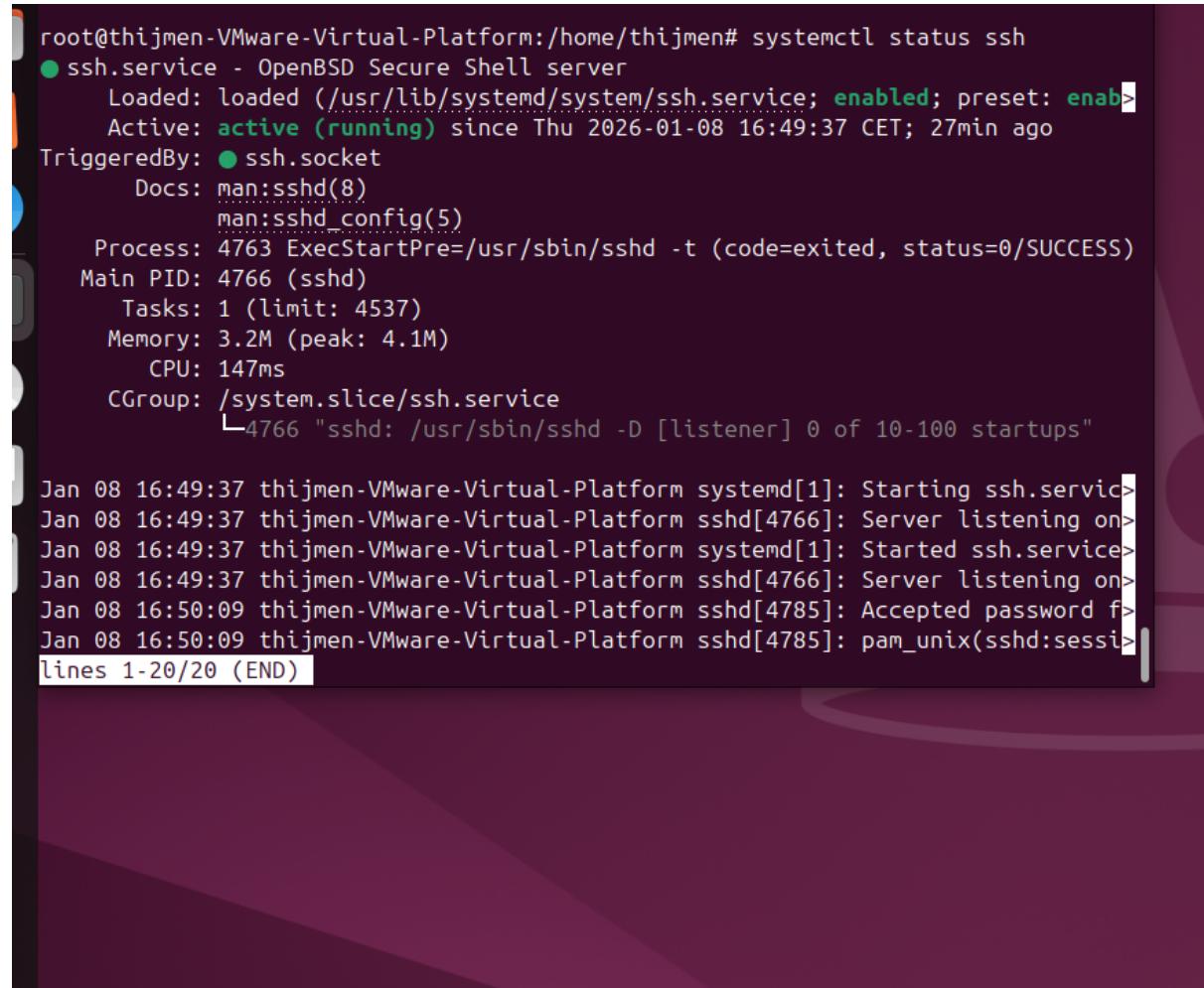


# Template Week 6 – Networking

Student number:574642

## Assignment 6.1: Working from home

Screenshot installation openssh-server:



```
root@thijmen-VMware-Virtual-Platform:/home/thijmen# systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
  Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: enabled)
  Active: active (running) since Thu 2026-01-08 16:49:37 CET; 27min ago
    TriggeredBy: ● ssh.socket
      Docs: man:sshd(8)
             man:sshd_config(5)
    Process: 4763 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 4766 (sshd)
     Tasks: 1 (limit: 4537)
    Memory: 3.2M (peak: 4.1M)
       CPU: 147ms
      CGroup: /system.slice/ssh.service
              └─4766 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jan 08 16:49:37 thijmen-VMware-Virtual-Platform systemd[1]: Starting ssh.service...
Jan 08 16:49:37 thijmen-VMware-Virtual-Platform sshd[4766]: Server listening on port 22...
Jan 08 16:49:37 thijmen-VMware-Virtual-Platform systemd[1]: Started ssh.service...
Jan 08 16:49:37 thijmen-VMware-Virtual-Platform sshd[4766]: Server listening on port 22...
Jan 08 16:50:09 thijmen-VMware-Virtual-Platform sshd[4785]: Accepted password from 127.0.0.1 port 55555 ssh2...
Jan 08 16:50:09 thijmen-VMware-Virtual-Platform sshd[4785]: pam_unix(sshd:session): session opened for user thijmen by sshd[4785]
[lines 1-20/20 (END)]
```

Screenshot successful SSH command execution:

The screenshot shows two terminal windows side-by-side. The left terminal window is titled 'thijmen@thijmen-VMware-Vi' and displays the output of the 'ip a' command. The right terminal window is titled 'root@thijmen-VMware-Virtual-Platform:/home/thijmen' and also displays the output of the 'ip a' command. Both terminals show the same configuration details for network interfaces like ens33 and lo.

