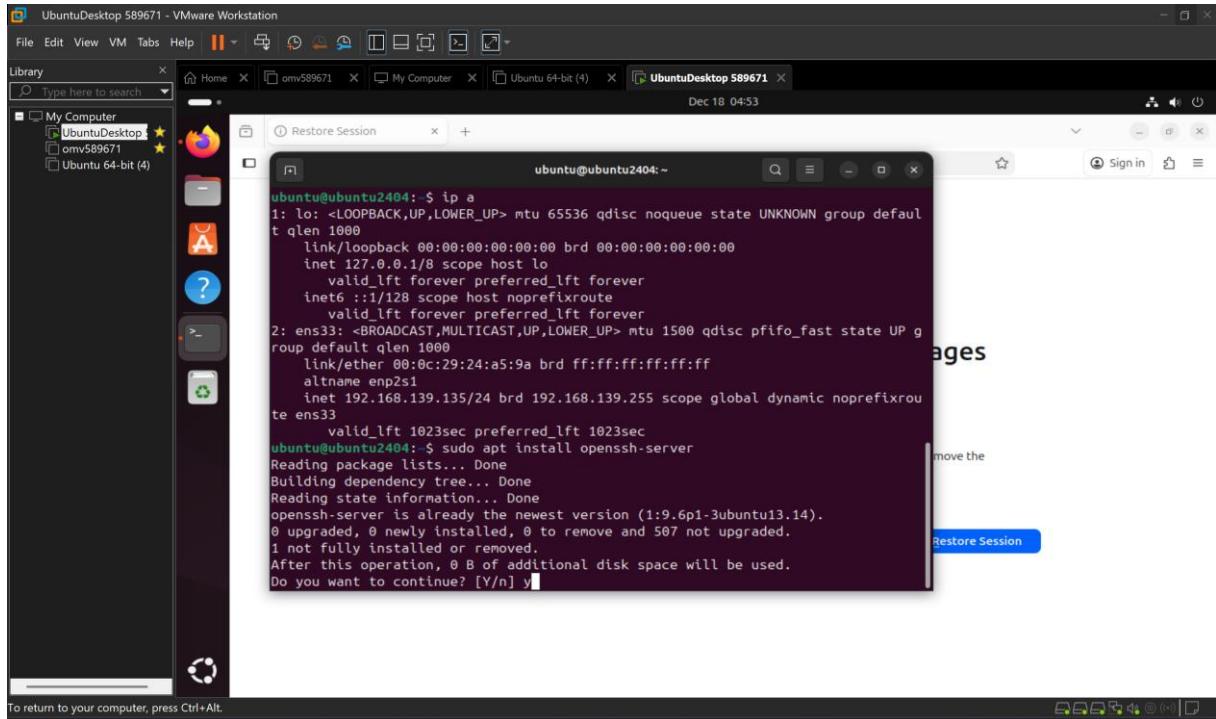


# Template Week 6 – Networking

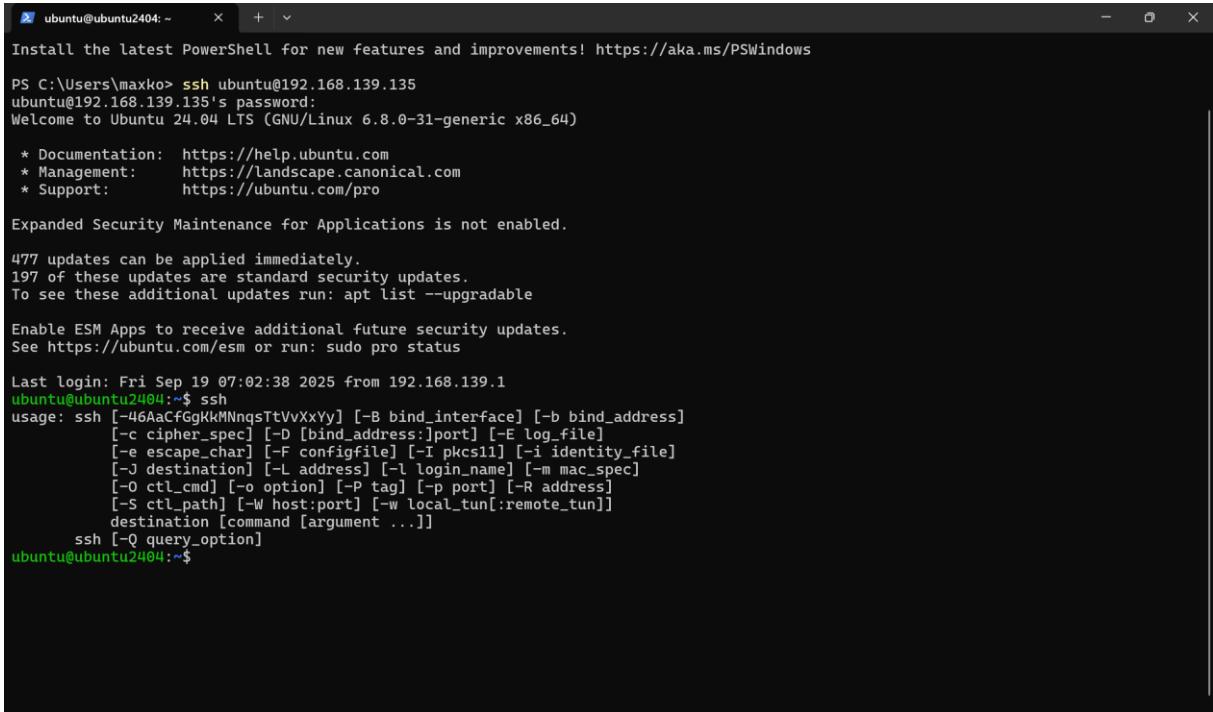
Student number: 589671

## Assignment 6.1: Working from home

Screenshot installation openssh-server:



Screenshot successful SSH command execution:



```
ubuntu@ubuntu2404:~ x + v
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\maxko> ssh ubuntu@192.168.139.135
ubuntu@192.168.139.135's password:
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-31-generic x86_64)

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

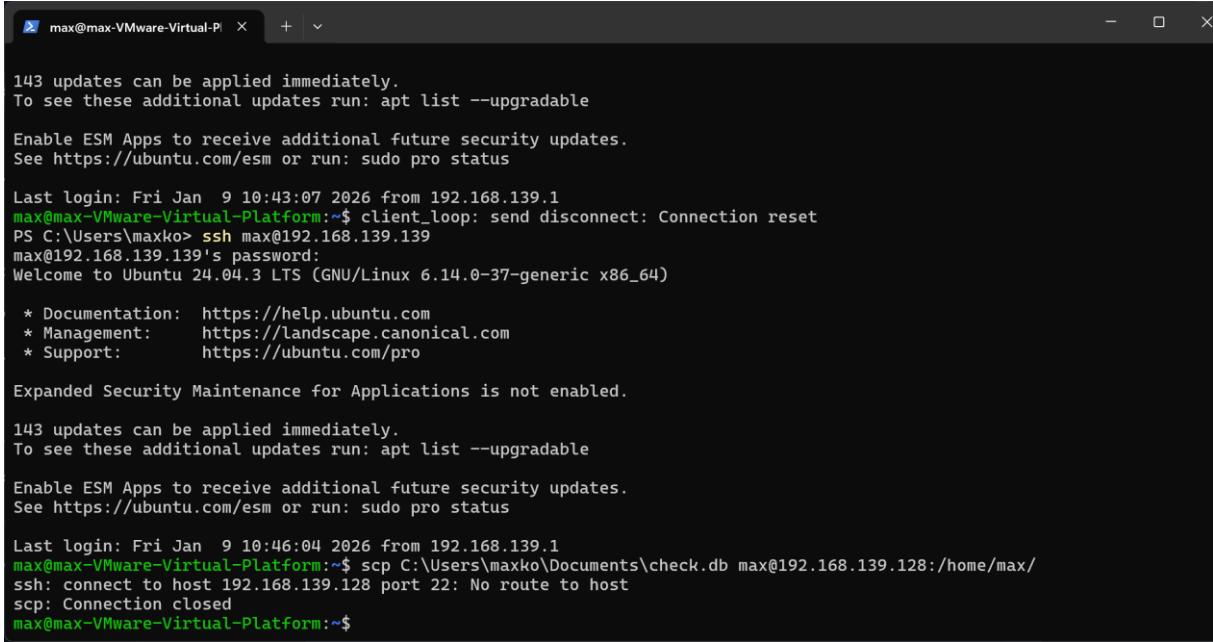
Expanded Security Maintenance for Applications is not enabled.

477 updates can be applied immediately.
197 of these updates are standard security updates.
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: Fri Sep 19 07:02:38 2025 from 192.168.139.1
ubuntu@ubuntu2404:~$ ssh
usage: ssh [-46AaCfGgKkMNnqSttVvXXy] [-B bind_interface] [-b bind_address]
           [-c cipher_spec] [-D [bind_address:]port] [-E log_file]
           [-e escape_char] [-F configfile] [-I pkcs11] [-i identity_file]
           [-J destination] [-L address] [-l login_name] [-m mac_spec]
           [-O ctl_cmd] [-o option] [-P tag] [-p port] [-R address]
           [-S ctl_path] [-W host:port] [-w local_tun[:remote_tun]]
           destination [command [argument ...]]
           ssh [-Q query_option]
ubuntu@ubuntu2404:~$
```

