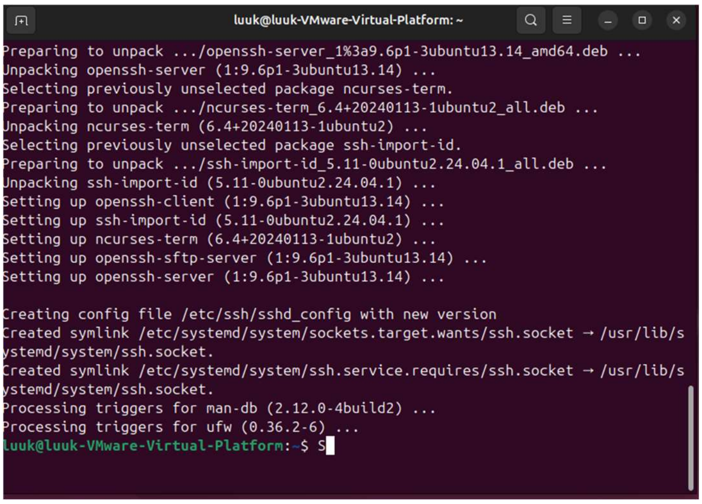
Template Week 6 – Networking

Student number: 586377

Assignment 6.1: Working from home

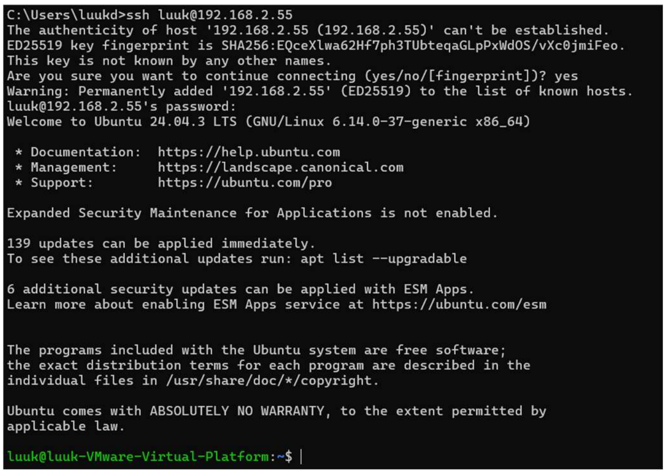
Screenshot installation openssh-server:



luuk@luuk-VMware-Virtual-Platform: ~

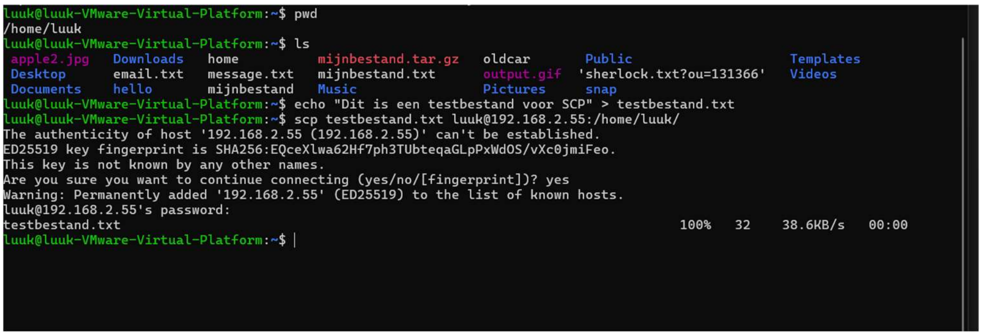
```
Preparing to unpack .../openssh-server_1%3a9.6p1-3ubuntu13.14_amd64.deb ...
Unpacking openssh-server (1:9.6p1-3ubuntu13.14) ...
Selecting previously unselected package ncurses-term.
Preparing to unpack .../ncurses-term_6.4+20240113-1ubuntu2_all.deb ...
Unpacking ncurses-term (6.4+20240113-1ubuntu2) ...
Selecting previously unselected package ssh-import-id.
Preparing to unpack .../ssh-import-id_5.11-0ubuntu2.24.04.1_all.deb ...
Unpacking ssh-import-id (5.11-0ubuntu2.24.04.1) ...
Setting up openssh-client (1:9.6p1-3ubuntu13.14) ...
Setting up ssh-import-id (5.11-0ubuntu2.24.04.1) ...
Setting up ncurses-term (6.4+20240113-1ubuntu2) ...
Setting up openssh-sftp-server (1:9.6p1-3ubuntu13.14) ...
Setting up openssh-server (1:9.6p1-3ubuntu13.14) ...

Creating config file /etc/ssh/sshd_config with new version
Created symlink /etc/systemd/system/sockets.target.wants/ssh.socket → /usr/lib/s
ystemd/system/ssh.socket.
Created symlink /etc/systemd/system/ssh.service.requires/ssh.socket → /usr/lib/s
ystemd/system/ssh.socket.
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for ufw (0.36.2-6) ...
luuk@luuk-VMware-Virtual-Platform:~$ S
```

