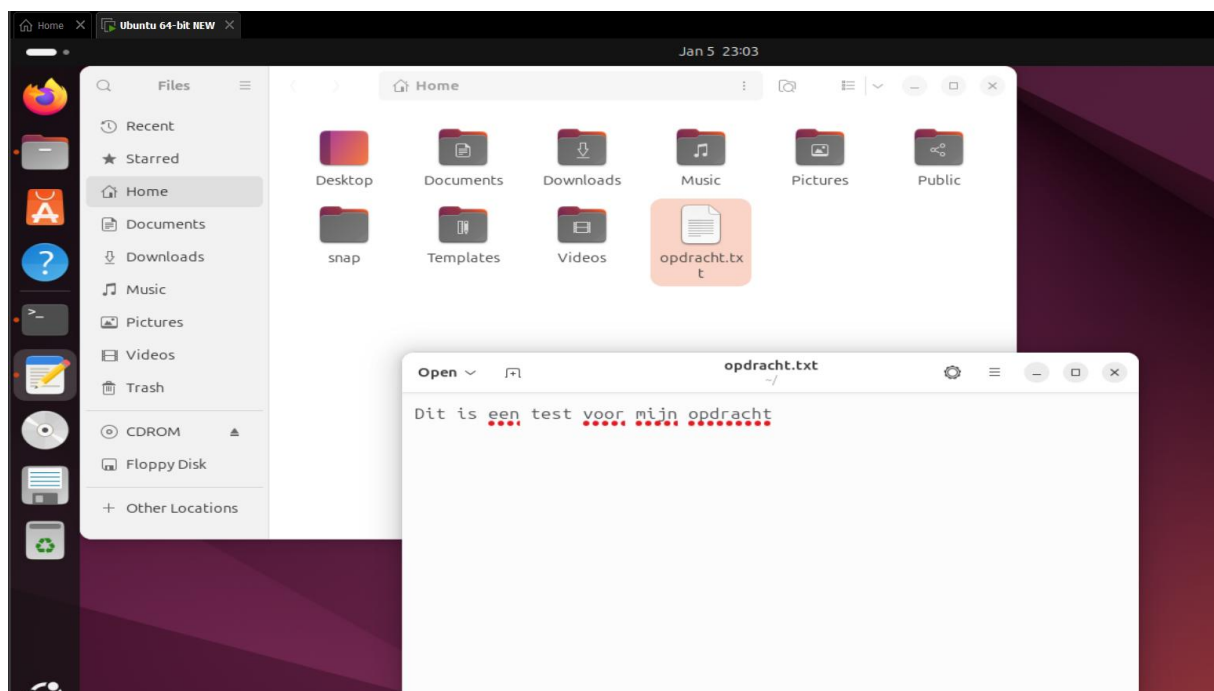
Screenshot successful SSH command execution:



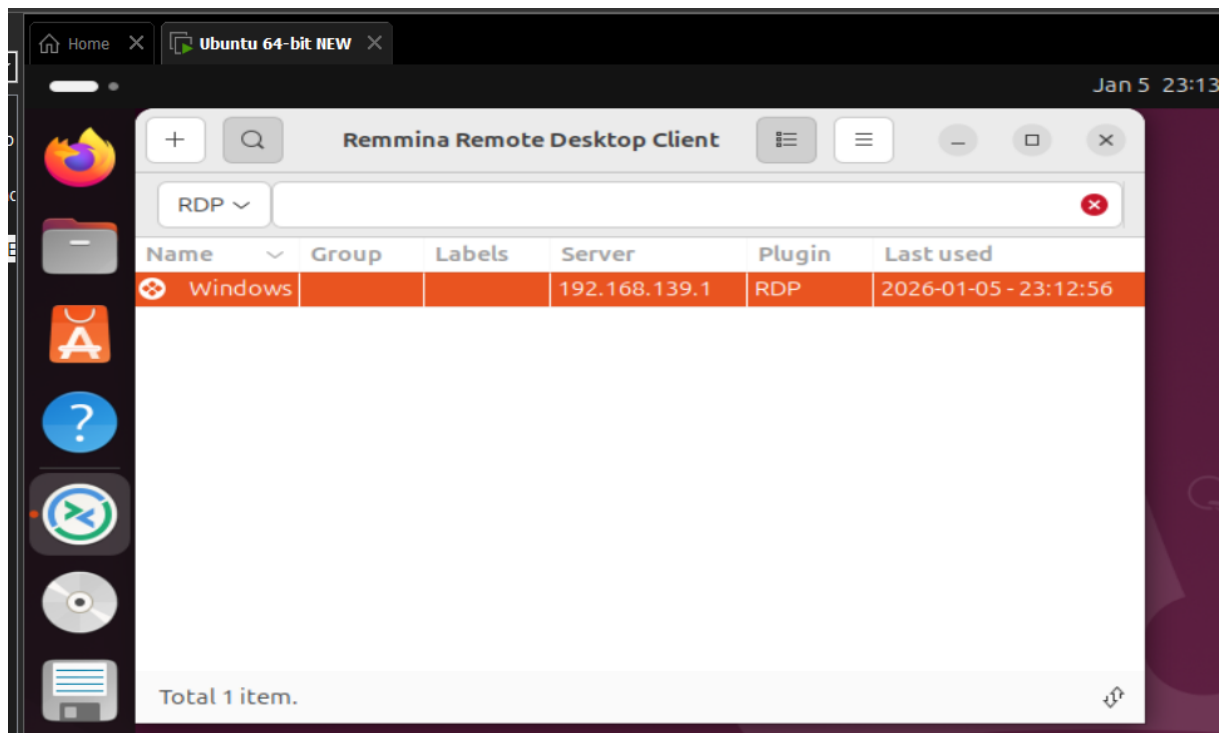
```
PS C:\WINDOWS\system32> ssh 192.168.139.134  
The authenticity of host '192.168.139.134 (192.168.139.134)' can't be established.  
ED25519 key fingerprint is SHA256:bxnHo9rKrjSmN0w2JLhcgWST0r0BfjHNIib1YBrRjv8.  
This key is not known by any other names.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '192.168.139.134' (ED25519) to the list of known hosts.  
andy@192.168.139.134'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.  
  
151 updates can be applied immediately.  
To see these additional updates run: apt list --upgradable  
  
Enable ESM Apps to receive additional future security updates.  
See https://ubuntu.com/esm or run: sudo pro status  
  
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.  
andy@andy-VMware-Virtual-Platform:~$
```

Screenshot successful execution SCP command:

```
andy@andy-VMware-Virtual-Platform: ~  
Microsoft Windows [Version 10.0.26200.7462]  
(c) Microsoft Corporation. Alle rechten voorbehouden.  
  
C:\Windows\System32>ssh 192.168.139.134  
andy@192.168.139.134'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.  
  
151 updates can be applied immediately.  
To see these additional updates run: apt list --upgradable  
  
Enable ESM Apps to receive additional future security updates.  
See https://ubuntu.com/esm or run: sudo pro status  
  
Last login: Mon Jan  5 23:01:38 2026 from 192.168.139.1  
andy@andy-VMware-Virtual-Platform:~$ echo Dit is een test voor mijn opdracht > opdracht.txt  
scp opdracht.txt andy@192.168.139.134:~/  
The authenticity of host '192.168.139.134 (192.168.139.134)' can't be established.  
ED25519 key fingerprint is SHA256:bxnHo9rKrjSmN0w2JLhcgWSTOr0BfjHNIib1YBrRjv8.  
This key is not known by any other names.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '192.168.139.134' (ED25519) to the list of known hosts.  
andy@192.168.139.134's password:  
opdracht.txt                                100% 35   72.5KB/s   00:00  
andy@andy-VMware-Virtual-Platform:~$
```



