

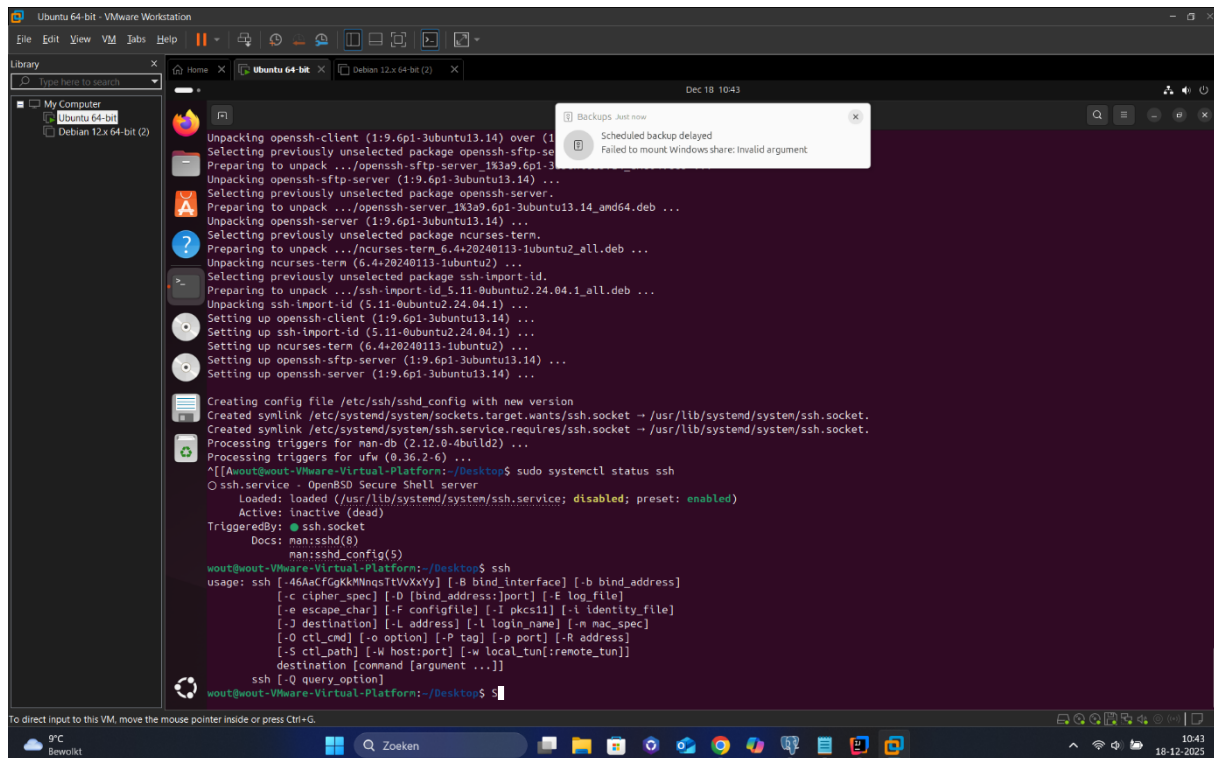
Template Week 6 – Networking

Student number:

587889

Assignment 6.1: Working from home

Screenshot installation openssh-server:



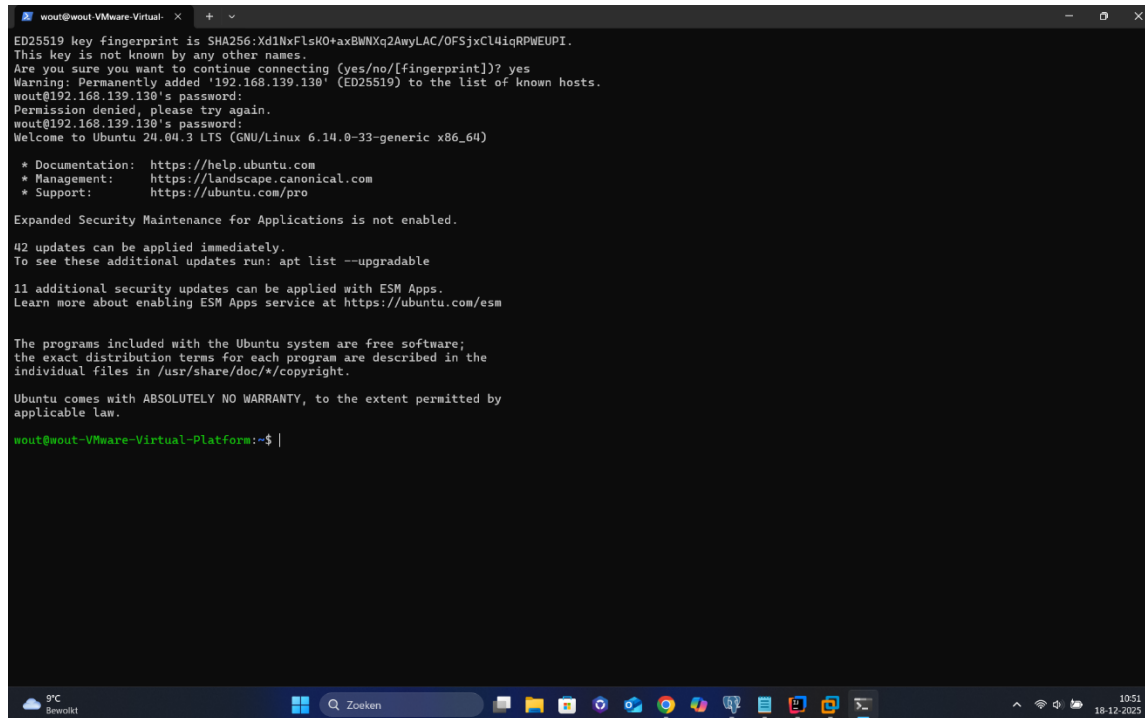
```
Unpacking openssh-client (1:9.6p1-3ubuntu13.14) over (1:9.6p1-3ubuntu13.14) ...
Selecting previously unselected package openssh-sftp-server.
Preparing to unpack .../openssh-sftp-server_1:9.6p1-3ubuntu13.14_1.deb ...
Unpacking openssh-sftp-server (1:9.6p1-3ubuntu13.14) ...
Selecting previously unselected package openssh-server.
Preparing to unpack .../openssh-server_1:9.6p1-3ubuntu13.14_and64.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/systemd/system/ssh.socket.
Created symlink /etc/systemd/system/ssh.service.requires/ssh.socket → /usr/lib/systemd/system/ssh.socket.
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for ufw (0.36.2-6) ...
^[[Awout@wout-VMware-Virtual-Platform:~/Desktop]$ sudo systemctl status ssh
○ ssh.service - OpenSSH Secure Shell server
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; disabled; preset: enabled)
   Active: inactive (dead)
   TriggeredBy: ● ssh.socket
   Docs: man:sshd(8)
        man:sshd_config(5)
wout@wout-VMware-Virtual-Platform:~/Desktop$ ssh
usage: ssh [-46AcFGgKkMNnqsTtVXxyY] [-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]
```

Je kan het laatste gedeelte van de installatie van openssh-server nog zien.

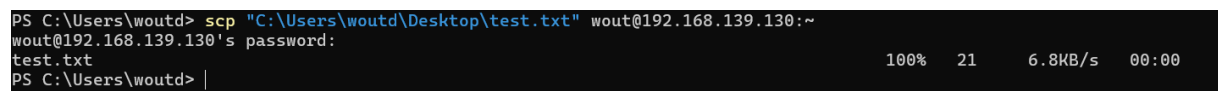
Daaronder heb ik de SSH op actief gezet.

