Template Week 6 – Networking

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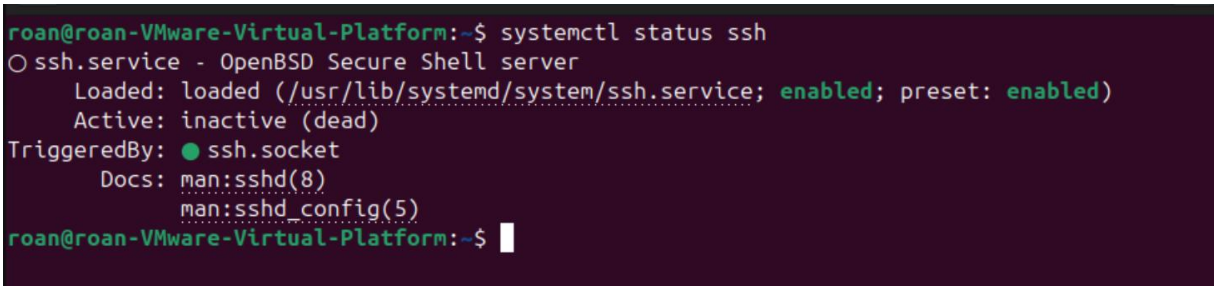
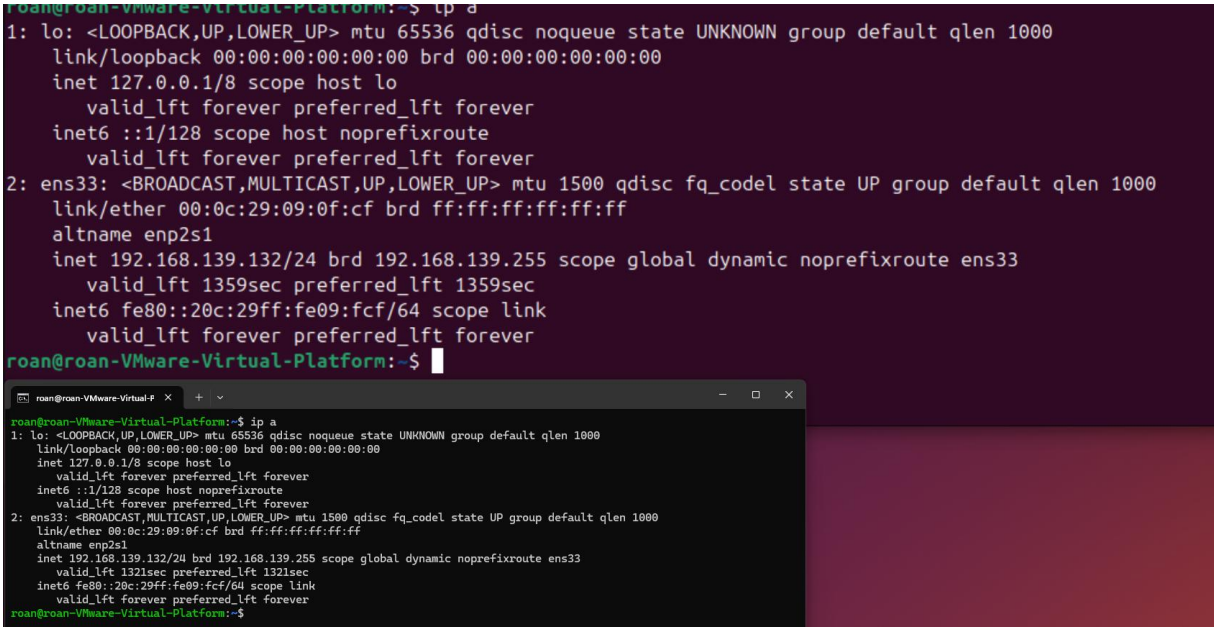
Assignment 6.1: Working from home

Screenshot installation openssh-server:



Screenshot successful SSH command execution:

