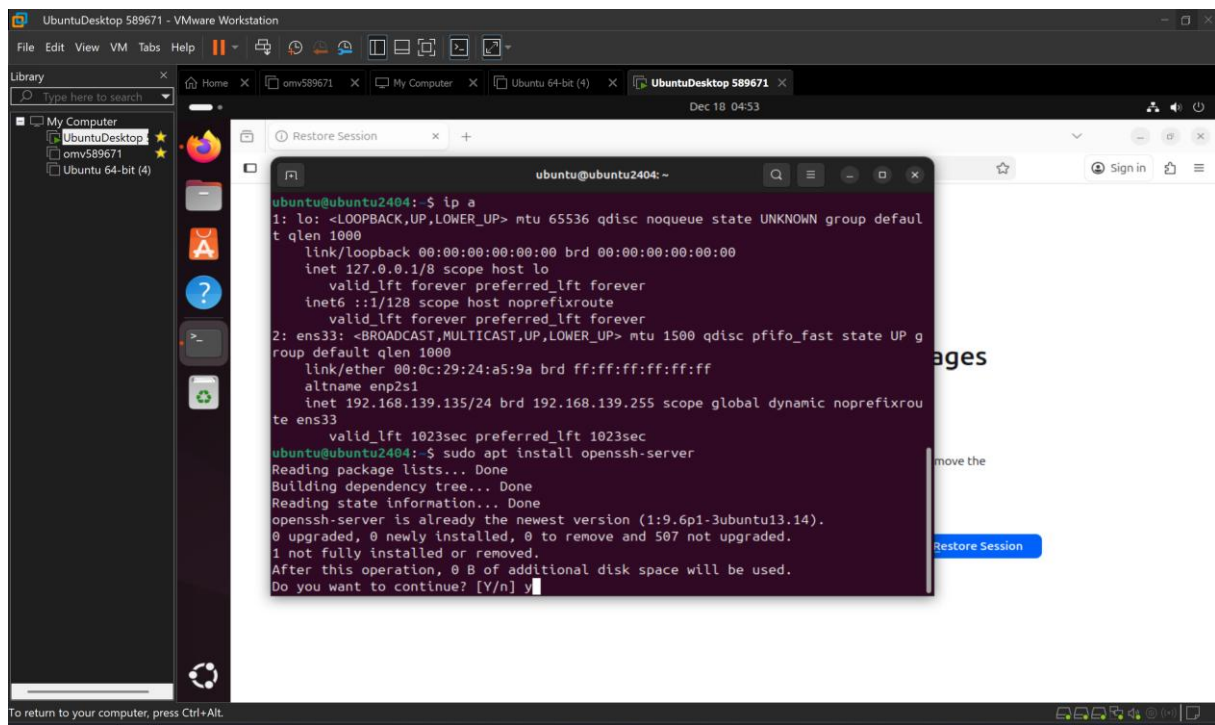


Template Week 6 – Networking

Student number: 589671

Assignment 6.1: Working from home

Screenshot installation openssh-server:



```
ubuntu@ubuntu2404: ~  
ubuntu@ubuntu2404:~$ 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 pfifo_fast state UP g  
    link/ether 00:0c:29:24:a5:9a brd ff:ff:ff:ff:ff:ff  
    altname enp2s1  
    inet 192.168.139.135/24 brd 192.168.139.255 scope global dynamic noprefixrou  
te ens33  
    valid_lft 1023sec preferred_lft 1023sec  
ubuntu@ubuntu2404:~$ sudo apt install openssh-server  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
openssh-server is already the newest version (1:9.6p1-3ubuntu13.14).  
0 upgraded, 0 newly installed, 0 to remove and 507 not upgraded.  
1 not fully installed or removed.  
After this operation, 0 B of additional disk space will be used.  
Do you want to continue? [Y/n] y
```