Screenshot remmina:



Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

```

andy@andy-VMware-Virtual-Platform: ~
Setting up libtclcl1:amd64 (1.20-10) ...
Setting up ns2 (2.35+dfsg-5build2) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
andy@andy-VMware-Virtual-Platform:~$ nslookup amazon.com
Server:          127.0.0.53
Address:         127.0.0.53#53

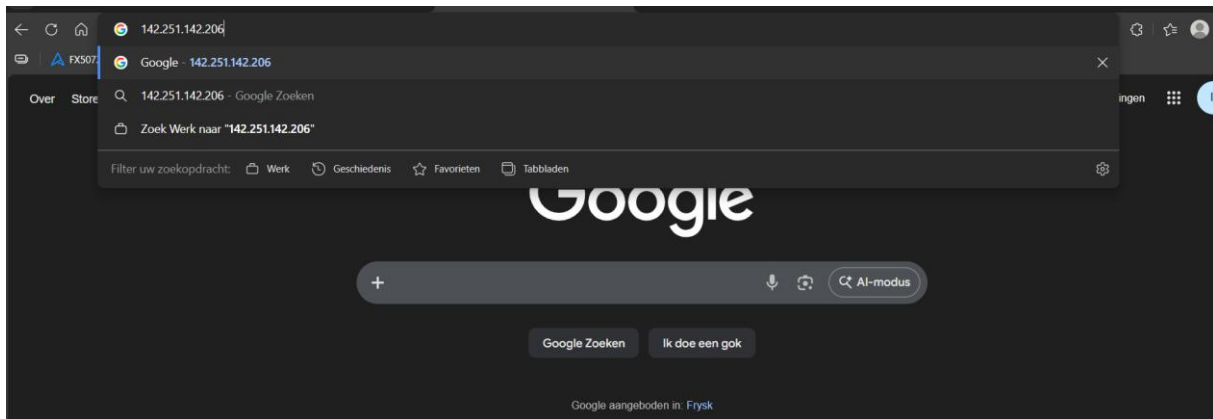
Non-authoritative answer:
Name:   amazon.com
Address: 98.87.170.71
Name:   amazon.com
Address: 98.87.170.74
Name:   amazon.com
Address: 98.82.161.185

andy@andy-VMware-Virtual-Platform:~$ nslookup google.com
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.251.142.206
Name:   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?

128

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

126

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