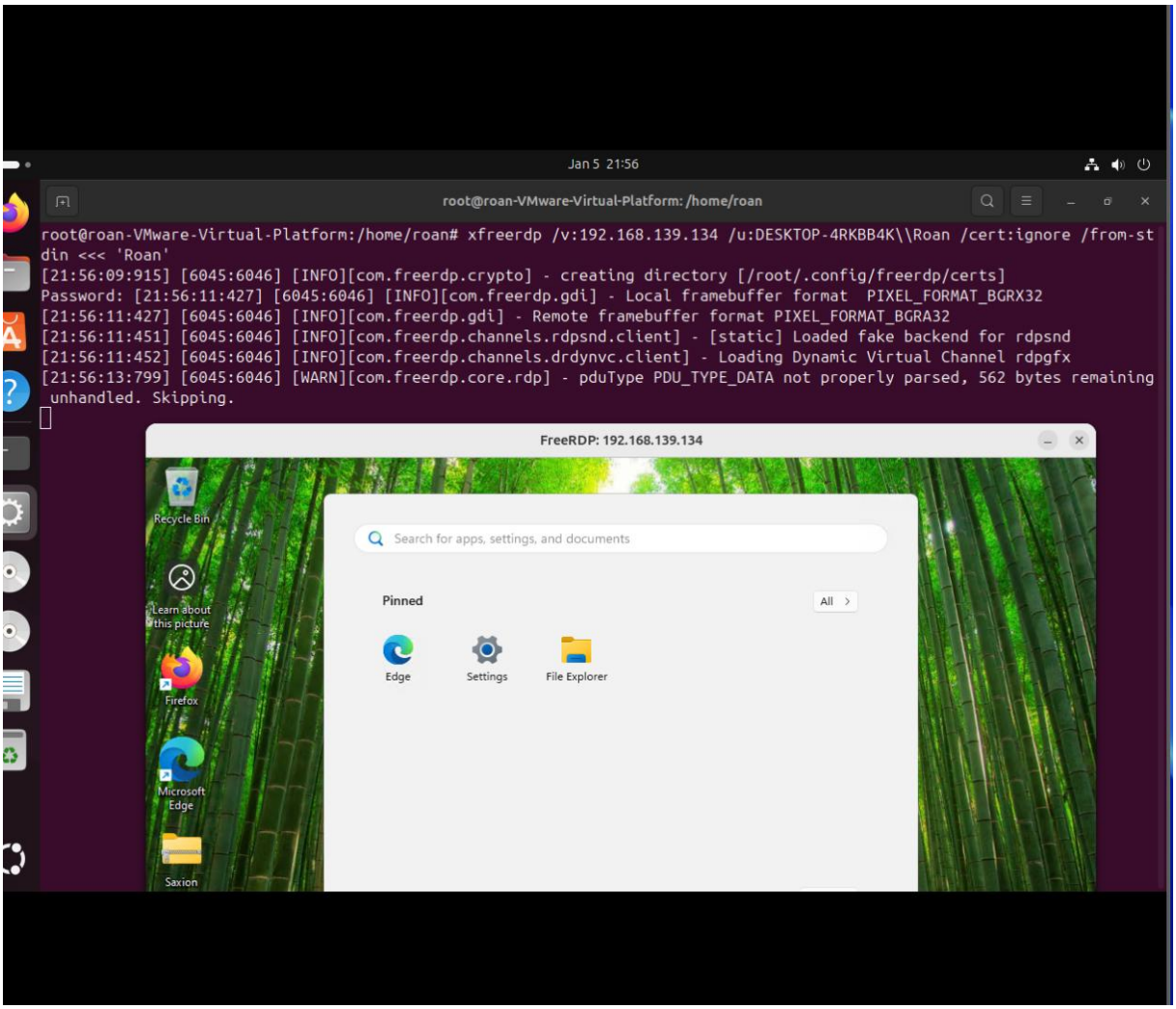


Screenshot successful execution SCP command:

```
C:\Users\Zbook>scp "C:\Users\Zbook\OneDrive - Saxion\Bureaublad\linuxtest.txt" roan@192.168.139.132:/home/roan/
roan@192.168.139.132's password:
linuxtest.txt                                                                                 100%   11     5.4KB/s   00:00

C:\Users\Zbook>
```

```
roan@roan-VMware-Virtual-Platform:~$ ls -l
total 2456
-rw-rw-r-- 1 roan roan   90161 Jan  5 17:29 apple2.jpg
-rw-r--r-- 1 root root    1856 Jan  5 17:21 decoded.gif
-rw-r--r-- 1 root root    1856 Jan  5 17:23 decoded.txt
drwxr-xr-x 2 roan roan    4096 Sep  7 16:46 Desktop
drwxr-xr-x 3 roan roan    4096 Jan  5 16:45 Documents
drwxr-xr-x 6 roan roan    4096 Jan  2 16:40 Downloads
-rw-r--r-- 1 root root    2509 Jan  5 17:20 email-base64.txt
-rw-rw-r-- 1 roan roan      11 Jan  5 21:07 linuxtest.txt
-rw-r--r-- 1 root root      48 Jan  5 17:30 message.txt
drwxr-xr-x 2 roan roan    4096 Sep  7 16:46 Music
-rw-rw-r-- 1 roan roan 2361308 Jan  5 17:07 oldcar
drwxr-xr-x 2 roan roan    4096 Sep  7 16:46 Pictures
drwxr-xr-x 2 roan roan    4096 Sep  7 16:46 Public
drwx------ 7 roan roan    4096 Jan  5 16:34 snap
drwxr-xr-x 2 roan roan    4096 Sep  7 16:46 Templates
-rw-r--r-- 1 root root       0 Jan  5 15:59 testbestandviafileexplorer.txt
drwxr-xr-x 2 roan roan    4096 Sep  7 16:46 Videos
roan@roan-VMware-Virtual-Platform:~$
```