Screenshot successful SSH command execution:



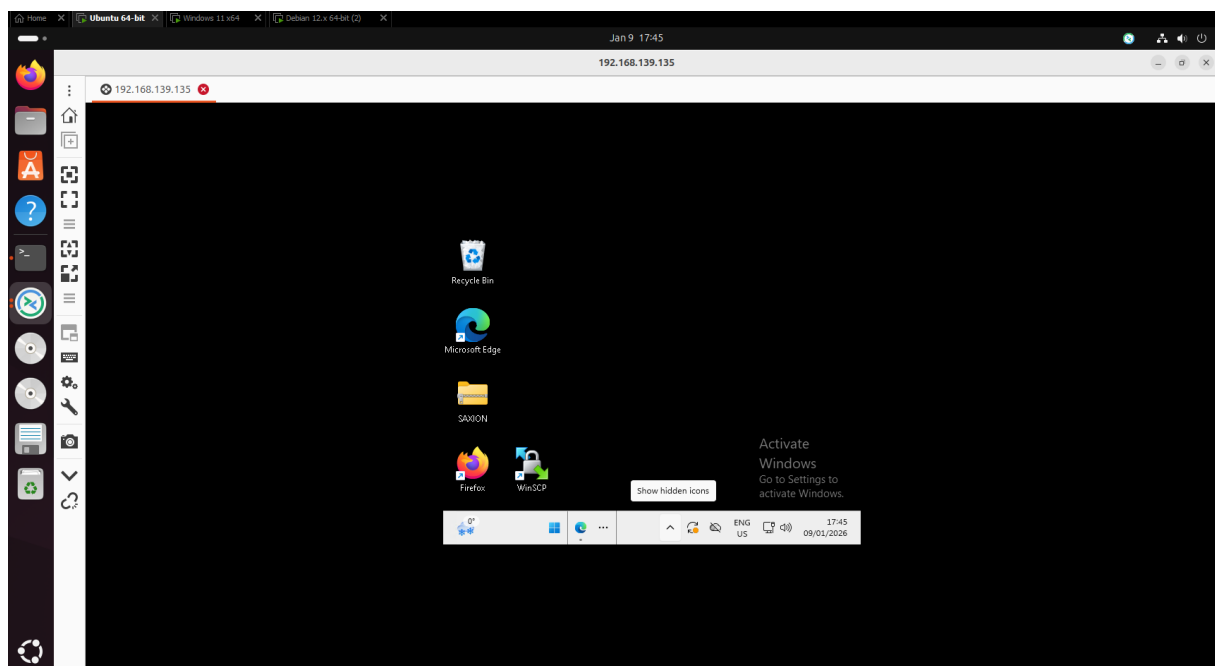
```
wout@wout-VMware-Virtual: ~  
ED25519 key fingerprint is SHA256:Xd1NxFlsK0+axBNXq2AmyLAC/OF5jxCl4iqRPWEUPI.  
This key is not known by any other names.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '192.168.139.130' (ED25519) to the list of known hosts.  
wout@192.168.139.130's password:  
Permission denied, please try again.  
wout@192.168.139.130's password:  
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-33-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.  
  
42 updates can be applied immediately.  
To see these additional updates run: apt list --upgradable  
  
11 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.  
wout@wout-VMware-Virtual-Platform:~$
```

Screenshot successful execution SCP command:



```
PS C:\Users\woutd> scp "C:\Users\woutd\Desktop\test.txt" wout@192.168.139.130:~  
wout@192.168.139.130's password:  
test.txt  
PS C:\Users\woutd> | 100% 21 6.8KB/s 00:00
```

Screenshot remmina:



Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

```
wout@wout-VMware-Virtual-Platform:~/Desktop$ nslookup
> amazon.com
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
Name:   amazon.com
Address: 98.82.161.185
Name:   amazon.com
Address: 98.87.170.71
Name:   amazon.com
Address: 98.87.170.74
> google.com
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 216.58.214.14
Name:   google.com
Address: 2a00:1450:400e:802::200e
> one.one.one.one
Server:          127.0.0.53
Address:         127.0.0.53#53
```

```
Non-authoritative answer:
Name:   one.one.one.one
Address: 1.0.0.1
Name:   one.one.one.one
Address: 1.1.1.1
Name:   one.one.one.one
Address: 2606:4700:4700::1001
Name:   one.one.one.one
Address: 2606:4700:4700::1111
> dns.google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

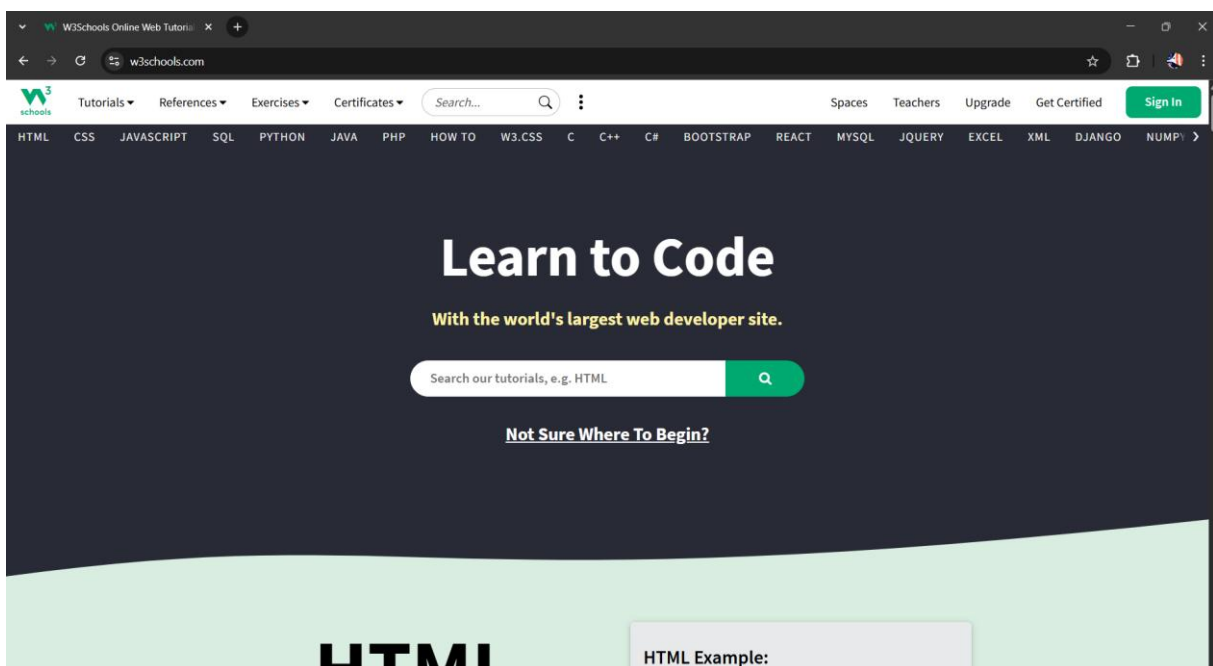
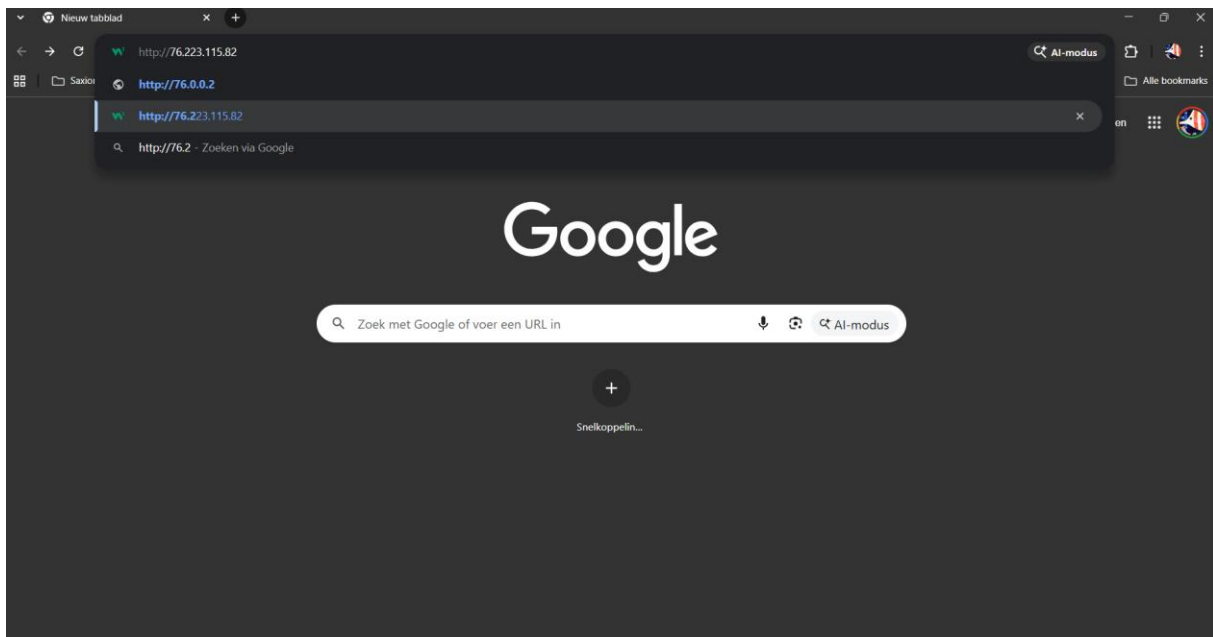
Non-authoritative answer:
Name:   dns.google.com
Address: 8.8.8.8
Name:   dns.google.com
Address: 8.8.4.4
Name:   dns.google.com
Address: 2001:4860:4860::8888
Name:   dns.google.com
Address: 2001:4860:4860::8844
> bol.com
Server:      127.0.0.53
Address:     127.0.0.53#53
```

```
Non-authoritative answer:
Name:   bol.com
Address: 79.170.100.62
> w3schools.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   w3schools.com
Address: 76.223.115.82
Name:   w3schools.com
Address: 13.248.240.135
> exit
```

```
wout@wout-VMware-Virtual-Platform:~/Desktop$
```