```
andy@andy-VMware-Virtual-Platform:~$ ipcalc 192.168.110.128/25
Address:    192.168.110.128      110000000.10101000.01101110.1 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  110000000.10101000.01101110.1 00000000
HostMin:    192.168.110.129     110000000.10101000.01101110.1 00000001
HostMax:    192.168.110.254     110000000.10101000.01101110.1 11111110
Broadcast:  192.168.110.255     110000000.10101000.01101110.1 11111111
Hosts/Net:  126                  Class C, Private Internet
```

Explain the above calculation in your own words.

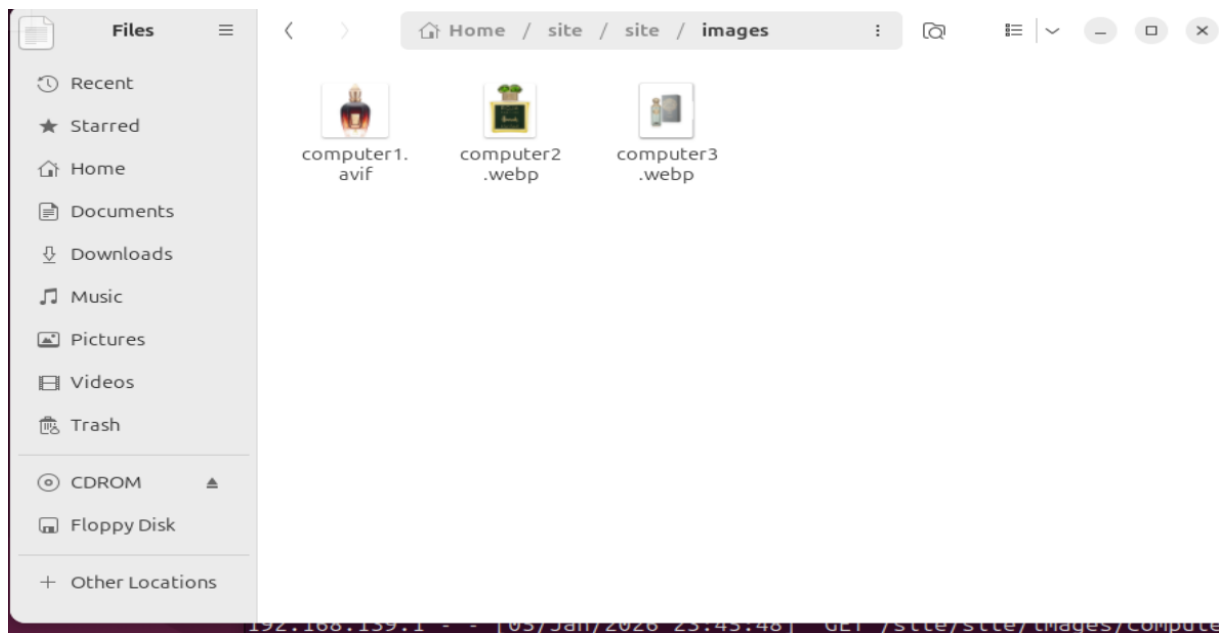
Subnet van 25, dus 32 (want zoveel bits bestaat een ipv4 adres uit) dus $32 - 25 = 7$, dus $2^7 = 128$ totaal adressen, maar de eerste en laatste zijn niet bruikbaar dus -2 dus 126

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

```
andy@andy-VMware-Virtual-Platform: ~  
andy@andy-VMware-Virtual-Platform:~$ ip a  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default  
    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  
    inet6 ::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 00:0c:29:65:8f:95 brd ff:ff:ff:ff:ff:ff  
    altname enp2s1  
    inet 192.168.139.134/24 brd 192.168.139.255 scope global dynamic noprefixroute ens33  
        valid_lft 948sec preferred_lft 948sec  
    inet6 fe80::20c:29ff:fe65:8f95/64 scope link  
        valid_lft forever preferred_lft forever  
andy@andy-VMware-Virtual-Platform:~$
```

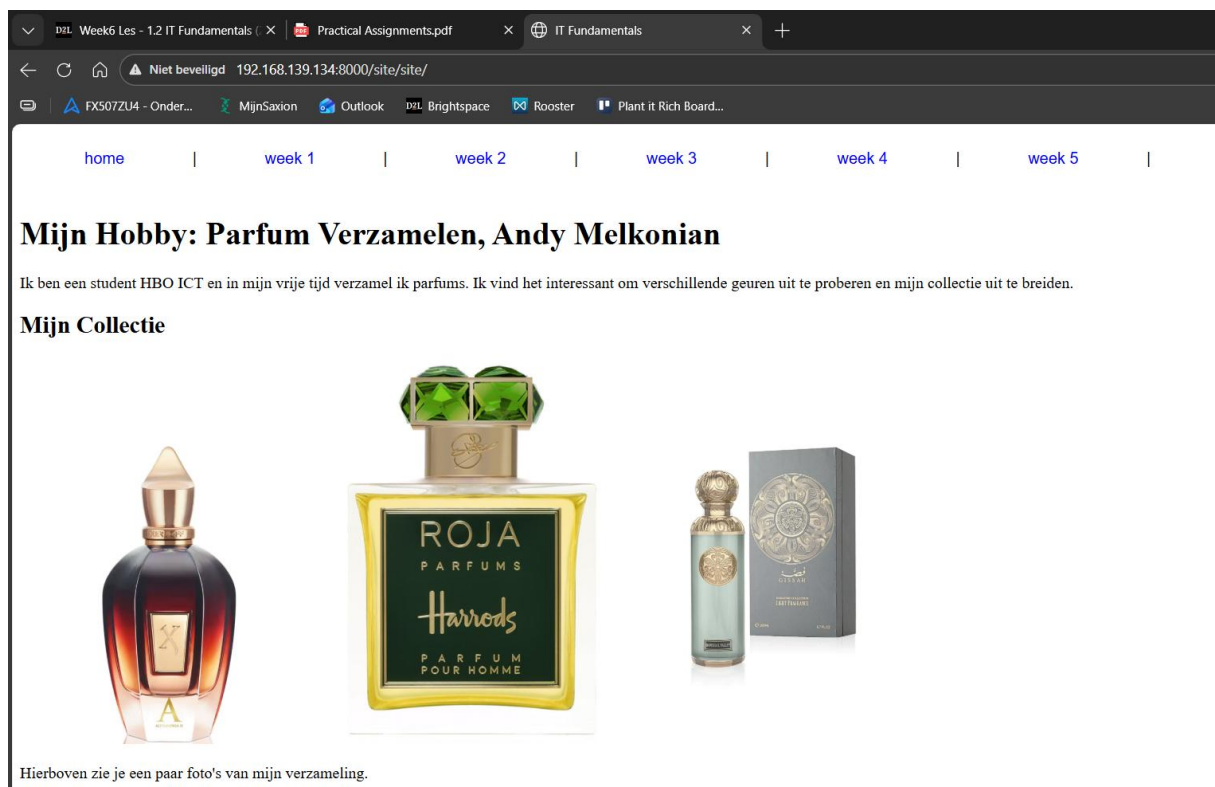
Screenshot of Site directory contents:



Screenshot python3 webserver command:


```
andy@andy-VMware-Virtual-Platform: ~  
andy@andy-VMware-Virtual-Platform:~$ python3 -m http.server 8000  
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...  
192.168.139.1 - - [05/Jan/2026 23:45:25] "GET / HTTP/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:25] code 404, message File not found  
192.168.139.1 - - [05/Jan/2026 23:45:25] "GET /favicon.ico HTTP/1.1" 404 -  
192.168.139.1 - - [05/Jan/2026 23:45:34] "GET /site/ HTTP/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:35] "GET /site/site/ HTTP/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:35] "GET /site/site/home.html HTTP/1.1" 200  
-  
192.168.139.1 - - [05/Jan/2026 23:45:35] "GET /site/site/css/mypdfstyle.css HTTP  
/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:35] "GET /site/site/images/computer1.avif H  
TTP/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:35] "GET /site/site/images/computer2.webp H  
TTP/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:35] "GET /site/site/images/computer3.webp H  
TTP/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:48] "GET /site/site/ HTTP/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:48] "GET /site/site/home.html HTTP/1.1" 200  
-  
192.168.139.1 - - [05/Jan/2026 23:45:48] "GET /site/site/css/mypdfstyle.css HTTP  
/1.1" 200 -  
192.168.139.1 - - [05/Jan/2026 23:45:48] "GET /site/site/images/computer1.avif H
```

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 Main {

    public static void main(String[] args) {

        String ipInput = "192.168.1.100";
        String maskInput = "255.255.255.224";

        String[] ipParts = ipInput.split("\\.");
        String[] maskParts = maskInput.split("\\.");

        String binaryIP = "";
        String binaryMask = "";
        String binaryNet = "";
        String decimalNet = "";

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

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

```

int netOctet = ipOctet & maskOctet;

binaryIP += getBinary(ipOctet);
binaryMask += getBinary(maskOctet);
binaryNet += getBinary(netOctet);

decimalNet += netOctet;