```

Last login: Thu Jan  8 16:50:10 2026 from 192.168.139.11
thijmen@thijmen-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
        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
    link/ether 00:0c:29:cc:f7:7f brd ff:ff:ff:ff:ff:ff
        altname enp2s1
        inet 192.168.139.131/24 brd 192.168.139.255 scope global dynamic noprefixroute
            valid_lft 1195sec preferred_lft 1195sec
            inet6 fe80::22b5:ba6d:4e04:b377/64 scope link noprefixroute
                valid_lft forever preferred_lft forever
thijmen@thijmen-VMware-Virtual-Platform:~$ 

root@thijmen-VMware-Virtual-Platform:/home/thijmen# 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
        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
    link/ether 00:0c:29:cc:f7:7f brd ff:ff:ff:ff:ff:ff
        altname enp2s1
        inet 192.168.139.131/24 brd 192.168.139.255 scope global dynamic noprefixroute
            valid_lft 984sec preferred_lft 984sec
            inet6 fe80::22b5:ba6d:4e04:b377/64 scope link noprefixroute
                valid_lft forever preferred_lft forever
root@thijmen-VMware-Virtual-Platform:/home/thijmen# 

```

Screenshot successful execution SCP command:

The screenshot shows two terminal windows side-by-side. The left terminal window is titled 'thijmen@thijmen-VMware-Vi' and shows the output of the 'ip a' command. The right terminal window is titled 'root@thijmen-VMware-Virtual-Platform:/home/thijmen' and shows the output of the 'ip a' command. Both terminals show the same configuration details for network interfaces like ens33 and lo.