Screenshot remmina:



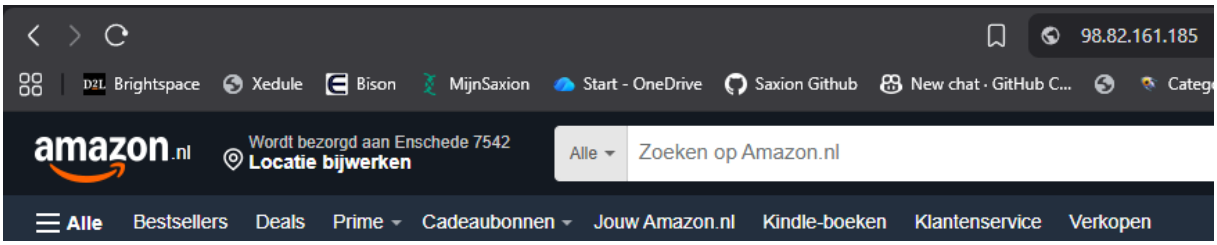
Remmina is niet gelukt want ik moet een domain name aangeven met freerdp werkt het wel.

Assignment 6.2: IP addresses websites

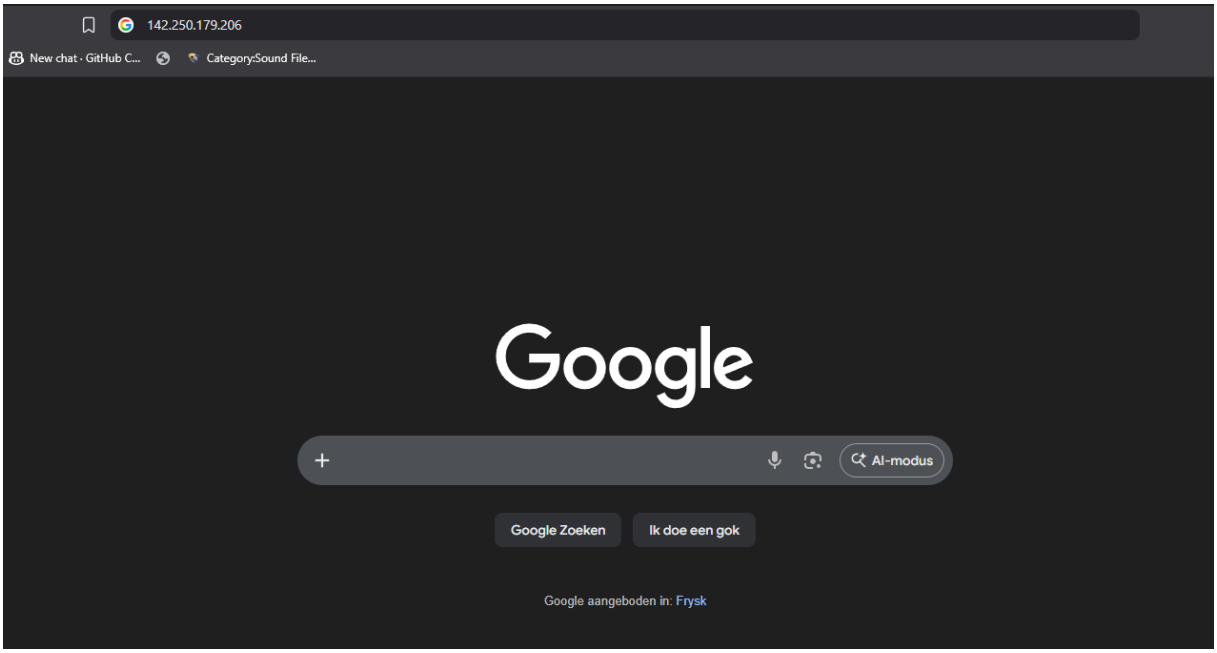
Relevant screenshots nslookup command:

```
C:\Windows\System32>nslookup
Default Server:  089-101-251229.customer.vmie.ie
Address:  89.101.251.229

> amazon.com
Server:  089-101-251229.customer.vmie.ie
Address:  89.101.251.229

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

> google.com
Server:  089-101-251229.customer.vmie.ie
Address:  89.101.251.229

Non-authoritative answer:
Name:    google.com
Addresses:  2a00:1450:400e:801::200e
          142.250.179.206

> one.one.one.one
Server:  089-101-251229.customer.vmie.ie
Address:  89.101.251.229

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:  089-101-251229.customer.vmie.ie
Address:  89.101.251.229

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

> bol.com
Server:  089-101-251229.customer.vmie.ie
Address:  89.101.251.229

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

> w3schools.com
Server:  089-101-251229.customer.vmie.ie
Address:  89.101.251.229

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

>
C:\Windows\System32>
```

