Template Week 6 – Networking

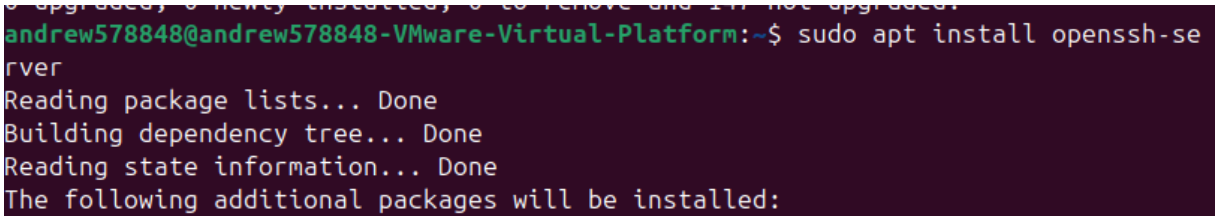
Student number:

578848

Assignment 6.1: Working from home

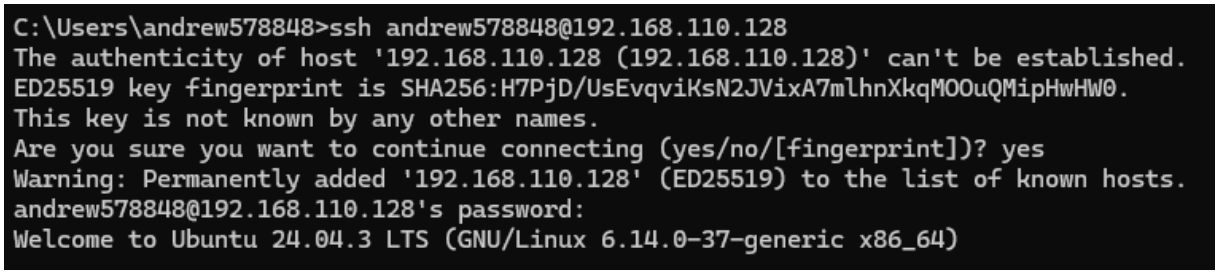
Screenshot installation openssh-server:

sudo apt install openssh-server:



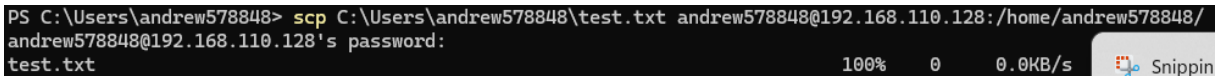
Screenshot successful SSH command execution:

ssh andrew578848@192.168.110.128

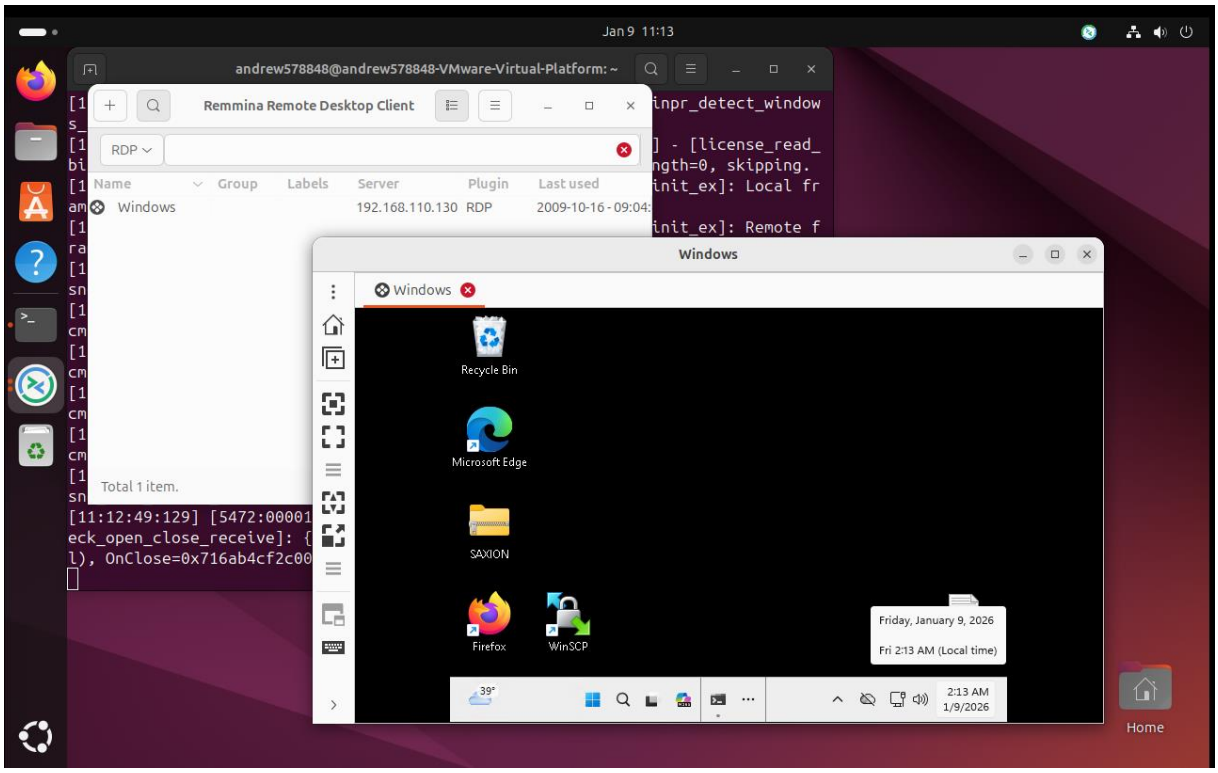


Screenshot successful execution SCP command:

Win to Ubuntu:



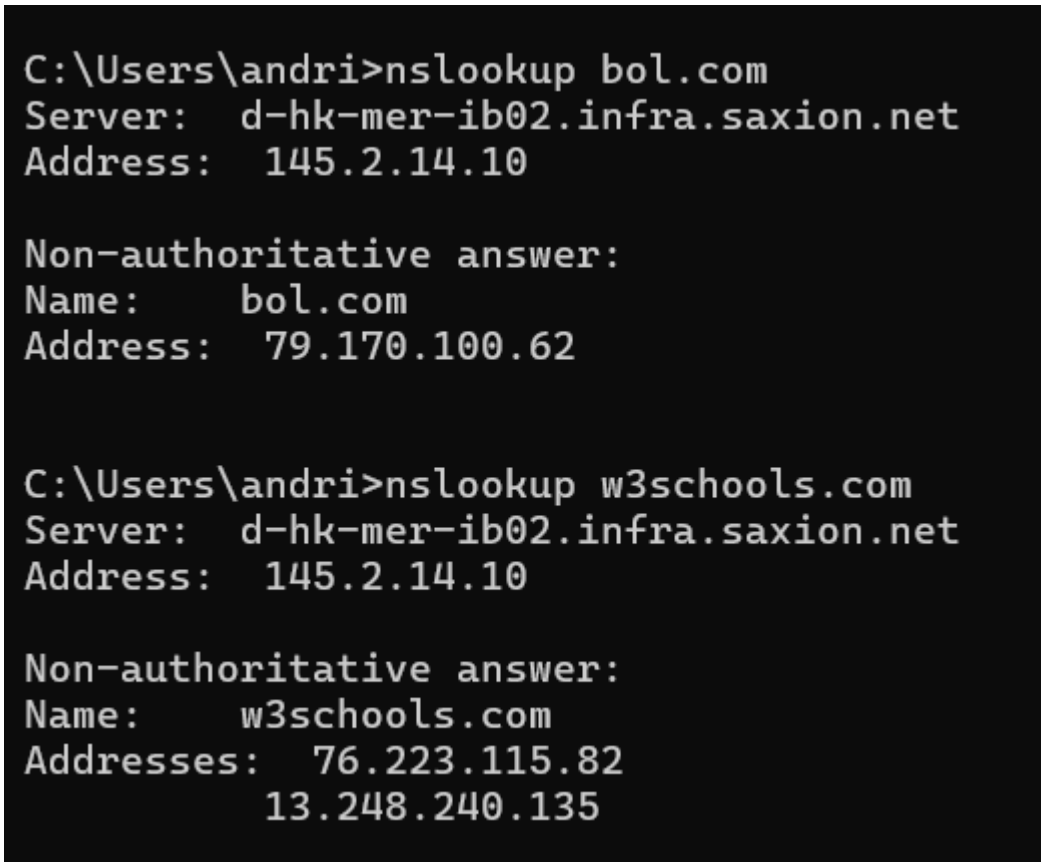
Screenshot remmina:



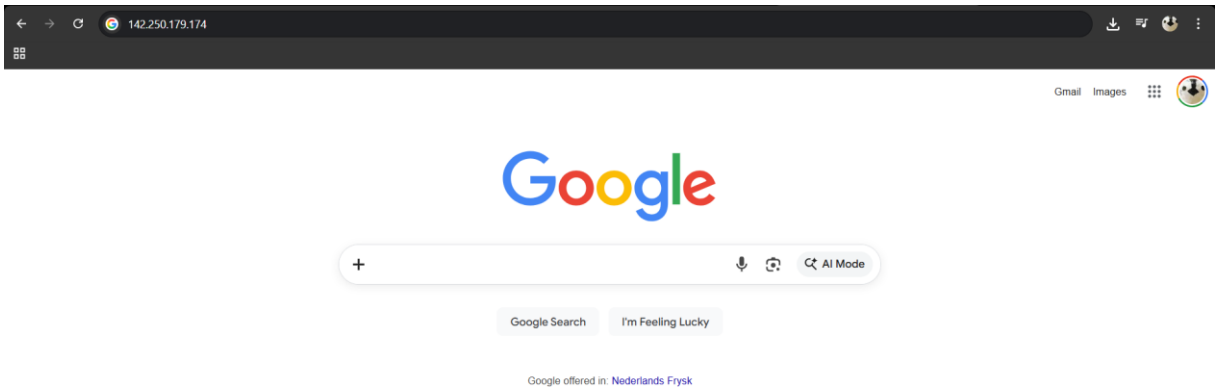
Assignment 6.2: IP addresses websites

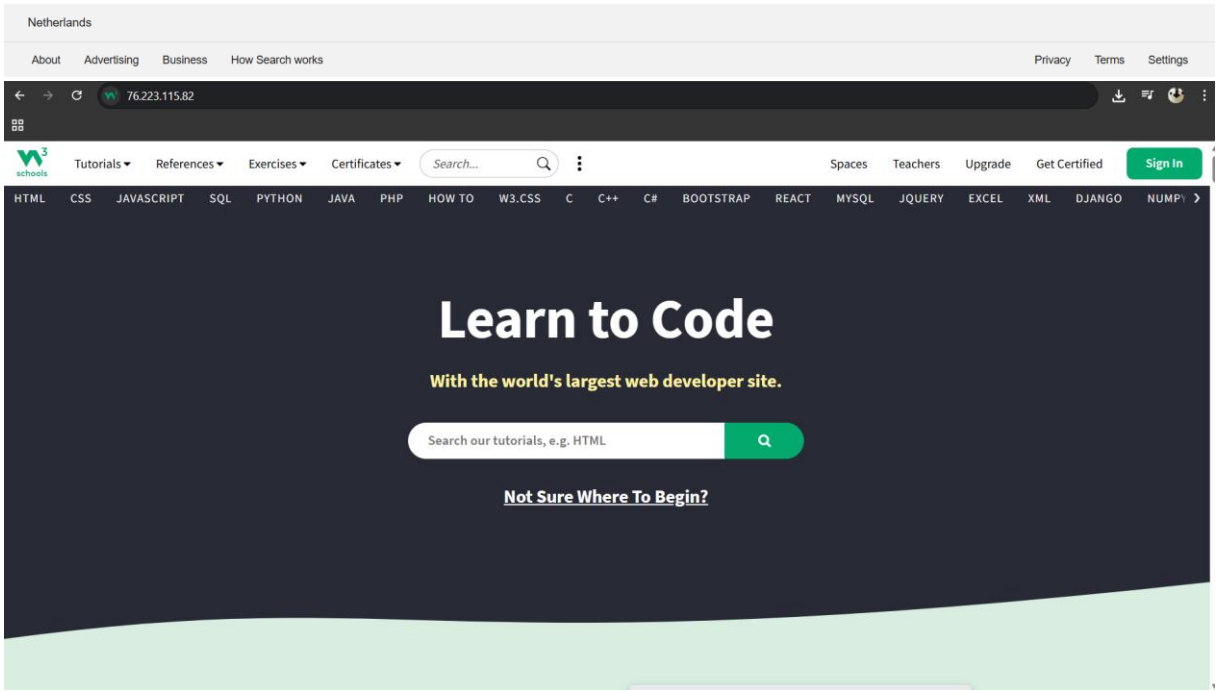
Relevant screenshots nslookup command:

```
C:\Users\andri>nslookup amazon.com
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

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


C:\Users\andri>nslookup google.com
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

Non-authoritative answer:
Name:    google.com
Addresses:  2a00:1450:400e:801::200e
          142.250.179.174


C:\Users\andri>nslookup one.one.one.one
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

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


C:\Users\andri>nslookup dns.google.com
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

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



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

2^7 = <u>128</u>

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

128 – 2 = <u>126</u>

So from 192.168.110.129 to 192.168.110.254

Check your two previous answers with this Linux command: `ipcalc 192.168.110.128/2`

Explain the above calculation in your own words.

Subnet of 25 tells us that the part that defines what network you are in is 25 bits long.

By subtracting it from total bit count we get that the part that defined what device you are inside the network is 7.

Meaning, that there are 7^2 ip addresses. 128 and 255 are reserved addresses, which leaves 126 usable addresses out of 128

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