Screenshot successful execution SCP command:



```
max@max-VMware-Virtual-Platform:~ x + v
143 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: Fri Jan  9 10:43:07 2026 from 192.168.139.1
max@max-VMware-Virtual-Platform:~$ client_loop: send disconnect: Connection reset
PS C:\Users\maxko> ssh max@192.168.139.139
max@192.168.139.139'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

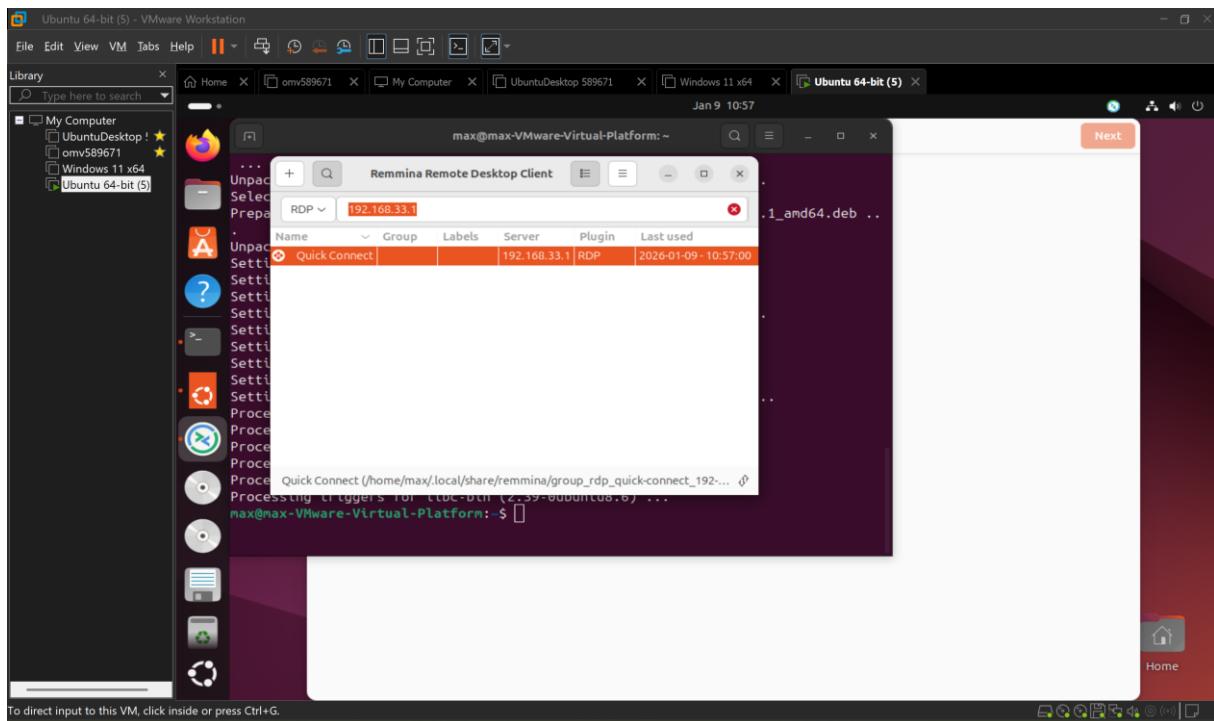
Expanded Security Maintenance for Applications is not enabled.

143 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: Fri Jan  9 10:46:04 2026 from 192.168.139.1
max@max-VMware-Virtual-Platform:~$ scp C:\Users\maxko\Documents\check.db max@192.168.139.128:/home/max/
ssh: connect to host 192.168.139.128 port 22: No route to host
scp: Connection closed
max@max-VMware-Virtual-Platform:~$
```

Screenshot remmina:



## Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

```
Wireless LAN adapter Wi-Fi:
Connection-specific DNS Suffix . : 
IPv6 Address . . . . . : 2a02:a451:c388:ff00::1002
IPv6 Address . . . . . : fd4f:b77e:c404:c6a0:68d0:da00:f68e:e2b8
Temporary IPv6 Address . . . . . : fd4f:b77e:c404:c6a0:751d:4418:9214:498c
Link-local IPv6 Address . . . . . : fe80::21e0:2a2f:40c8:4ebf%21
IPv4 Address . . . . . : 192.168.68.108
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : fe80::da0d:17ff:fecc:81c6%21
192.168.68.1

Ethernet adapter Bluetooth Network Connection:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

C:\Users\maxko>nslookup amazon.com
Server:  mijnmodem.kpn
Address:  2a02:a451:c388:0:d676:ea09:fe09:7b25

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

C:\Users\maxko>
```

```
Command Prompt + - X
Default Gateway . . . . . : fe80::da0d:17ff:fecb:81c6%21
192.168.68.1

Ethernet adapter Bluetooth Network Connection:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

C:\Users\maxko>nslookup amazon.com
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

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

C:\Users\maxko>nslookup google.com
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: google.com
Addresses: 2a00:1450:400e:803::200e
           142.251.142.206

C:\Users\maxko>
```

```
Command Prompt + - X
Non-authoritative answer:
Name: amazon.com
Addresses: 98.87.170.74
           98.87.170.71
           98.82.161.185

C:\Users\maxko>nslookup google.com
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: google.com
Addresses: 2a00:1450:400e:803::200e
           142.251.142.206

C:\Users\maxko>nslookup one.one.one.one
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: one.one.one.one
Addresses: 2606:4700:4700::1001
           2606:4700:4700::1111
           1.1.1.1
           1.0.0.1

C:\Users\maxko>
```

```
Command Prompt

C:\Users\maxko>nslookup one.one.one.one
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: one.one.one.one
Addresses: 2606:4700:4700::1001
           2606:4700:4700::1111
           1.1.1.1
           1.0.0.1

C:\Users\maxko>dns.google.com
'dns.google.com' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\maxko>nslookup dns.google.com
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: dns.google.com
Addresses: 2001:4860:4860::8888
           2001:4860:4860::8844
           8.8.8.8
           8.8.4.4

C:\Users\maxko>
```

```
Command Prompt

C:\Users\maxko>nslookup HPSE.nl
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: HPSE.nl
Address: 198.202.211.1

C:\Users\maxko>nslookup kotteman.nl
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: kotteman.nl
Addresses: 2a01:238:20a:202:1160::
           81.169.145.160

C:\Users\maxko>
C:\Users\maxko>nslookup Bol.com
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: Bol.com
Address: 79.170.100.62

C:\Users\maxko>
```

```
Command Prompt + - X
81.169.145.160

C:\Users\maxko>
C:\Users\maxko>nslookup Bol.com
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: Bol.com
Address: 79.170.100.62

C:\Users\maxko>nslookup w3schools.com
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

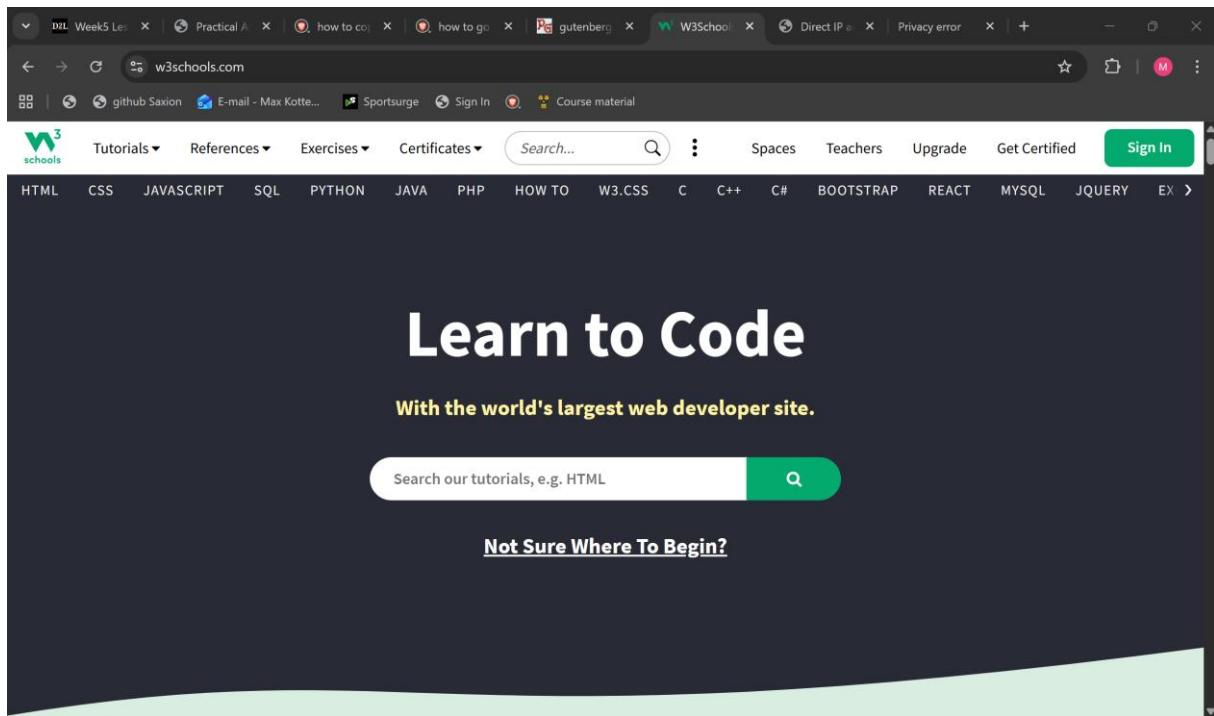
*** mijnmodem.kpn can't find w3schools.com: Non-existent domain

C:\Users\maxko>nslookup w3schools.com
Server: mijnmodem.kpn
Address: 2a02:a451:c388:0:d676:eaff:fe09:7b25

Non-authoritative answer:
Name: w3schools.com
Addresses: 13.248.240.135
76.223.115.82

C:\Users\maxko>
```

Screenshot website visit via IP address:



### Assignment 6.3: subnetting

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

$32 - 25 = 7\text{bits}$

25 bits voor network

2 tot de macht 7 = 128

Dus er zitten 128 ip adressen in dit subnet

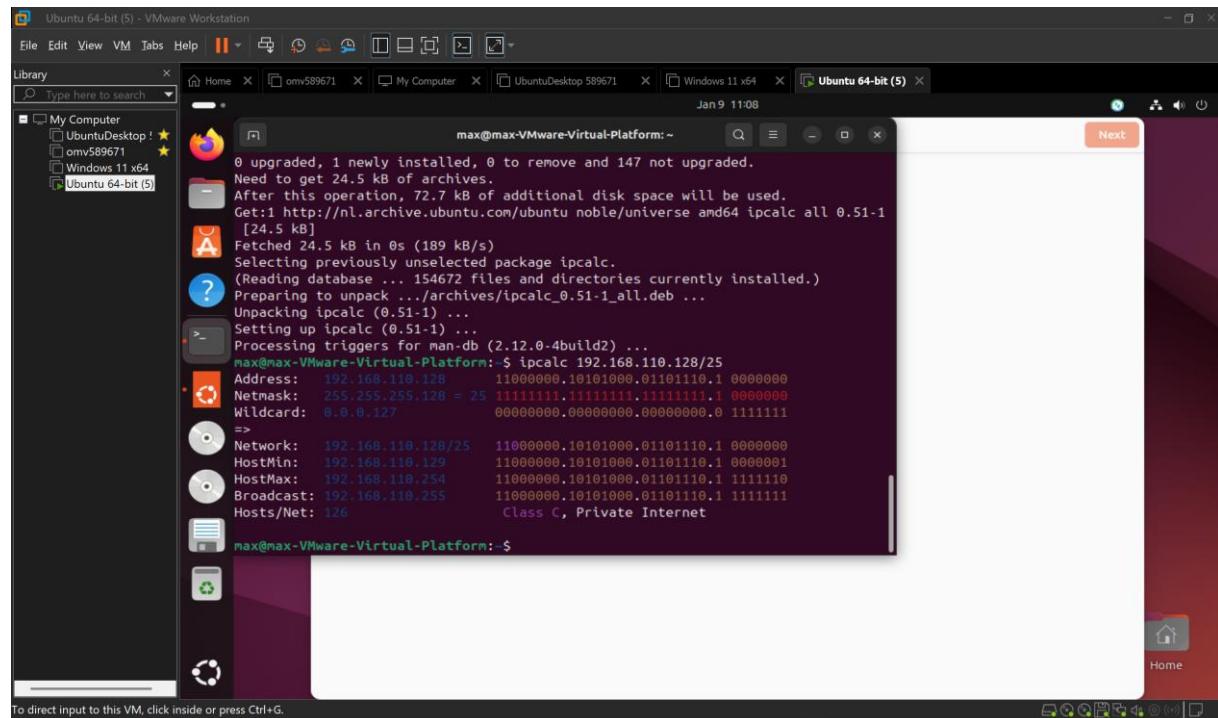
What is the usable IP range to hand out to the connected computers?

Eerste address is voor netwerk

Laatste adres broadcast adres

Dus van 192.168.110.129 tot 192.168.110.254

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



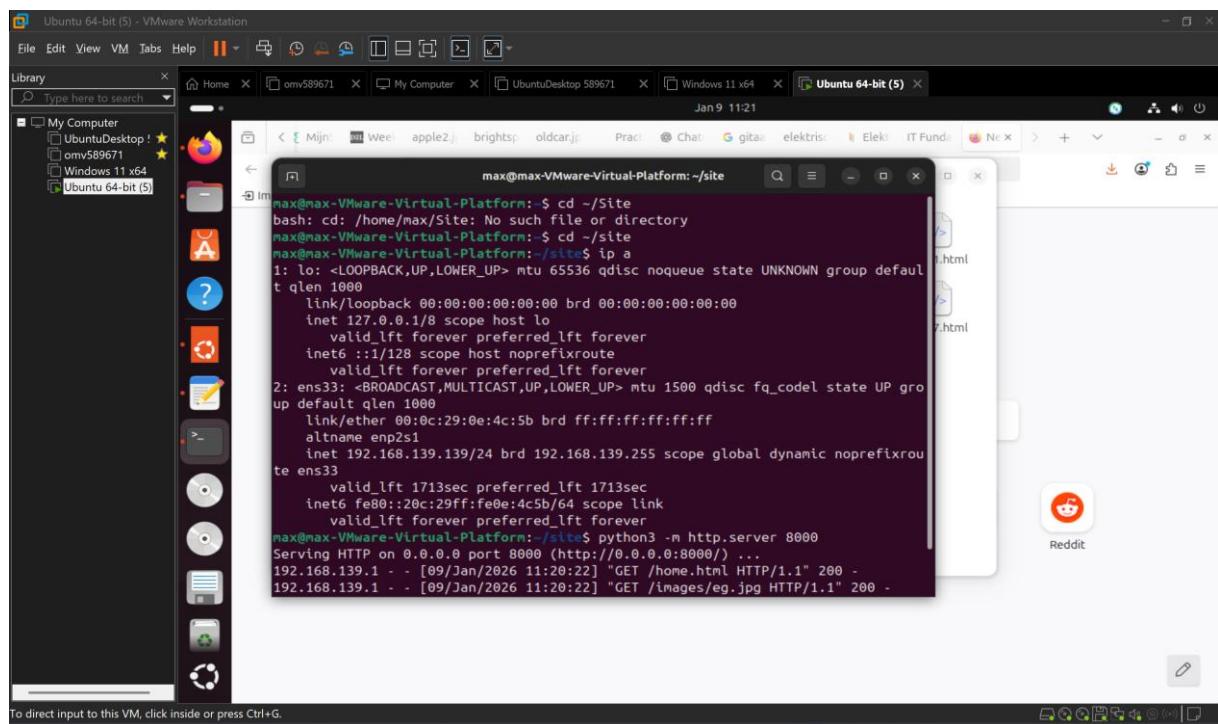
```
max@max-VMware-Virtual-Platform:~$ ipcalc 192.168.110.128/25
Address: 192.168.110.128      11000000.10101000.01101110.1 0000000
Netmask: 255.255.255.128 = 25 11111111.11111111.11111111.1 0000000
Wildcard: 0.0.0.127          00000000.00000000.00000000.0 1111111
=>
Network: 192.168.110.128/25 11000000.10101000.01101110.1 0000000
HostMin: 192.168.110.129    11000000.10101000.01101110.1 0000001
HostMax: 192.168.110.254    11000000.10101000.01101110.1 1111110
Broadcast: 192.168.110.255   11000000.10101000.01101110.1 1111111
Hosts/Net: 126               Class C, Private Internet
```

Explain the above calculation in your own words.