Screenshot successful SSH command execution:



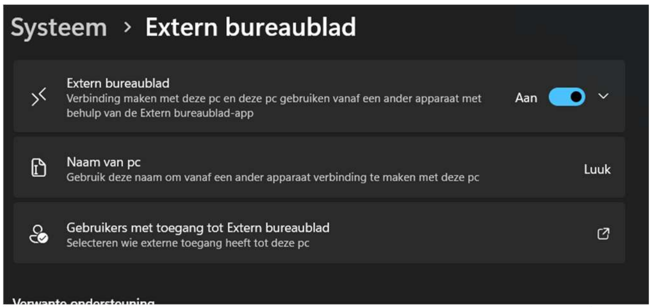
```
C:\Users\luukd>ssh luuk@192.168.2.55
The authenticity of host '192.168.2.55 (192.168.2.55)' can't be established.
ED25519 key fingerprint is SHA256:EQceXlwa62Hf7ph3TUbteqaGLpPxWdOS/vXc0jmiFeo.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.2.55' (ED25519) to the list of known hosts.
luuk@192.168.2.55'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.

139 updates can be applied immediately.
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.

luuk@luuk-VMware-Virtual-Platform:~$ |
```

Screenshot successful execution SCP command:



```
luuk@luuk-VMware-Virtual-Platform:~$ pwd
/home/luuk
luuk@luuk-VMware-Virtual-Platform:~$ ls
 apple2.jpg   Downloads   home          mijnbestand.tar.gz   oldcar      Public                    Templates
 Desktop      email.txt   message.txt   mijnbestand.txt      output.gif  'sherlock.txt?ou=131366'  Videos
 Documents    hello       mijnbestand   Music                Pictures    snap
luuk@luuk-VMware-Virtual-Platform:~$ echo "Dit is een testbestand voor SCP" > testbestand.txt
luuk@luuk-VMware-Virtual-Platform:~$ scp testbestand.txt luuk@192.168.2.55:/home/luuk/
The authenticity of host '192.168.2.55 (192.168.2.55)' can't be established.
ED25519 key fingerprint is SHA256:EQceXlwa62Hf7ph3TUbteqaGLpPxWdOS/vXc0jmiFeo.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.2.55' (ED25519) to the list of known hosts.
luuk@192.168.2.55's password:
testbestand.txt                                                                       100%   32    38.6KB/s   00:00
luuk@luuk-VMware-Virtual-Platform:~$ |
```

Screenshot remmina:



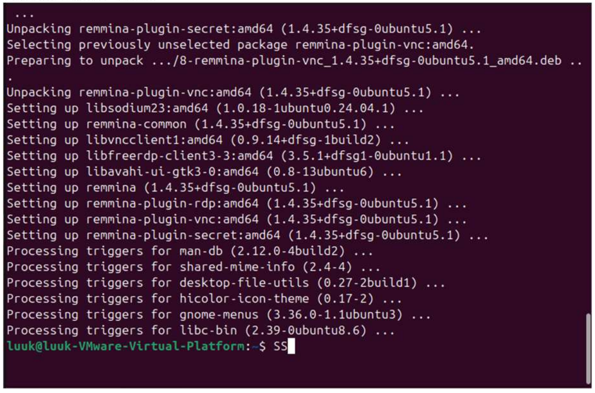
Systeem › Extern bureaublad

Extern bureaublad
Verbinding maken met deze pc en deze pc gebruiken vanaf een ander apparaat met behulp van de Extern bureaublad-app
Aan