```
andrew578848@andrew578848-VMware-Virtual-Platform:~/Downloads/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:c9:45:4f brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.110.128/24 brd 192.168.110.255 scope global dynamic noprefixroute ens33
       valid_lft 1038sec preferred_lft 1038sec
    inet6 fe80::20c:29ff:fec9:454f/64 scope link
       valid_lft forever preferred_lft forever
```

Screenshot of Site directory contents:

```
andrew578848@andrew578848-VMware-Virtual-Platform:~/Downloads/site$ tree
.
├── css
│   └── mypdfstyle.css
├── home.html
├── images
│   ├── node.png
│   └── ts.png
├── 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
```

Screenshot python3 webserver command:

```
andrew578848@andrew578848-VMware-Virtual-Platform:~/Downloads/site$ python3 -m h
ttp.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
127.0.0.1 - - [09/Jan/2026 12:37:44] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [09/Jan/2026 12:37:44] "GET /home.html HTTP/1.1" 200 -
127.0.0.1 - - [09/Jan/2026 12:37:44] "GET /css/mypdfstyle.css HTTP/1.1" 200 -
127.0.0.1 - - [09/Jan/2026 12:37:44] code 404, message File not found
127.0.0.1 - - [09/Jan/2026 12:37:44] "GET /favicon.ico HTTP/1.1" 404 -
127.0.0.1 - - [09/Jan/2026 12:37:44] "GET /images/ts.png HTTP/1.1" 200 -
127.0.0.1 - - [09/Jan/2026 12:37:44] "GET /images/node.png HTTP/1.1" 200 -
192.168.110.1 - - [09/Jan/2026 12:38:21] "GET / HTTP/1.1" 200 -
192.168.110.1 - - [09/Jan/2026 12:38:21] "GET /home.html HTTP/1.1" 200 -
192.168.110.1 - - [09/Jan/2026 12:38:21] "GET /css/mypdfstyle.css HTTP/1.1" 200
-
192.168.110.1 - - [09/Jan/2026 12:38:21] "GET /images/ts.png HTTP/1.1" 200 -
192.168.110.1 - - [09/Jan/2026 12:38:21] "GET /images/node.png HTTP/1.1" 200 -
192.168.110.1 - - [09/Jan/2026 12:38:21] code 404, message File not found
192.168.110.1 - - [09/Jan/2026 12:38:21] "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.

```
import java.util.Arrays;
import java.util.Scanner;

public static class Main {
   static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);
```

```
        System.out.print("Enter an IP Address: ");
        Integer[] ipChunks = parseIp(scanner.nextLine());

        System.out.print("Enter a subnet: ");
        Integer[] subnetChunks = parseIp(scanner.nextLine());

        StringBuilder networkAddress = new StringBuilder();
        for (int i = 0;  i < 4;  i++) {
            networkAddress.append((ipChunks[i] & subnetChunks[i])).append(i < 3 ? "." : "");
        }

        System.out.println("The network address is: " + networkAddress);
    }

    static Integer[] parseIp(String input) {
        return Arrays.stream(input.split("\\."))
                .limit(4)
                .map(Integer::parseInt)
                .toArray(Integer[]::new);
    }
}
```

```
Enter an IP Address:
192.168.1.100
Enter a subnet:
255.255.255.224
The network address is: 192.168.1.96
```

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