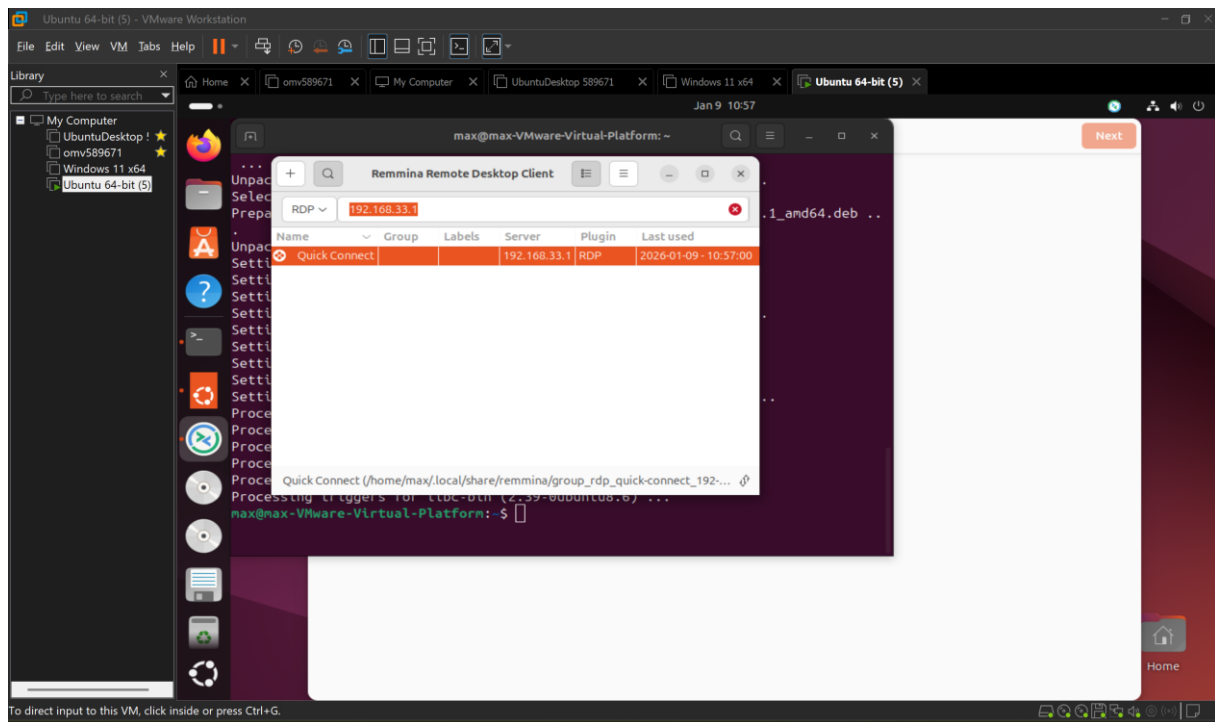
Screenshot successful SSH command execution:

```
ubuntu@ubuntu2404: ~  
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 [-46AaCfGgKkMNnqsTtVvXxYy] [-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-Pl: ~  
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:

```

Command Prompt

Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix  . : 
IPv6 Address. . . . . : 2a02:a451:c388:ff00::1002
IPv6 Address. . . . . : fd4f:b77e:c404:c6a0:68d6: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:feeb: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>

```

```
Command Prompt
Default Gateway . . . . . : fe80::da0d:17ff:feeb: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