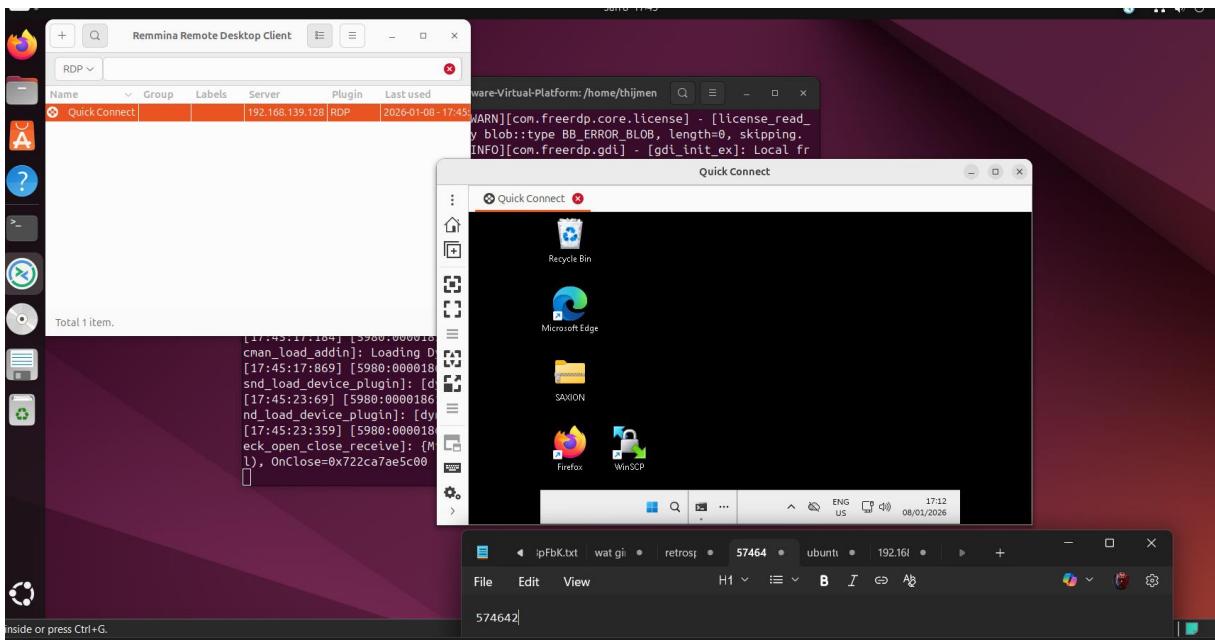
```

net 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
    link/ether 00:0c:29:cc:f7:7f brd ff:ff:ff:ff:ff:ff
        altname enp2s1
        inet 192.168.139.131/24 brd 192.168.139.255 scope global dynamic noprefixroute
            valid_lft 1195sec preferred_lft 1195sec
            inet6 fe80::22b5:ba6d:4e04:b377/64 scope link noprefixroute
                valid_lft forever preferred_lft forever
thijmen@thijmen-VMware-Virtual-Platform:~$ echo Hello SCP > testfile.txt
thijmen@thijmen-VMware-Virtual-Platform:~$ scp testfile.txt thijmen@192.168.139.131:/home/thijmen/
The authenticity of host '192.168.139.131 (192.168.139.131)' can't be established.
ED25519 key fingerprint is SHA256:kgCz23g9lJ0gVEY1S8Gjgr43l70c2BBujW8g
zMSORD0.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? y
es
Warning: Permanently added '192.168.139.131' (ED25519) to the list of known hosts.
thijmen@192.168.139.131's password:
testfile.txt      100%   10     5.0KB/s   00:00
thijmen@thijmen-VMware-Virtual-Platform:~$ 

root@thijmen-VMware-Virtual-Platform:/home/thijmen# 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
        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
    link/ether 00:0c:29:cc:f7:7f brd ff:ff:ff:ff:ff:ff
        altname enp2s1
        inet 192.168.139.131/24 brd 192.168.139.255 scope global dynamic noprefixroute
            valid_lft 984sec preferred_lft 984sec
            inet6 fe80::22b5:ba6d:4e04:b377/64 scope link noprefixroute
                valid_lft forever preferred_lft forever
root@thijmen-VMware-Virtual-Platform:/home/thijmen# ls
Desktop  hallo.txt  oldcar  snap  thijmen-VMware-Virtual-Platform
Documents  Hello  Pictures  Templates  Videos
Downloads  Music  Public  testfile.txt
root@thijmen-VMware-Virtual-Platform:/home/thijmen# 