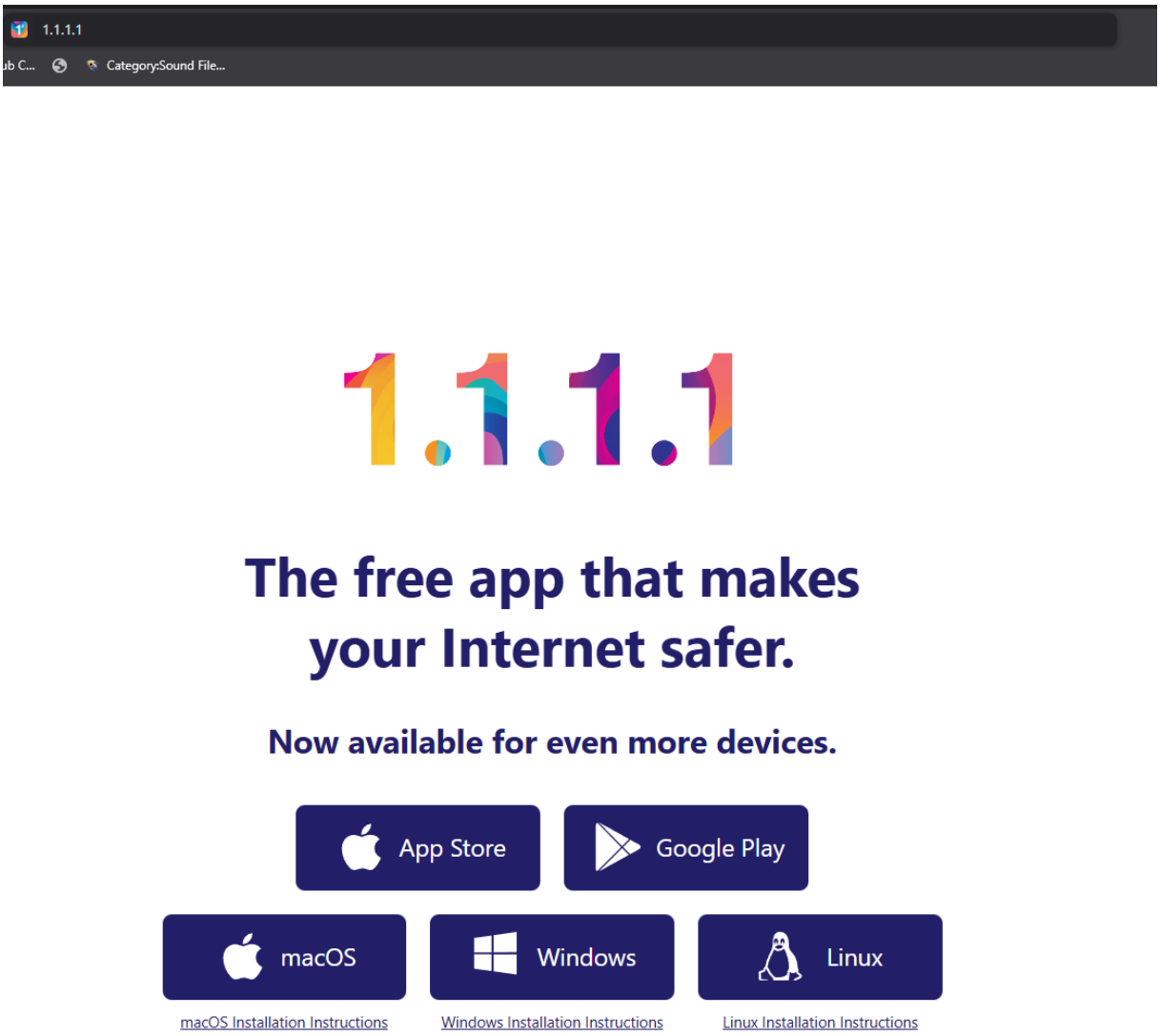
Screenshot website visit via IP address:



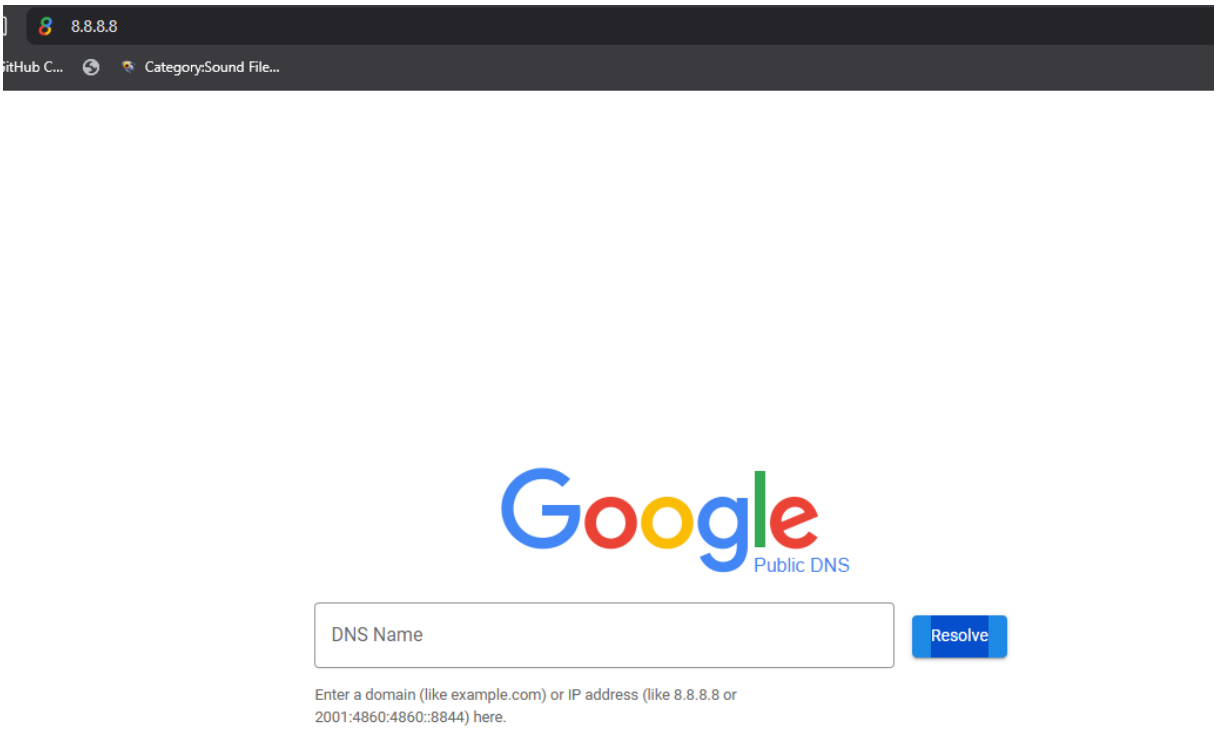
Hier zie je dat ik op amazon kom



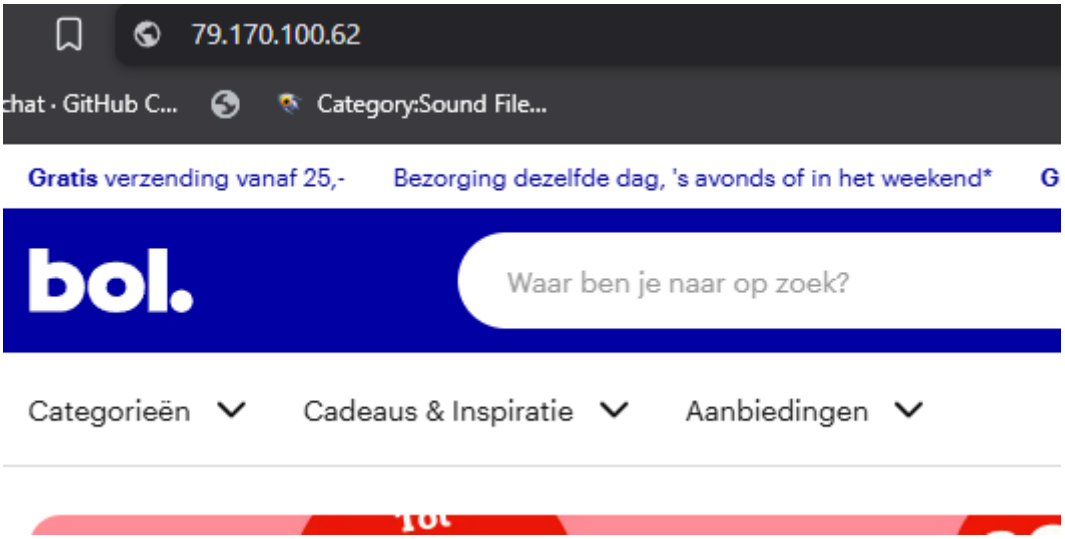
hier zie je dat ik op google kom via het IP address