Screenshot website visit via IP address:



Assignment 6.3: subnetting

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

/25 = 25 bits voor het network

$32 - 25 = 7$ hostbits

$2^7 = 128$ ip adressen in het subnet

$128 - 2$ voor het network adres en broadcast adres = 126 bruikbare ip adressen

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

128 ip adressen zit hier tussen: 192.168.110.128 – 192.168.110.255

De eerste en laatste worden gebruikt door het internet en broadcast dus:

192.168.110.129 – 192.168.110.254 zijn de bruikbare ip adressen.

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

```
wout@wout-VMware-Virtual-Platform:~/Desktop$ 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

wout@wout-VMware-Virtual-Platform:~/Desktop$
```

Dit komt overeen met mijn berekeningen

Explain the above calculation in your own words.

Het subnet /25 betekent dat er 7 bits overblijven voor hosts.

Met 7 bits kun je $2^7 = 128$ IP-adressen maken.

Daarvan zijn er 2 gereserveerd (network + broadcast), dus 126 bruikbaar.

De bruikbare IP-range is 192.168.110.129 t/m 192.168.110.254.

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

```
wout@wout-VMware-Virtual-Platform:~/Website2/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:29:4e:b0:a1 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.139.130/24 brd 192.168.139.255 scope global dynamic noprefixroute ens33
        valid_lft 1719sec preferred_lft 1719sec
    inet6 fe80::204:d513:c47f:55be/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
```