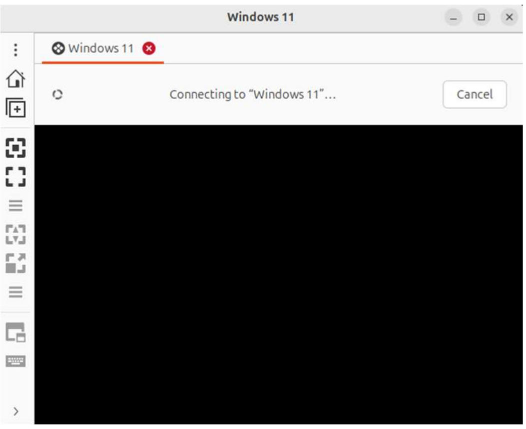
Naam van pc
Gebruik deze naam om vanaf een ander apparaat verbinding te maken met deze pc
Luuk

Gebruikers met toegang tot Extern bureaublad
Selecteren wie externe toegang heeft tot deze pc

Verwante ondersteuning



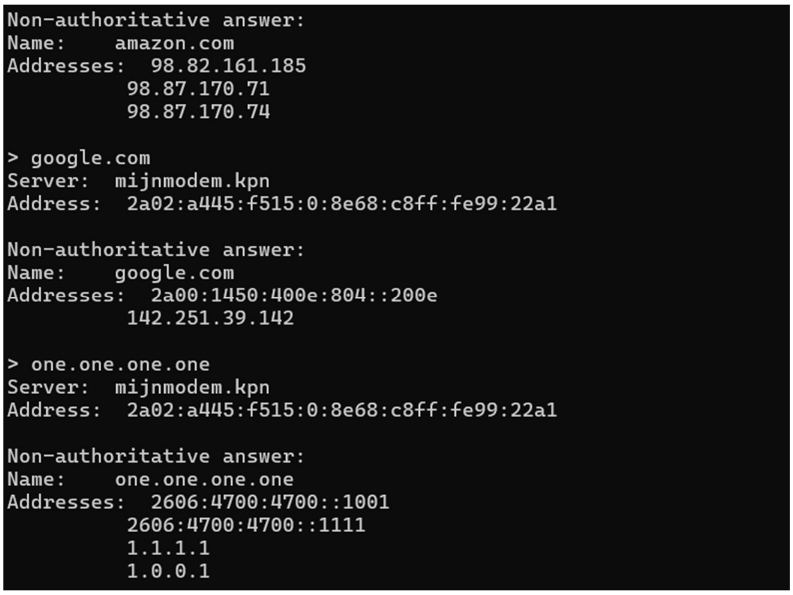
```
 ...
Unpacking remmina-plugin-secret:amd64 (1.4.35+dfsg-0ubuntu5.1) ...
Selecting previously unselected package remmina-plugin-vnc:amd64.
Preparing to unpack .../8-remmina-plugin-vnc_1.4.35+dfsg-0ubuntu5.1_amd64.deb ..
.
Unpacking remmina-plugin-vnc:amd64 (1.4.35+dfsg-0ubuntu5.1) ...
Setting up libsodium23:amd64 (1.0.18-1ubuntu0.24.04.1) ...
Setting up remmina-common (1.4.35+dfsg-0ubuntu5.1) ...
Setting up libvncclient1:amd64 (0.9.14+dfsg-1build2) ...
Setting up libfreerdp-client3-3:amd64 (3.5.1+dfsg1-0ubuntu1.1) ...
Setting up libavahi-ui-gtk3-0:amd64 (0.8-13ubuntu6) ...
Setting up remmina (1.4.35+dfsg-0ubuntu5.1) ...
Setting up remmina-plugin-rdp:amd64 (1.4.35+dfsg-0ubuntu5.1) ...
Setting up remmina-plugin-vnc:amd64 (1.4.35+dfsg-0ubuntu5.1) ...
Setting up remmina-plugin-secret:amd64 (1.4.35+dfsg-0ubuntu5.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for shared-mime-info (2.4-4) ...
Processing triggers for desktop-file-utils (0.27-2build1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
luuk@luuk-VMware-Virtual-Platform:~$ SS
```