```

Screenshot remmina:



Je ziet hier da tik via remmina geconnect ben met mijn windows vm

### Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

```
Microsoft Windows [Version 10.0.26100.7462]
(c) Microsoft Corporation. All rights reserved.

C:\Users\thijm>nslookup amazon.com
Server: e-kw-mer-ib01.infra.saxion.net
Address: 145.76.14.10

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

C:\Users\thijm>nslookup google.com
Server: e-kw-mer-ib01.infra.saxion.net
Address: 145.76.14.10

Non-authoritative answer:
Name:   google.com
Addresses: 2a00:1450:400e:801::200e
          142.250.179.142

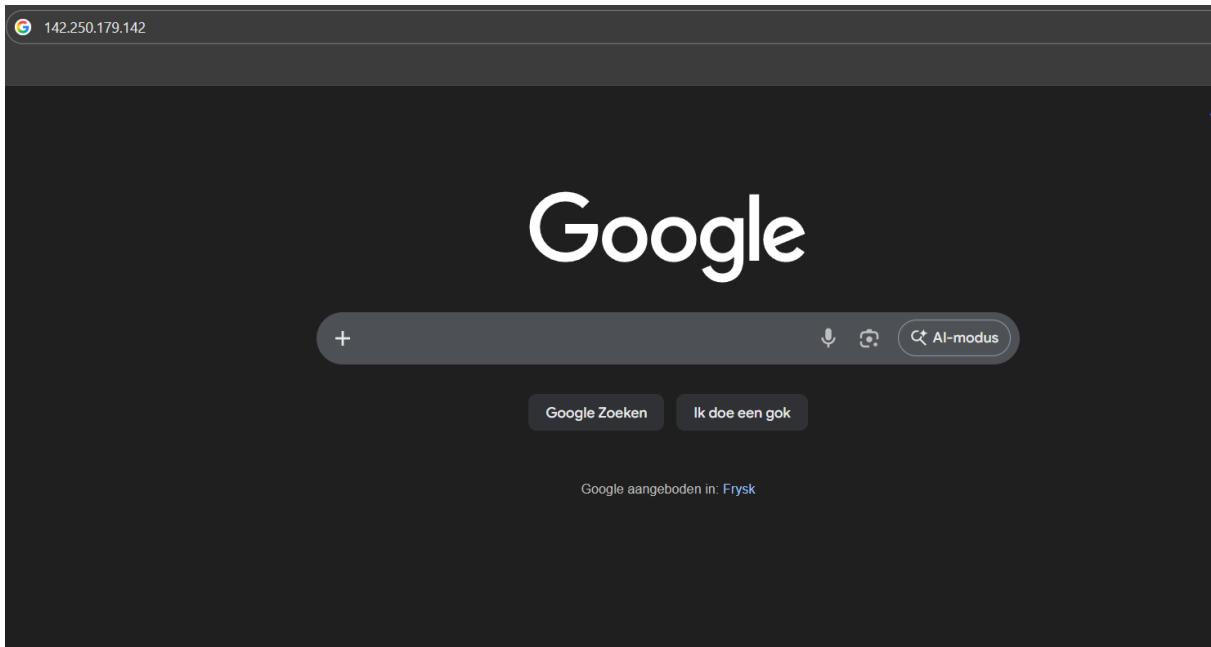
C:\Users\thijm>nslookup one.one.one.one
Server: e-kw-mer-ib01.infra.saxion.net
Address: 145.76.14.10

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

C:\Users\thijm>nslookup dns.google.com
Server: e-kw-mer-ib01.infra.saxion.net
Address: 145.76.14.10

Non-authoritative answer:
```

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 ip adressen

$32 - 25 = 7$  bits, twee tot de macht 7 is 128

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

254 bij een /24 1 bit voor broadcast en 1 bit voor het network

Bij een 25/ dan is het 126

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

```
thijmen@thijmen-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
```

```
thijmen@thijmen-VMware-Virtual-Platform:~$
```

Explain the above calculation in your own words.