De /25-notatie betekent dat 25 bits voor het netwerk zijn gereserveerd en dat er 7 bits overblijven voor hosts. Met 7 hostbits zijn er  $2^7=128$  mogelijke adressen, waarvan het eerste het netwerkadres is en het laatste het broadcastadres. De adressen tussen deze twee vormen het bruikbare bereik voor computers in het netwerk.

#### Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

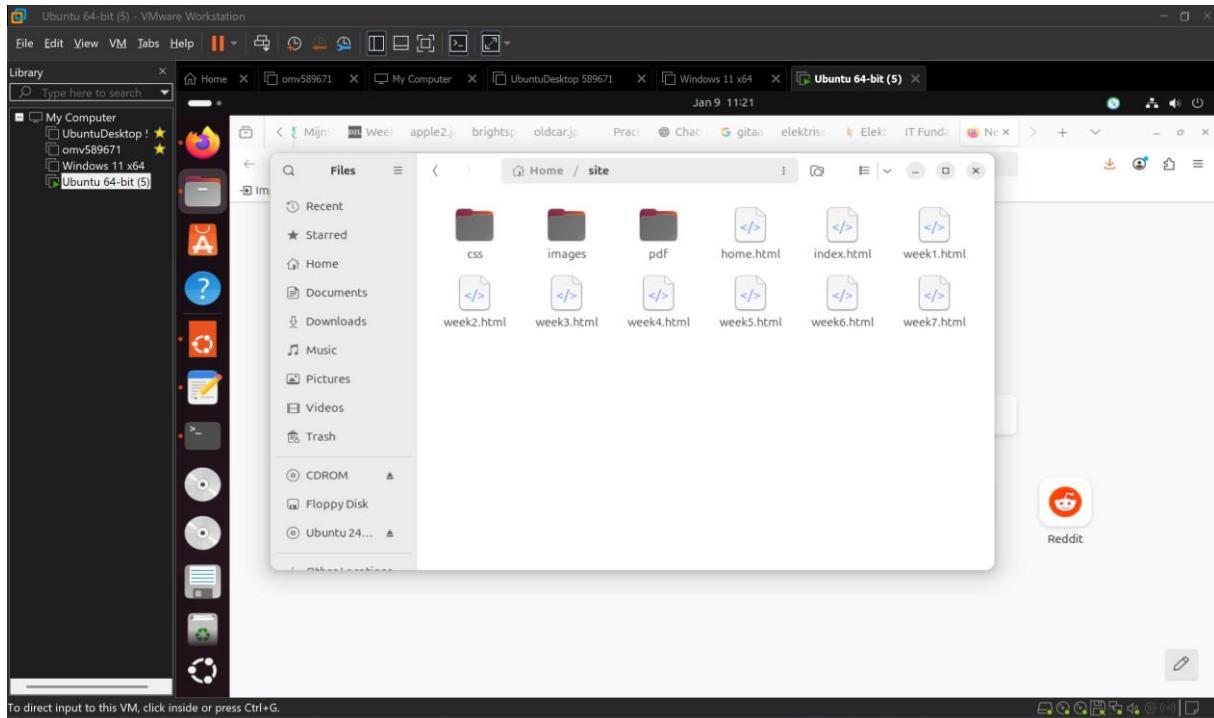


The screenshot shows a VMware Workstation window with an Ubuntu 64-bit (5) VM running. The terminal window displays the following command-line session:

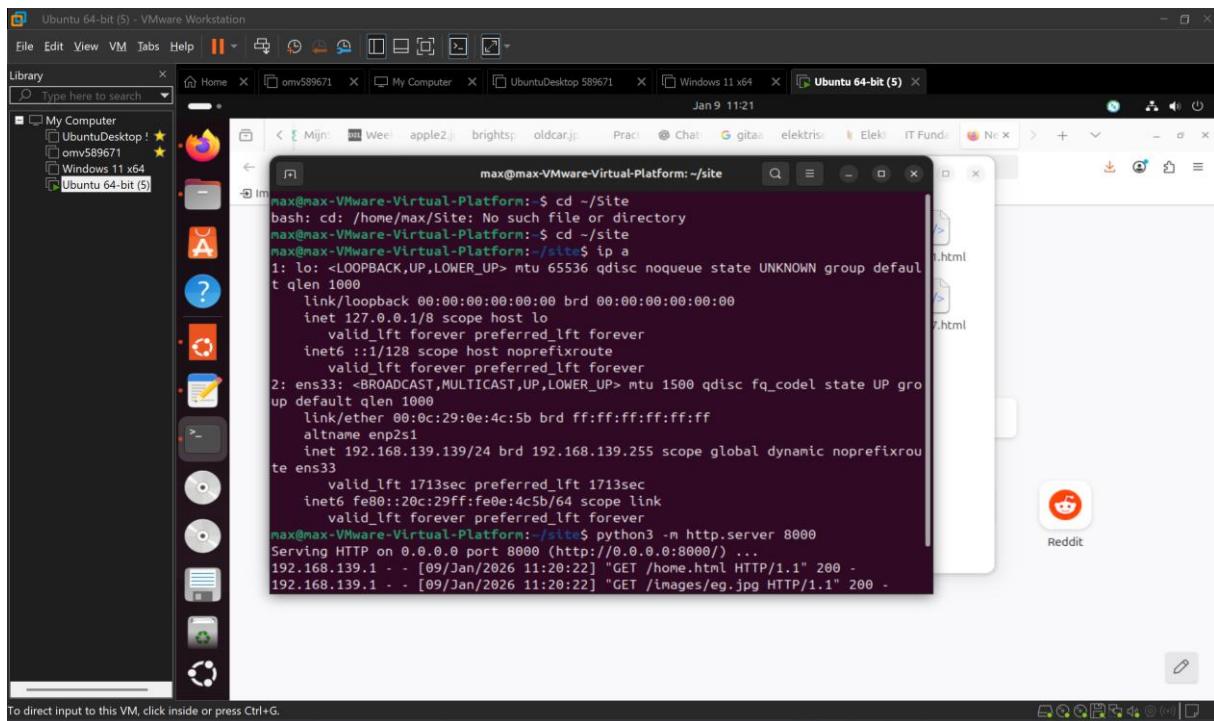
```
max@max-VMware-Virtual-Platform:~$ cd ~/Site
bash: cd: /home/max/Site: No such file or directory
max@max-VMware-Virtual-Platform:~$ cd -/site
max@max-VMware-Virtual-Platform:~/site$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 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
            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:c2:90:0e:4c:5b brd ff:ff:ff:ff:ff:ff
        altname enp2s1
        inet 192.168.139.139/24 brd 192.168.139.255 scope global dynamic noprefixroute ens33
            valid_lft 1713sec preferred_lft 1713sec
            inet6 fe80::20c:29ff:fe0e:4c5b/64 scope link
                valid_lft forever preferred_lft forever
max@max-VMware-Virtual-Platform:~/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.139.1 - - [09/Jan/2026 11:20:22] "GET /home.html HTTP/1.1" 200 -
192.168.139.1 - - [09/Jan/2026 11:20:22] "GET /images/eg.jpg HTTP/1.1" 200 -
```

The file browser window shows two files: `1.html` and `7.html`. A Reddit icon is visible in the desktop dock.

Screenshot of Site directory contents:



Screenshot python3 webserver command:



Screenshot web browser visits your site

A screenshot of a web browser window. The title bar shows multiple tabs, one of which is 'Not secure 192.168.139.139:8000/home.html'. The main content area has a heading 'Gitaar Spelen'. Below it, there is some text: 'ik speel al 15 jaar' and 'Ik speelde vroeger ook in een band'. A large image of a black electric guitar with two humbucker pickups is displayed.

### 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

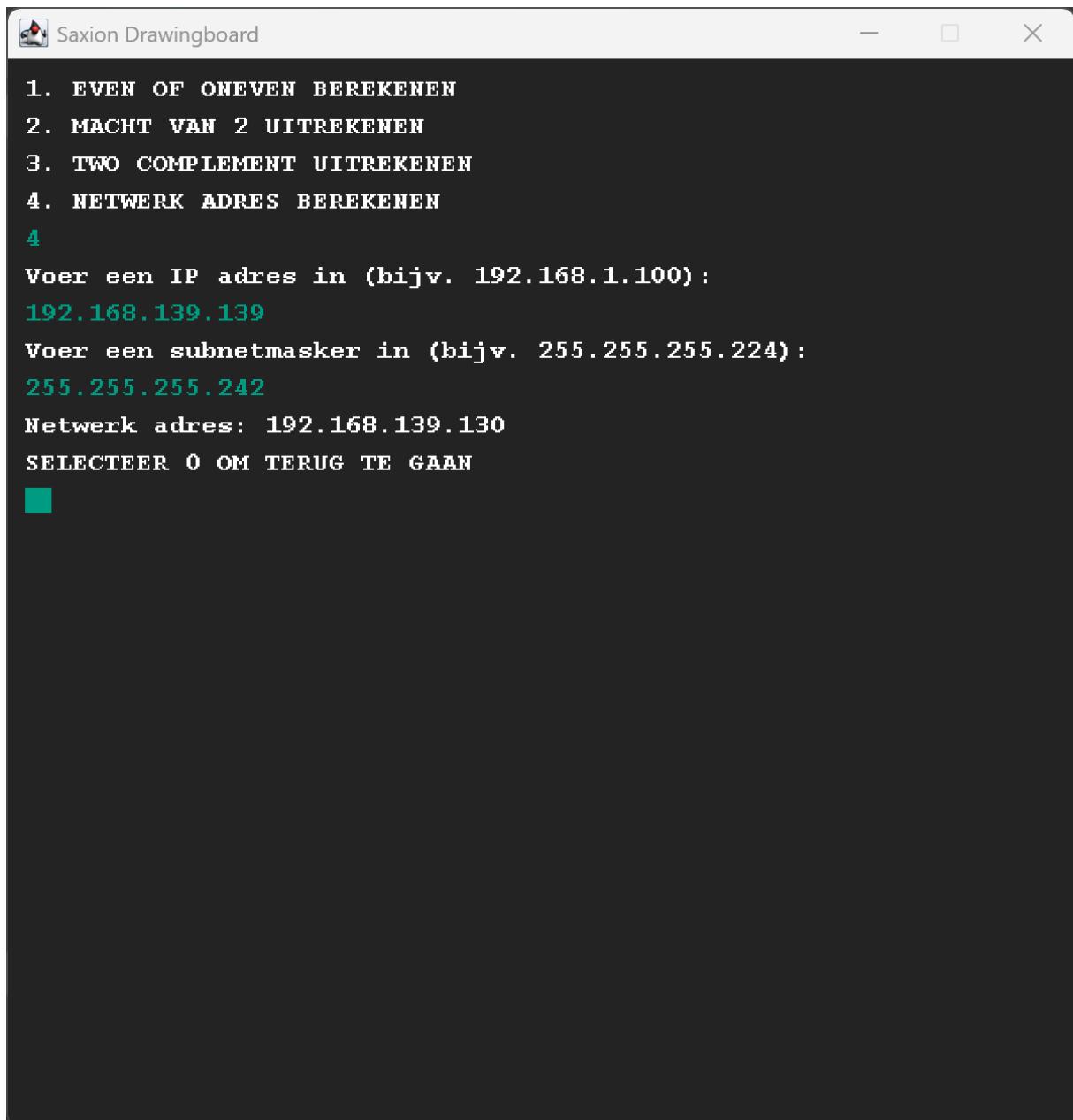
-----  
Network Addr: 11000000.10101000.00000001.01100000