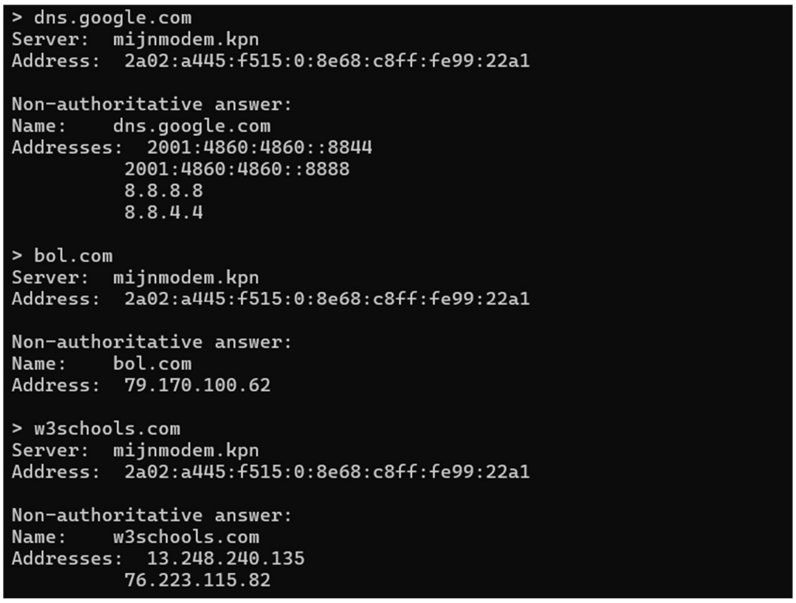
Connecting to "Windows 11"...

Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

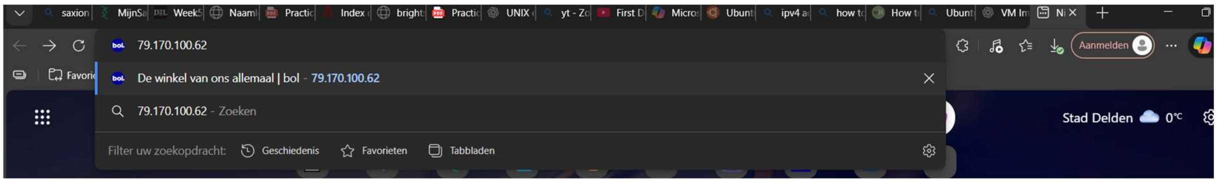


```
Non-authoritative answer:
Name:    amazon.com
Addresses:  98.82.161.185
          98.87.170.71
          98.87.170.74

> google.com
Server:  mijnmodem.kpn
Address:  2a02:a445:f515:0:8e68:c8ff:fe99:22a1

Non-authoritative answer:
Name:    google.com
Addresses:  2a00:1450:400e:804::200e
          142.251.39.142

> one.one.one.one
Server:  mijnmodem.kpn
Address:  2a02:a445:f515:0:8e68:c8ff:fe99:22a1

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
```



```
> dns.google.com
Server:  mijnmodem.kpn
Address:  2a02:a445:f515:0:8e68:c8ff:fe99:22a1

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

> bol.com
Server:  mijnmodem.kpn
Address:  2a02:a445:f515:0:8e68:c8ff:fe99:22a1

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

> w3schools.com
Server:  mijnmodem.kpn
Address:  2a02:a445:f515:0:8e68:c8ff:fe99:22a1

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

Screenshot website visit via IP address:



79.170.100.62

De winkel van ons allemaal | bol - 79.170.100.62

79.170.100.62 - Zoeken

Assignment 6.3: subnetting

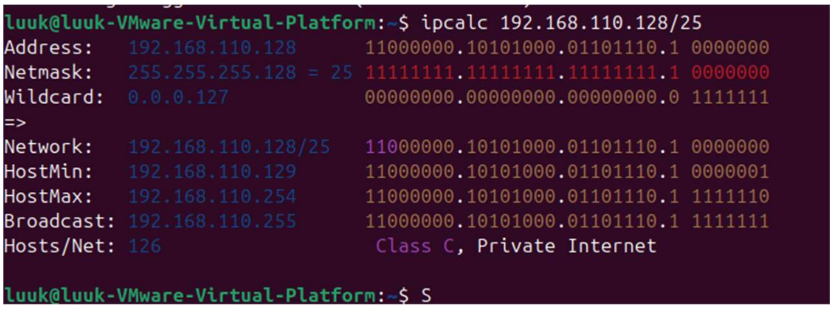
How many IP addresses are in this network configuration 192.168.110.128/25?

128 IP adressen.

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

Het bruikbare IP-bereik is 192.168.110.129 t/m 192.168.110.254
Er zijn 126 bruikbare IP-adressen.

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