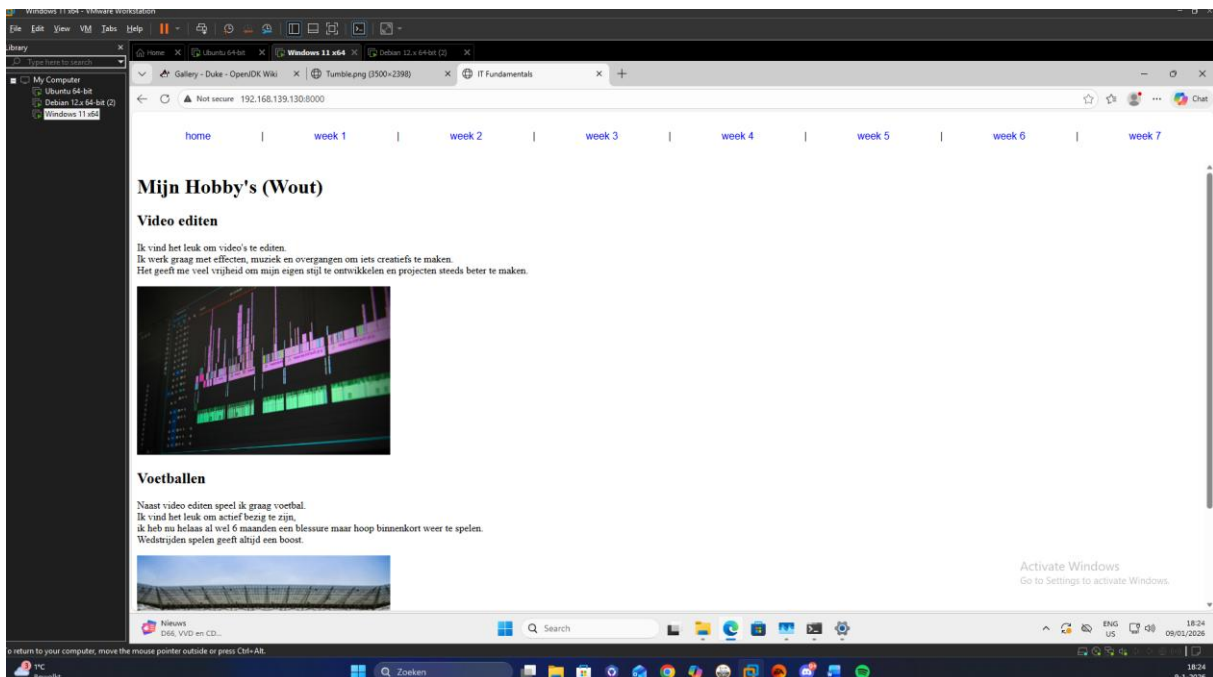
Screenshot of Site directory contents:

```
wout@wout-VMware-Virtual-Platform: ~/Website2
wout@wout-VMware-Virtual-Platform:~/Desktop$ cd ~
wout@wout-VMware-Virtual-Platform:~$ ls
archive.tar.gz Desktop Documents Downloads hello Music Pictures Public snap tekst2.txt tekst.txt Templates test.txt Videos Website2
wout@wout-VMware-Virtual-Platform:~$ cd Website2
wout@wout-VMware-Virtual-Platform:~/Website2$ tree
.
├── site
│   ├── css
│   │   └── mypdfstyle.css
│   ├── home.html
│   ├── images
│   ├── index.html
│   ├── pdf
│   │   ├── week1.pdf
│   │   ├── week2.pdf
│   │   ├── week3.pdf
│   │   ├── week4.pdf
│   │   ├── week5.pdf
│   │   ├── week6.pdf
│   │   └── week7.pdf
│   ├── week1.html
│   ├── week2.html
│   ├── week3.html
│   ├── week4.html
│   ├── week5.html
│   ├── week6.html
│   └── week7.html
└── 5 directories, 17 files
wout@wout-VMware-Virtual-Platform:~/Website2$
```

Screenshot python3 webserver command:

```
wout@wout-VMware-Virtual-Platform:~/Website2/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.139.135 - - [09/Jan/2026 18:24:15] "GET / HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:15] "GET /css/mypdfstyle.css HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:15] "GET /home.html HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:16] "GET /favicon.ico HTTP/1.1" 404 -
192.168.139.135 - - [09/Jan/2026 18:24:16] "GET /week1.html HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:16] "GET /week2.html HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:16] "GET /week3.html HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:16] "GET /week4.html HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:16] "GET /week5.html HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:16] "GET /week6.html HTTP/1.1" 200 -
192.168.139.135 - - [09/Jan/2026 18:24:16] "GET /week7.html HTTP/1.1" 200 -
```

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.

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