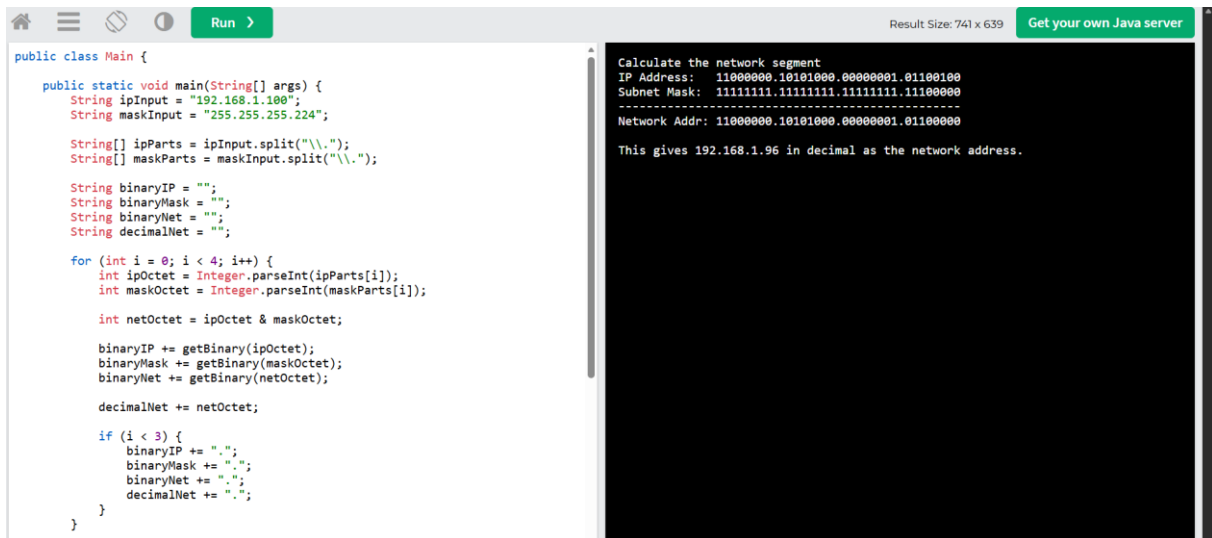
if (i < 3) {
    binaryIP += ".";
    binaryMask += ".";
    binaryNet += ".";
    decimalNet += ".";
}
}

System.out.println("Calculate the network segment");
System.out.println("IP Address: " + binaryIP);
System.out.println("Subnet Mask: " + binaryMask);
System.out.println("-----");
System.out.println("Network Addr: " + binaryNet);
System.out.println("\nThis gives " + decimalNet + " in decimal as the network address.");
}

public static String getBinary(int n) {
    String b = Integer.toBinaryString(n);
    while (b.length() < 8) {
        b = "0" + b;
    }
    return b;
}

```


}



```
public class Main {  
    public static void main(String[] args) {  
        String ipInput = "192.168.1.100";  
        String maskInput = "255.255.255.224";  
  
        String[] ipParts = ipInput.split("\\.");  
        String[] maskParts = maskInput.split("\\.");  
  
        String binaryIP = "";  
        String binaryMask = "";  
        String binaryNet = "";  
        String decimalNet = "";  
  
        for (int i = 0; i < 4; i++) {  
            int ipOctet = Integer.parseInt(ipParts[i]);  
            int maskOctet = Integer.parseInt(maskParts[i]);  
  
            int netOctet = ipOctet & maskOctet;  
  
            binaryIP += getBinary(ipOctet);  
            binaryMask += getBinary(maskOctet);  
            binaryNet += getBinary(netOctet);  
  
            decimalNet += netOctet;  
  
            if (i < 3) {  
                binaryIP += ".";  
                binaryMask += ".";  
                binaryNet += ".";  
                decimalNet += ".";  
            }  
        }  
    }  
}
```

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.

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