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>
```

```
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

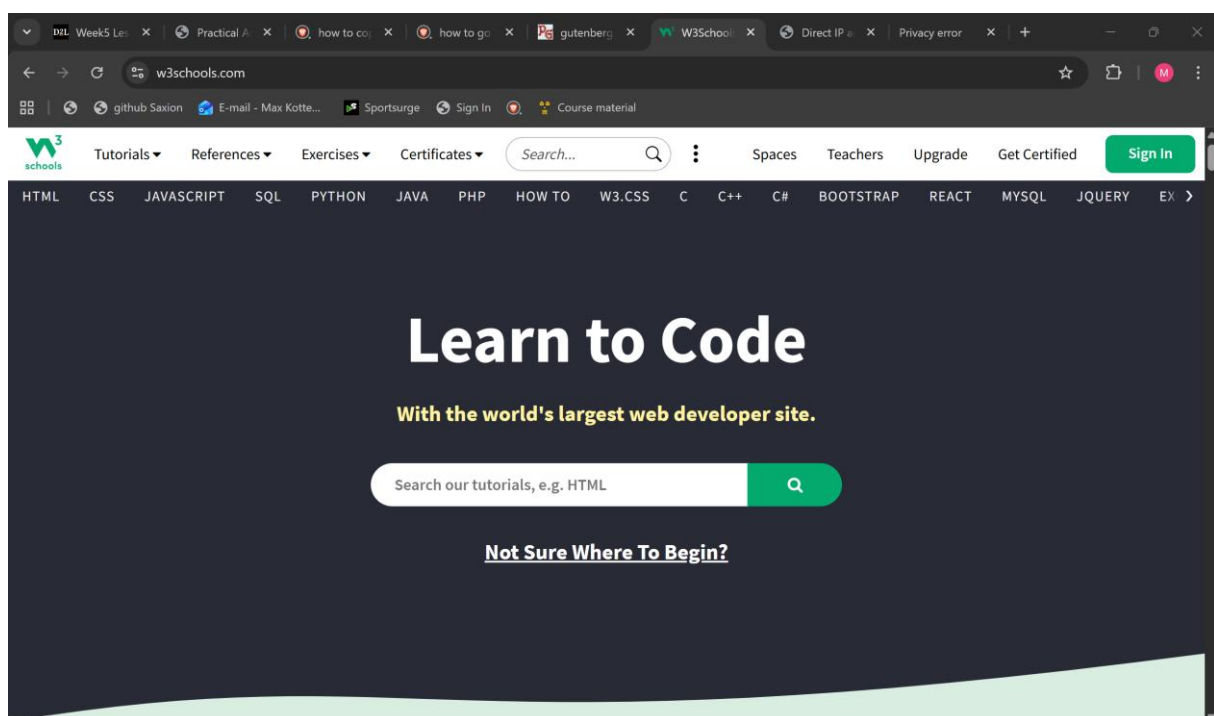
*** mijnmodem.kpn can't find w3schools.com: Non-existent domain

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

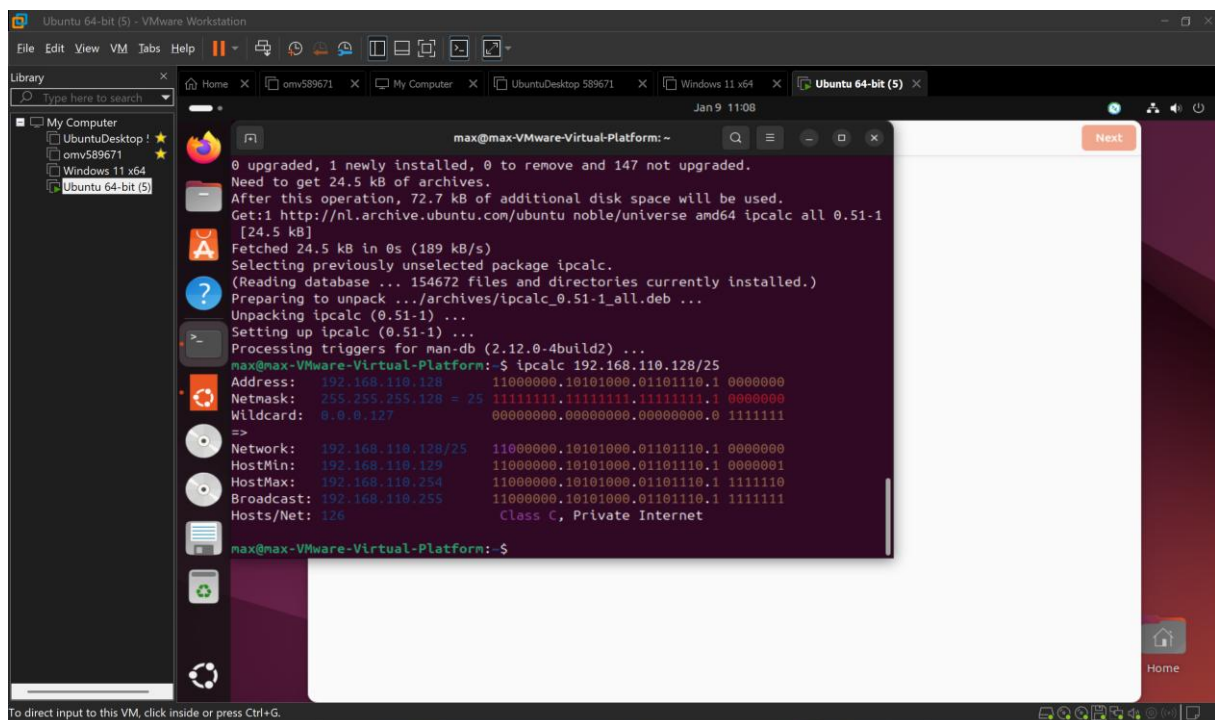
What is the usable IP range to hand out to the connected computers?