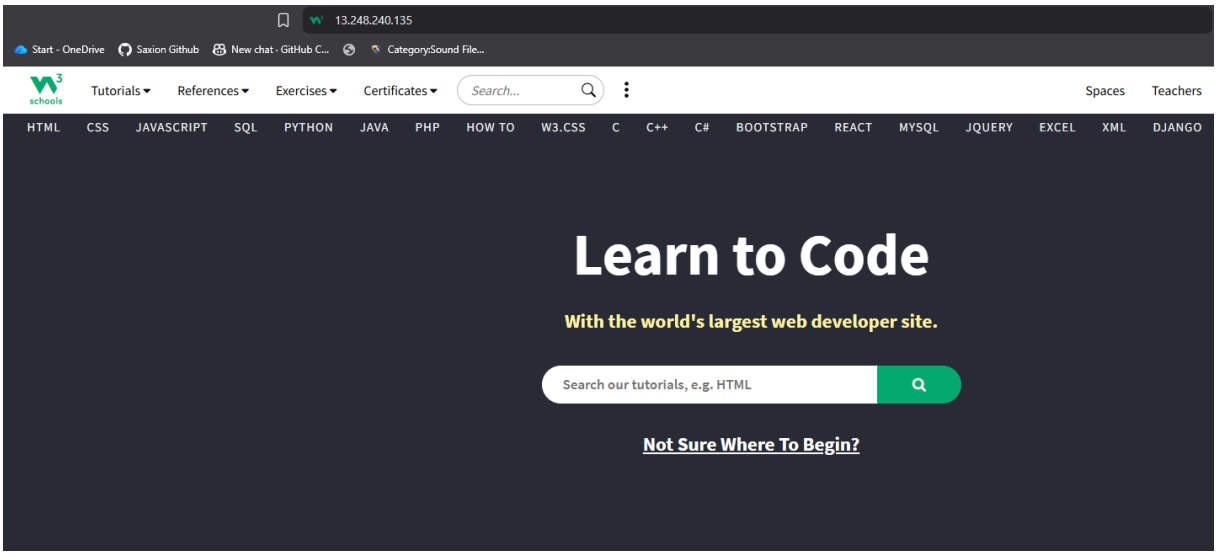
hier zie je dat ik op one one one one kom via het IP address



Hier zie je dat ik op DNS google kom via het IP address



Hier zie je dat ik op Bol kom via het IP address



hier zie je dat ik op w3school kom via het IP address

Assignment 6.3: subnetting

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

128 ip addressen namelijk

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 /25 is het dan 126

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

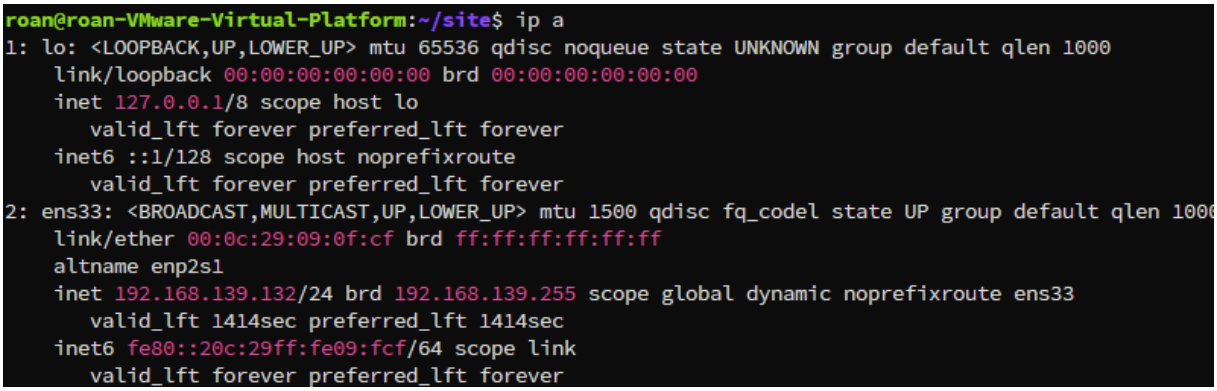
```
Address:   192.168.110.128       11000000.10101000.01101110.1 0000000
Netmask:   255.255.255.128 = 25  11111111.11111111.11111111.1 0000000
Wildcard:  0.0.0.127             00000000.00000000.00000000.0 1111111
=>
Network:   192.168.110.128/25    11000000.10101000.01101110.1 0000000
HostMin:   192.168.110.129       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

root@roan-VMware-Virtual-Platform:/home/roan#
```

Explain the above calculation in your own words.