```
luuk@luuk-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

luuk@luuk-VMware-Virtual-Platform:~$ S
```

Explain the above calculation in your own words.

Een /25 subnetmask betekent dat de eerste 25 bits van het IP-adres vaststaan voor het netwerk.

Daardoor blijven er 7 bits over voor hostadressen. Met 7 bits kunnen 2^7 = 128 adressen worden gevormd.

Van deze 128 adressen wordt het eerste adres gebruikt als netwerkadres.

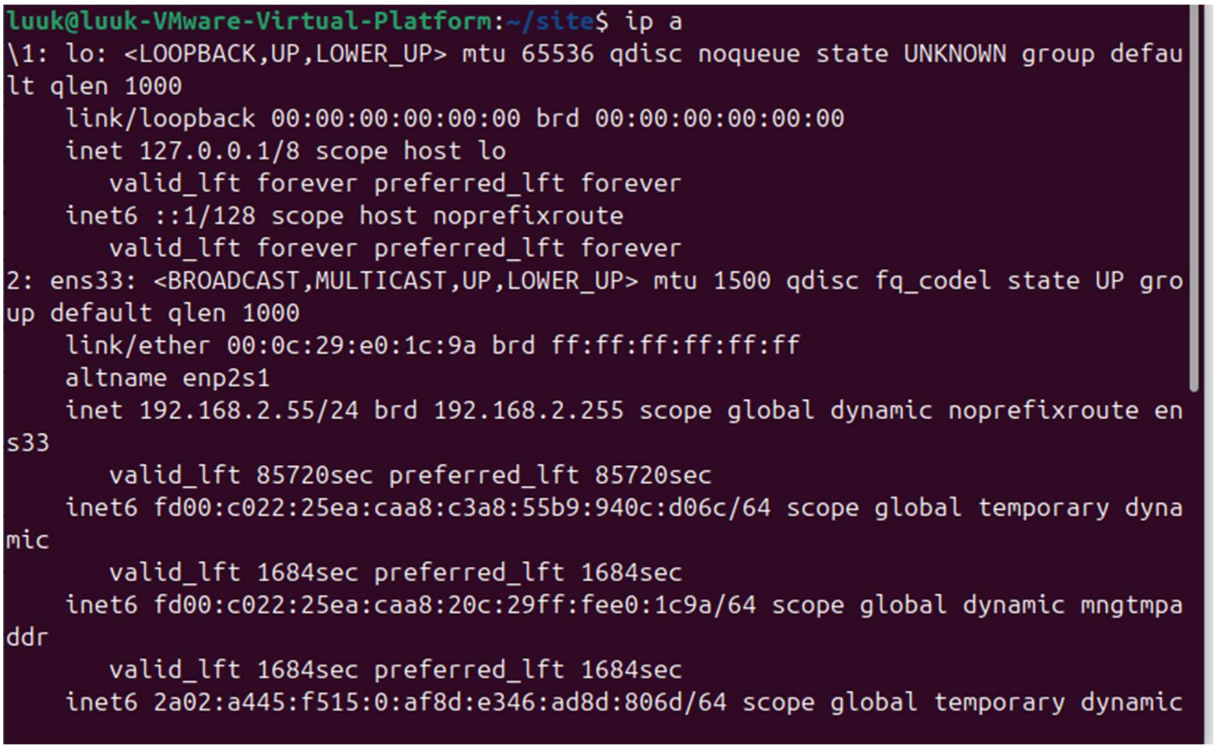
Wordt het laatste adres gebruikt als broadcastadres

Deze twee adressen kunnen niet aan computers worden gegeven.

Daarom blijven er 126 bruikbare IP-adressen over voor apparaten in het netwerk.

Assignment 6.4: HTML

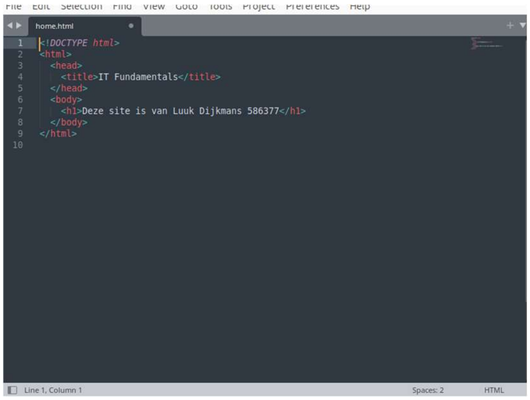
Screenshot IP address Ubuntu VM