Eerste address is voor network

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`



The screenshot shows a terminal window titled 'max@max-VMware-Virtual-Platform: ~' with the following output:

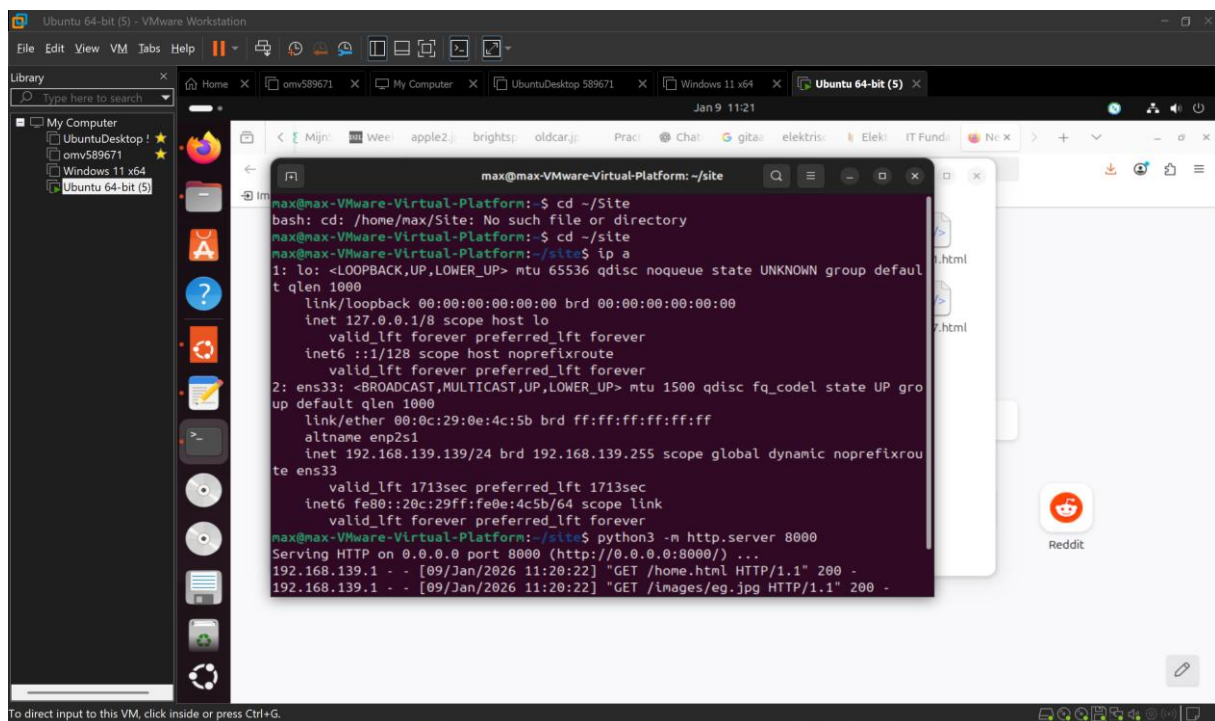
```
0 upgraded, 1 newly installed, 0 to remove and 147 not upgraded.
Need to get 24.5 kB of archives.
After this operation, 72.7 kB of additional disk space will be used.
Get:1 http://nl.archive.ubuntu.com/ubuntu noble/universe amd64 ipcalc all 0.51-1
[24.5 kB]
Fetched 24.5 kB in 0s (189 kB/s)
Selecting previously unselected package ipcalc.
(Reading database ... 154672 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) ...
max@max-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 11111111.11111111.11111111.1 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
max@max-VMware-Virtual-Platform:~$
```