Het adres 192.168.110.128 gebruikt een subnet 255.255.255.128. Dit betekent dat er nog 7 bits over zijn als je die in de macht van 2 doet krijgt je 128. Je moet er vervolgens nog 2 bits vanaf halen voor het broadcast en het netwerk adres en dan krijg je 126

#### Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

```
thijmen@thijmen-Virtual-Platform:~$ 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:cc:f7:7f brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.139.131/24 brd 192.168.139.255 scope global dynamic noprefixroute ens33
        valid_lft 1180sec preferred_lft 1180sec
    inet6 fe80::22b5:ba6d:4e04:b377/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
thijmen@thijmen-Virtual-Platform:~$
```

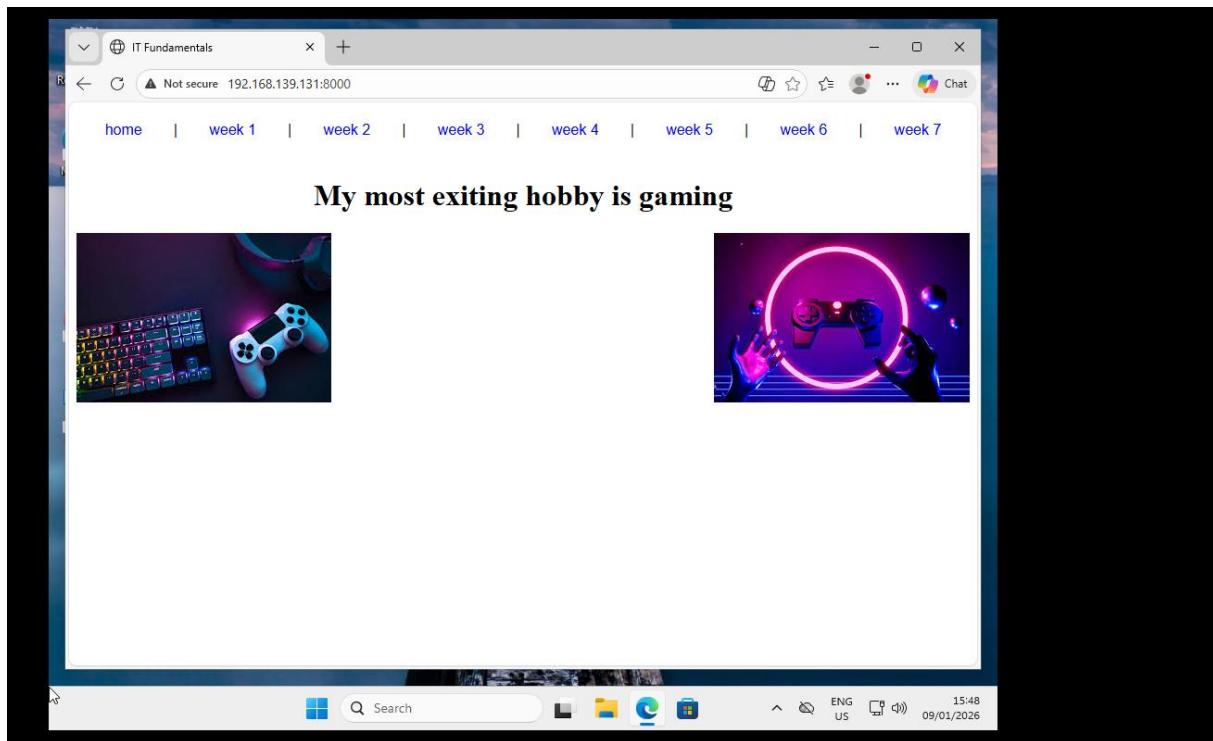
Screenshot of Site directory contents:

```
thijmen@thijmen-Virtual-Platform:~/Downloads$ cd site
thijmen@thijmen-Virtual-Platform:~/Downloads/site$ ls
css      images      pdf      week2.html  week4.html  week6.html
home.html index.html  week1.html  week3.html  week5.html  week7.html
thijmen@thijmen-Virtual-Platform:~/Downloads/site$
```