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.



```
import nl.saxion.app.CsvReader;
import nl.saxion.app.SaxionApp;
import nl.saxion.app.SaxionAppSettings;

import java.awt.*;
import java.util.ArrayList;
import java.util.Random;

public class Application implements Runnable {

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

```

SaxionApp.start(new Application());
}

public void run() {
    boolean blijfgaan = true;
    while (blijfgaan) {
        int gekozenSelectie = printmenu();
        String gekozenSelectieString = String.valueOf(gekozenSelectie);
        switch (gekozenSelectieString) {
            case "1":
                option1();
                break;
            case "2":
                option2();
                break;
            case "3":
                option3();
                break;
            case "4":
                option4();
                break;
        }
        SaxionApp.printLine("SELECTEER 0 OM TERUG TE GAAN");
        int teruggaan = SaxionApp.readInt();
        if (teruggaan != 0) {
            blijfgaan = false;
        }
    }
    SaxionApp.print("SYSTEEM BEEINDIGD");
}

public int printmenu(){
    SaxionApp.printLine("1. EVEN OF ONEVEN BEREKENEN");
    SaxionApp.printLine("2. MACHT VAN 2 UITREKENEN");
    SaxionApp.printLine("3. TWO COMPLEMENT UITREKENEN");
    SaxionApp.printLine("4. NETWERK ADRES BEREKENEN");
    int selection = SaxionApp.readInt();
    return selection;
}

public void option1(){
    SaxionApp.printLine("KIES EEN GETAL: ");
    int gekozennummer = SaxionApp.readInt();

    if ((gekozennummer & 1) == 0) {
        SaxionApp.printLine("HET NUMMER IS EVEN");
    } else {
        SaxionApp.printLine("HET NUMMER IS ONEVEN");
    }
}

```

```

}

public void option2(){
    SaxionApp.printLine("KIES EEN GETAL: ");
    int gekozennummer = SaxionApp.readInt();

    if ((gekozennummer & (gekozennummer - 1)) == 0 && gekozennummer > 0) {
        SaxionApp.printLine("DIT IS EEN MACHT VAN 2");
    } else {
        SaxionApp.printLine ("DIT IS GEEN MACHT VAN 2");
    }
}

public void option3(){
    SaxionApp.print("KIES EEN GETAL: ");
    int gekozennummer = SaxionApp.readInt();

    int negatief = ~gekozennummer + 1;

    int positief = ~negatief + 1;

    SaxionApp.printLine("Origineel: " + gekozennummer);
    SaxionApp.printLine("Negatief: " + negatief);
    SaxionApp.printLine("Positief: " + positief);
}

public void option4() {
    SaxionApp.printLine("Voer een IP adres in (bijv. 192.168.1.100): ");
    String ip = SaxionApp.readString();

    SaxionApp.printLine("Voer een subnetmasker in (bijv. 255.255.255.224): ");
    String mask = SaxionApp.readString();

    int[] ipParts = parse(ip);
    int[] maskParts = parse(mask);

    int[] network = new int[4];

    for (int i = 0; i < 4; i++) {
        network[i] = ipParts[i] & maskParts[i];
    }

    SaxionApp.printLine("Netwerk adres: " +
        network[0] + "." + network[1] + "." + network[2] + "." + network[3]);
}

private int[] parse(String s) {
    String[] parts = s.split("\\.");
    int[] nums = new int[4];
    for (int i = 0; i < 4; i++) {
        nums[i] = Integer.parseInt(parts[i]);
    }
}

```

```
    }  
    return nums;  
}  
  
}
```

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