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

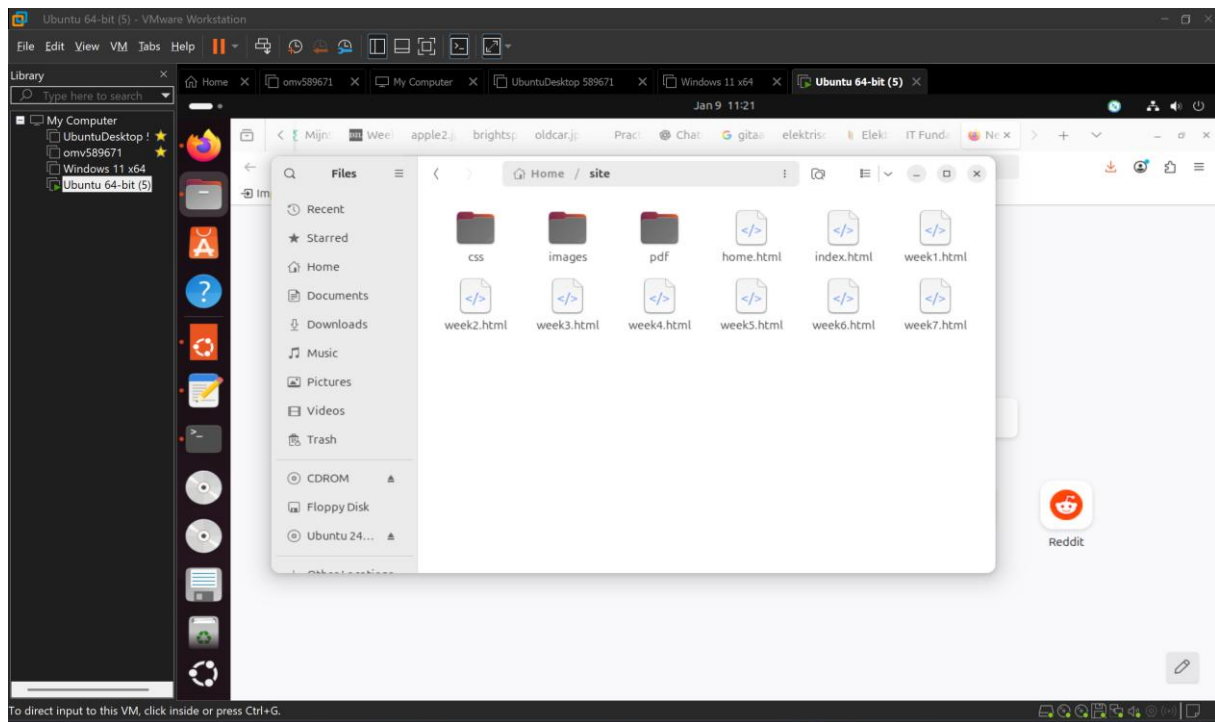
Screenshot IP address Ubuntu VM:



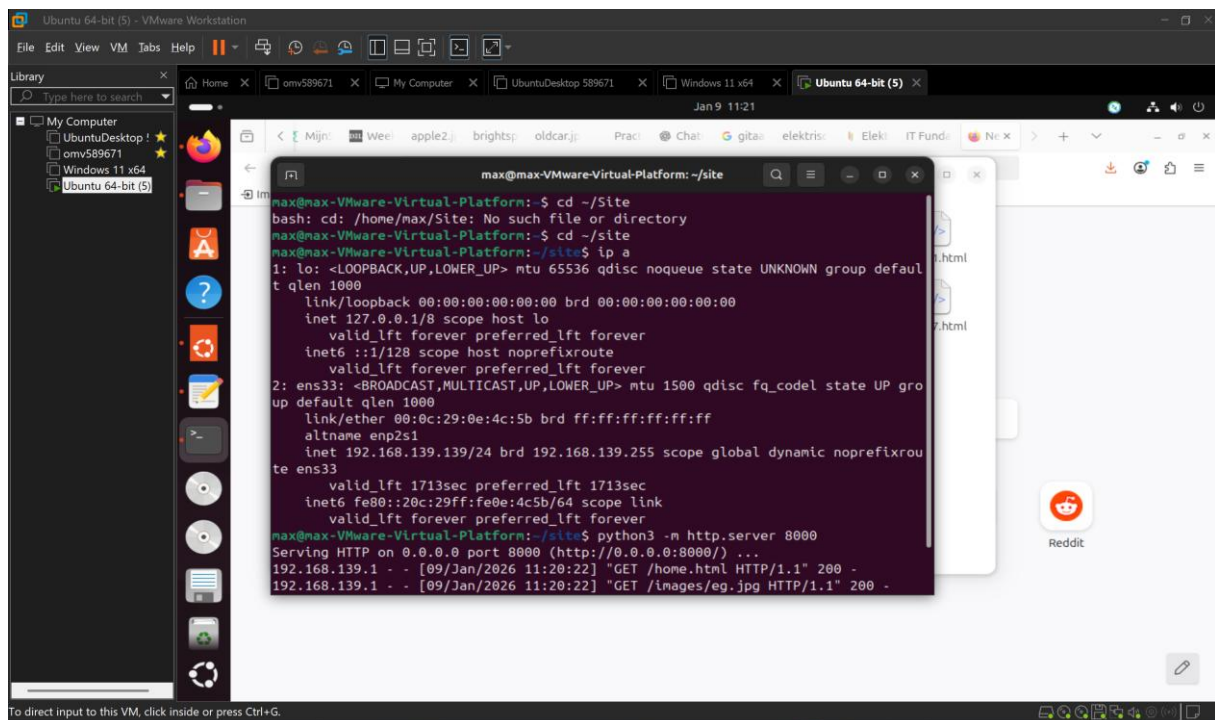
The screenshot shows a VMware Workstation window with an Ubuntu 64-bit (5) VM. The terminal window is open, displaying the following commands and output:

```
max@max-VMware-Virtual-Platform: ~/site
max@max-VMware-Virtual-Platform: ~/site$ cd ~/Site
bash: cd: /home/max/Site: No such file or directory
max@max-VMware-Virtual-Platform: ~/site$ 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 00:0c:29:0e: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 -
```