```
luuk@luuk-VMware-Virtual-Platform:~/site$ ip a
\1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defau
lt 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 gro
up default qlen 1000
    link/ether 00:0c:29:e0:1c:9a brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.2.55/24 brd 192.168.2.255 scope global dynamic noprefixroute en
s33
       valid_lft 85720sec preferred_lft 85720sec
    inet6 fd00:c022:25ea:caa8:c3a8:55b9:940c:d06c/64 scope global temporary dyna
mic
       valid_lft 1684sec preferred_lft 1684sec
    inet6 fd00:c022:25ea:caa8:20c:29ff:fee0:1c9a/64 scope global dynamic mngtmpa
ddr
       valid_lft 1684sec preferred_lft 1684sec
    inet6 2a02:a445:f515:0:af8d:e346:ad8d:806d/64 scope global temporary dynamic
```

:

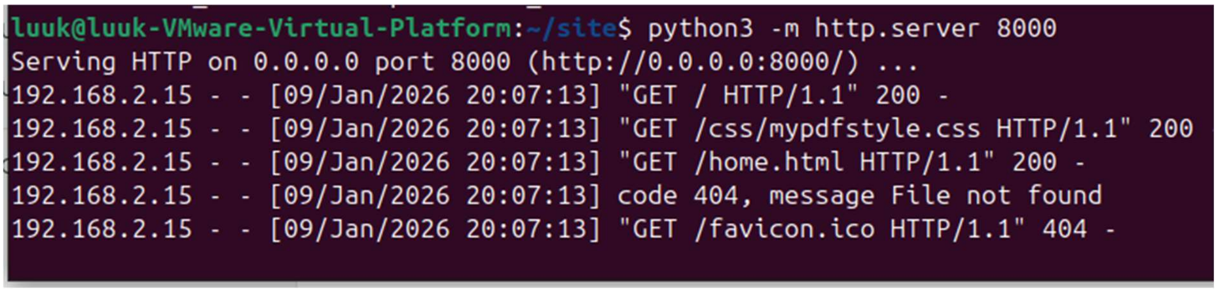
Screenshot of Site directory contents:



File Edit Selection Find View Goto Tools Project Preferences Help
home.html
Line 1, Column 1
Spaces: 2
HTML

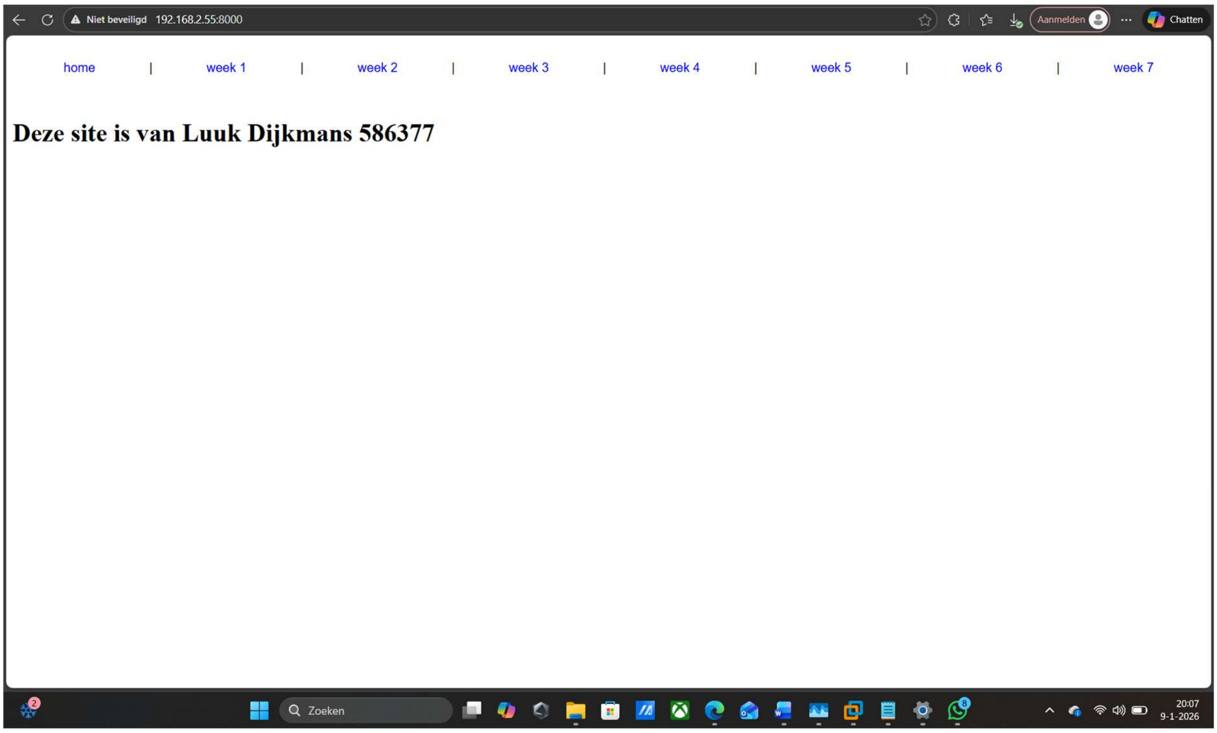
```
<!DOCTYPE html>
<html>
  <head>
    <title>IT Fundamentals</title>
  </head>
  <body>
    <h1>Deze site is van Luuk Dijkmans 586377</h1>
  </body>
</html>

```

Screenshot python3 webserver command:



```
luuk@luuk-VMware-Virtual-Platform:~/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.2.15 - - [09/Jan/2026 20:07:13] "GET / HTTP/1.1" 200 -
192.168.2.15 - - [09/Jan/2026 20:07:13] "GET /css/mypdfstyle.css HTTP/1.1" 200
192.168.2.15 - - [09/Jan/2026 20:07:13] "GET /home.html HTTP/1.1" 200 -
192.168.2.15 - - [09/Jan/2026 20:07:13] code 404, message File not found
192.168.2.15 - - [09/Jan/2026 20:07:13] "GET /favicon.ico HTTP/1.1" 404 -
```

Screenshot web browser visits your site


Niet beveiligd 192.168.2.55:8000
Aanmelden
Chatten
home | week 1 | week 2 | week 3 | week 4 | week 5 | week 6 | week 7
Zoeken
20:07
9-1-2026

Deze site is van Luuk Dijkmans 586377

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.SaxionApp;


public class Main {


    public static void main(String[] args) {


        String ip = SaxionApp.readString("Voer IP in (bijv. 192.168.1.100): ");

        String mask = SaxionApp.readString("Voer subnetmask in (bijv. 255.255.255.224): ");


        int ipInt = ipToInt(ip);

        int maskInt = ipToInt(mask);


        int network = ipInt & maskInt;


        SaxionApp.printLine("Network address = " + intToIp(network));

    }


    // IP string → integer

    public static int ipToInt(String ip) {

        String[] parts = ip.split("\\.");

        int result = 0;


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

            int p = Integer.parseInt(parts[i]);

            result = (result << 8) + p;

        }
        return result;
    }

    // integer → IP string
    public static String intToIp(int value) {
        return ((value >> 24) & 255) + "." +
               ((value >> 16) & 255) + "." +
               ((value >> 8) & 255) + "." +
               (value & 255);
    }
}
```

Ready? Save this file and export it as a pdf file with the name: **week6.pdf**