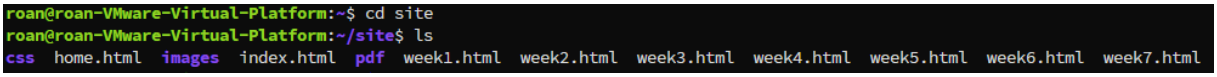
Het ip addres 192.168.110.128 gebruikt een subnet van 255.255.255.128, dat betekent dat er nog 7 bitjes over zijn. Deze 7 bitjes moet je in de macht van 2 doen vanwege het tweetallig stelsel (binair) dan wordt 128, daar moet je er nog twee van af halen vanwege het broadcast address en het network address. Dan heb je dus 126 over.

Assignment 6.4: HTML

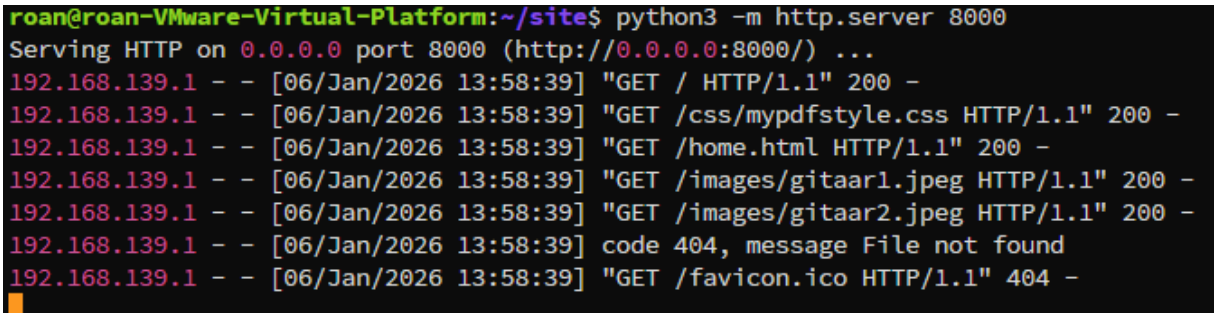
Screenshot IP address Ubuntu VM:



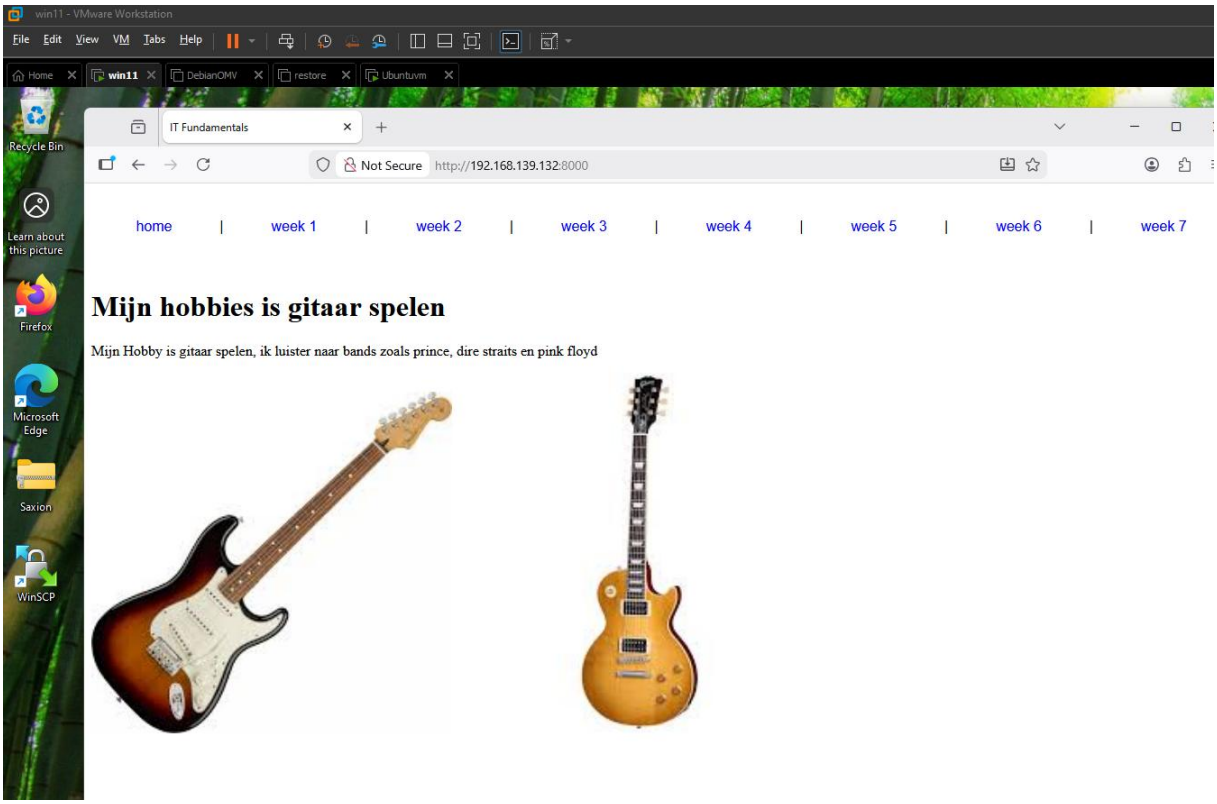
Screenshot of Site directory contents:



Screenshot python3 webserver command:



Screenshot web browser visits your site



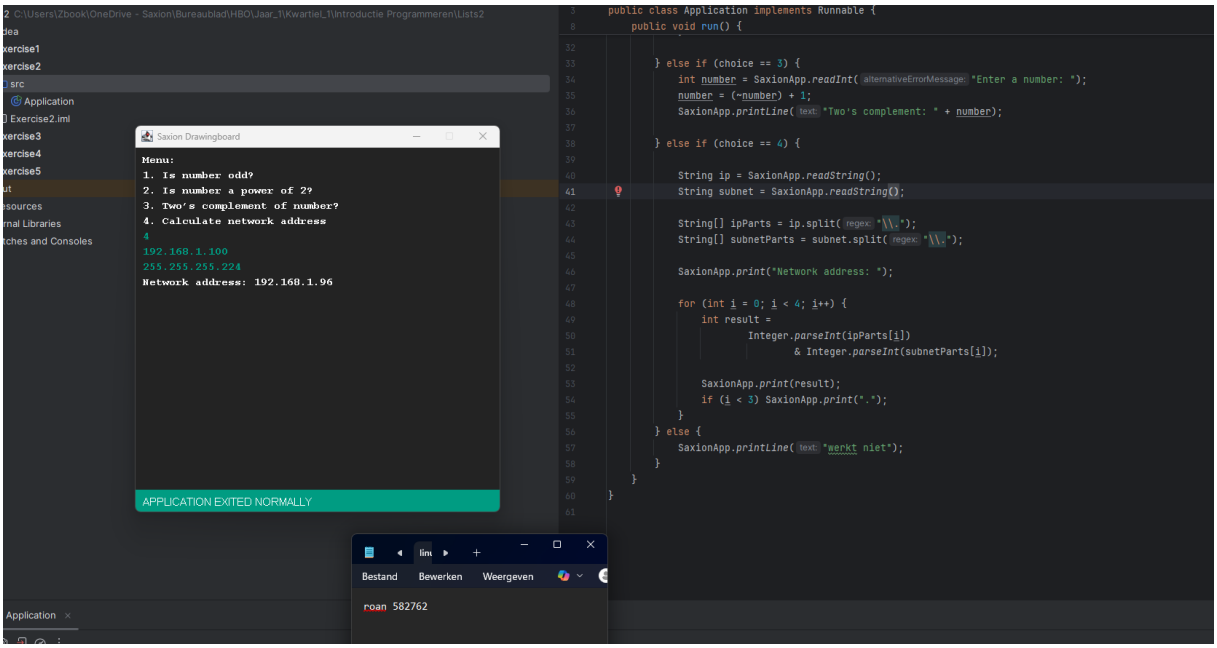
Assignment 6.5: Network segment

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 (2⁵).
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 Application implements Runnable {
  public static void main(String[] args) {
    SaxionApp.start(new Application(), 500, 500);
  }

  public void run() {

    SaxionApp.printLine("Menu:");
    SaxionApp.printLine("1. Is number odd?");
    SaxionApp.printLine("2. Is 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) {
      int number = SaxionApp.readInt("Enter a number: ");
      if ((number & 1) == 1) {
        SaxionApp.printLine("Number is odd");
      } else {
        SaxionApp.printLine("Number is even");
      }

    } else if (choice == 2) {
      int number = SaxionApp.readInt("Enter a number: ");
      if (number > 0 && (number & (number - 1)) == 0) {
        SaxionApp.printLine(number + " is a power of 2");
      } else {
        SaxionApp.printLine(number + " isn't a power of 2");
      }

    } else if (choice == 3) {
      int number = SaxionApp.readInt("Enter a number: ");
      number = (~number) + 1;
      SaxionApp.printLine("Two's complement: " + number);

    } else if (choice == 4) {

      // Geen tekst bij de readstring, als ik er tekst bij deed kreeg ik de SaxionApp.readString(color:) en dan kijkt hij naar kleur)
      String ip = SaxionApp.readString();
      String subnet = SaxionApp.readString();

      // split het ip en subnet op basis van een . en stop het in String[]
      String[] ipParts = ip.split("\\.");
      String[] subnetParts = subnet.split("\\.");

      SaxionApp.print("Network address: ");

      // loopje voor het berekenen van netwerk address, door de & operator te gebruiken.
      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(".");
      }
      //kleine failsafe als het niet werkt.
    } else {
      SaxionApp.printLine("werkt niet");
    }
  }
}
```

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