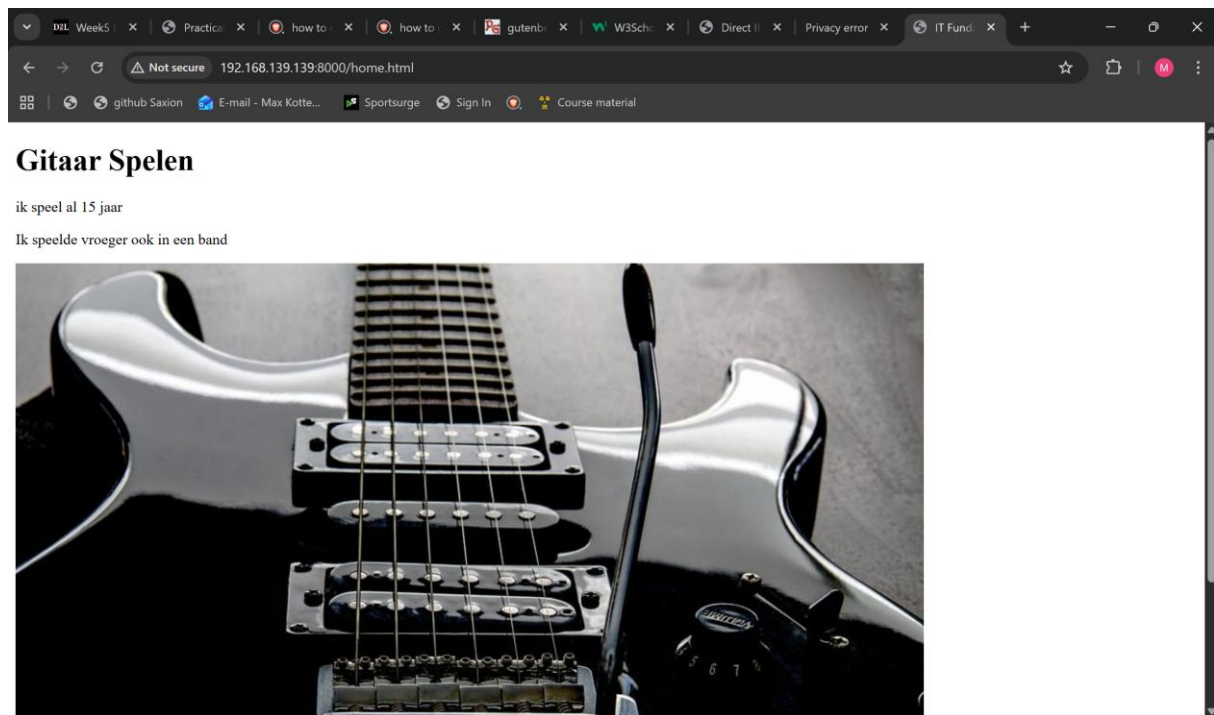
Screenshot of Site directory contents:



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

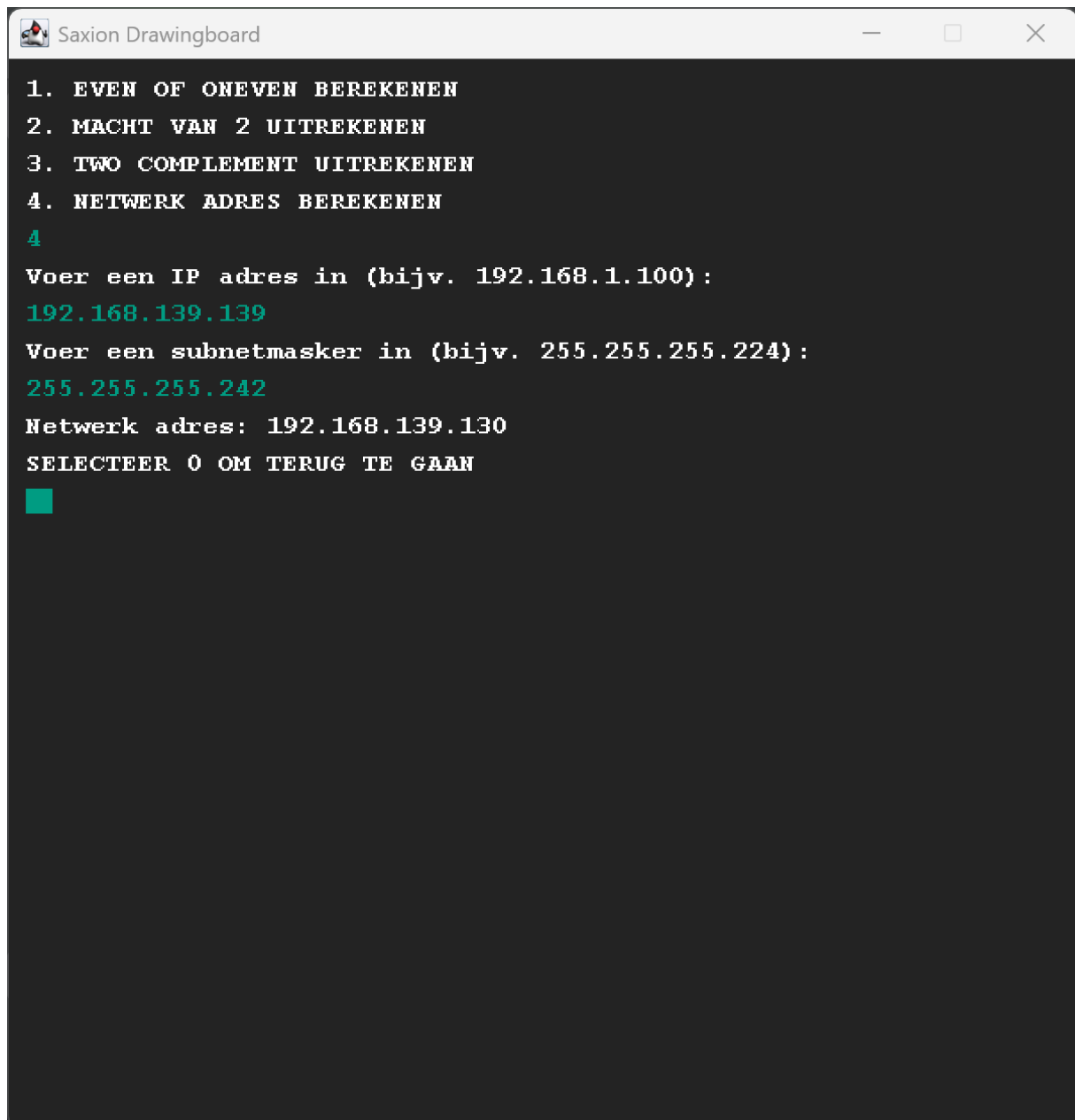
Network Addr: 11000000.10101000.00000001.01100000

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.



```
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.println("SELECTEER 0 OM TERUG TE GAAN");
        int teruggaan = SaxionApp.readInt();
        if (teruggaan != 0) {
            blijfgaan = false;
        }
    }
    SaxionApp.print("SYSTEEM BEEINDIGD");
}

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

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

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

```

```

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

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

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

    int negatief = ~gekozennummer + 1;

    int positief = ~negatief + 1;

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

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

    SaxionApp.println("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.println("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](#)