Screenshot python3 webserver command:

```
thijmen@thijmen-VMware-Virtual-Platform:~$ cd Downloads
thijmen@thijmen-VMware-Virtual-Platform:~/Downloads$ cd site
thijmen@thijmen-VMware-Virtual-Platform:~/Downloads/site$ python3 -m http.server
8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.139.128 - - [09/Jan/2026 16:21:17] "GET / HTTP/1.1" 200 -
192.168.139.128 - - [09/Jan/2026 16:21:17] "GET /home.html HTTP/1.1" 200 -
192.168.139.128 - - [09/Jan/2026 16:21:17] "GET /css/mypdfstyle.css HTTP/1.1" 20
0 -
192.168.139.128 - - [09/Jan/2026 16:21:17] "GET /images/Untitled.jpeg HTTP/1.1"
200 -
192.168.139.128 - - [09/Jan/2026 16:21:17] "GET /images/gaming.jpeg HTTP/1.1" 20
0 -
192.168.139.128 - - [09/Jan/2026 16:21:18] code 404, message File not found
192.168.139.128 - - [09/Jan/2026 16:21:18] "GET /favicon.ico HTTP/1.1" 404 -
```

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 Application implements Runnable {
    public void run() {
        number = (~number) + 1;
        SaxonApp.printLine(text: "Number:" + number);
        number = (~number) + 1;
        SaxonApp.printLine(text: "Back to:" + number);
    } else if (choice == 4) {

        String ip = SaxonApp.readString();
        String subnet = SaxonApp.readString();

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

        SaxonApp.print("Network address: ");

        for (int i = 0; i < 4; i++) {
            int result =
                Integer.parseInt(ipParts[i]) &
                Integer.parseInt(subnetParts[i]);
            SaxonApp.print(result);
            if (i < 3) SaxonApp.print(".");
        } else {
            SaxonApp.printLine(text: "Werkt niet");
        }
    }
}

== SaxonApp version: 1.0.1 ==
```

```
import nl.saxon.app.SaxonApp;

import java.awt.color.ICC_ColorSpace;
import java.util.ArrayList;

public class Application implements Runnable {

    public static void main(String[] args) {
        SaxonApp.start(new Application(), 500, 500);
```

```

}

    public void run() {
int number = SaxionApp.readInt("Please enter a number:");

SaxionApp.printLine("Menu:");
SaxionApp.printLine("1, Is the number odd?");
SaxionApp.printLine("2, Is the number a power of 2");
SaxionApp.printLine("3, Two's complement of number?");
SaxionApp.printLine("4. Calculate network address");
int choice = SaxionApp.readInt("Choose an option:");

if (choice == 1) {
    if ((number & 1) == 1){
        SaxionApp.printLine("The number is odd");
    } else {
        SaxionApp.printLine("The number is even");
    }
} else if (choice == 2) {
    if (number > 0 && (number & (number - 1)) == 0) {
        SaxionApp.printLine(number + "is a power of 2");
    } else {
        SaxionApp.printLine(number + "Isnt a power of 2");
    }
} else if (choice == 3){
    number = (~number) + 1;
    SaxionApp.printLine("Number:" + number);
    number = (~number) + 1;
    SaxionApp.printLine("Back to:" + number);
} else if (choice == 4) {

    String ip = SaxionApp.readString();
    String subnet = SaxionApp.readString();

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

    SaxionApp.print("Network address: ");

    for (int i = 0; i < 4; i++) {
        int result =
            Integer.parseInt(ipParts[i]) &
            Integer.parseInt(subnetParts[i]);

        SaxionApp.print(result);
        if (i < 3) SaxionApp.print(".");
    }
} else {
    SaxionApp.printLine("Werkt niet");
}

```

```
}
```

```
    }
```

```
}
```

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