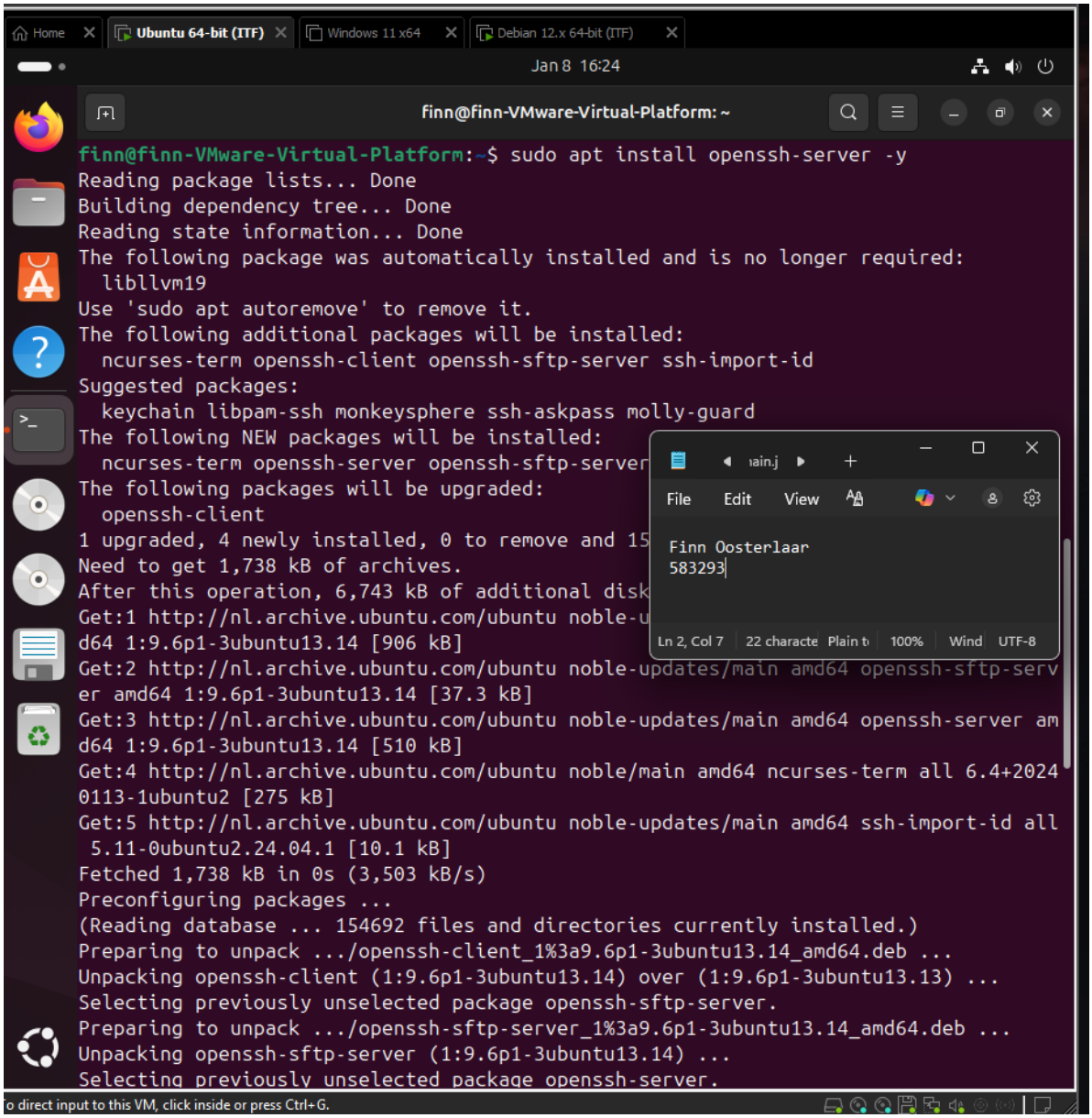
Template Week 6 – Networking

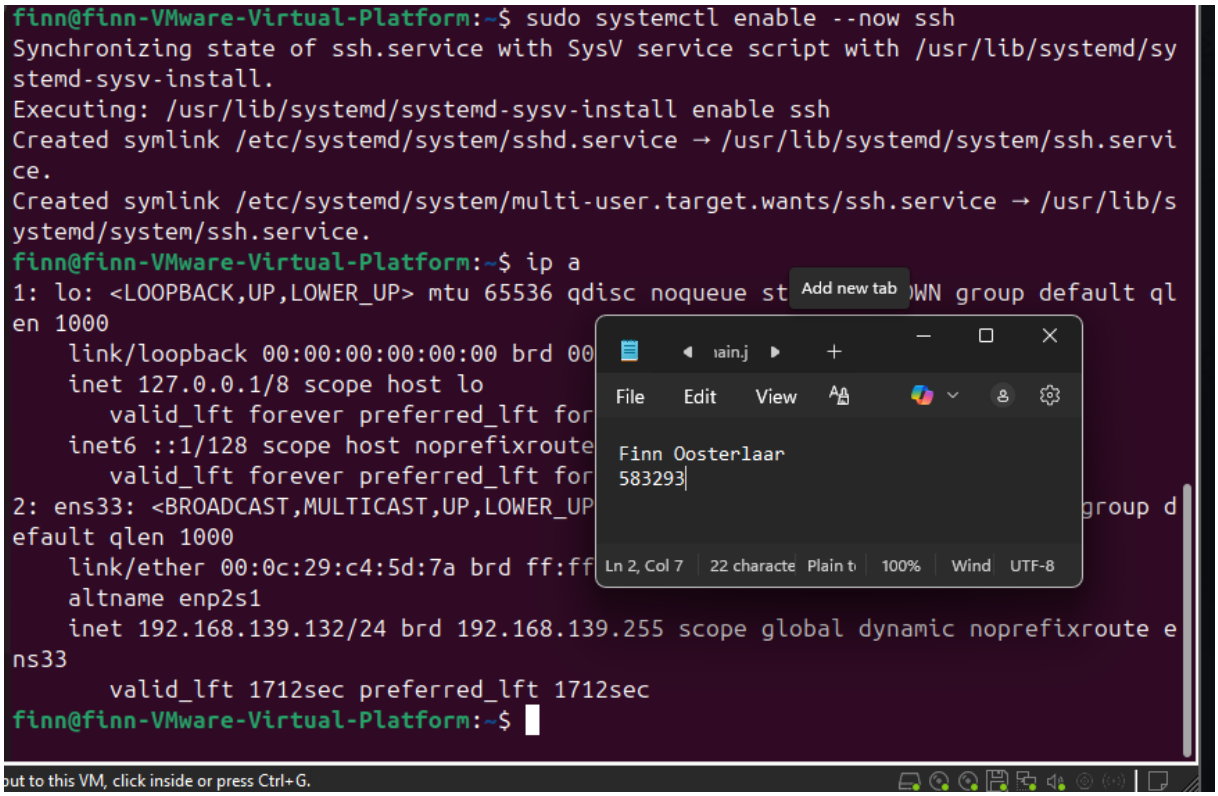
Student number: 583293

Assignment 6.1: Working from home

Screenshot installation openssh-server:



Screenshot successful SSH command execution:


finn@finn-VMware-Virtual-Platform:~$ sudo systemctl enable --now ssh
Synchronizing state of ssh.service with SysV service script with /usr/lib/systemd/sy
stemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
Created symlink /etc/systemd/system/sshd.service → /usr/lib/systemd/system/ssh.servi
ce.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /usr/lib/s
ystemd/system/ssh.service.
finn@finn-VMware-Virtual-Platform:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue st
Add new tab
WN group default ql
en 1000
link/loopback 00:00:00:00:00:00 brd 00
inet 127.0.0.1/8 scope host lo
valid_lft forever preferred_lft for
inet6 ::1/128 scope host noprefixroute
valid_lft forever preferred_lft for
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP
group d
efault qlen 1000
link/ether 00:0c:29:c4:5d:7a brd ff:ff
altname enp2s1
inet 192.168.139.132/24 brd 192.168.139.255 scope global dynamic noprefixroute e
ns33
valid_lft 1712sec preferred_lft 1712sec
finn@finn-VMware-Virtual-Platform:~$
File
Edit
View
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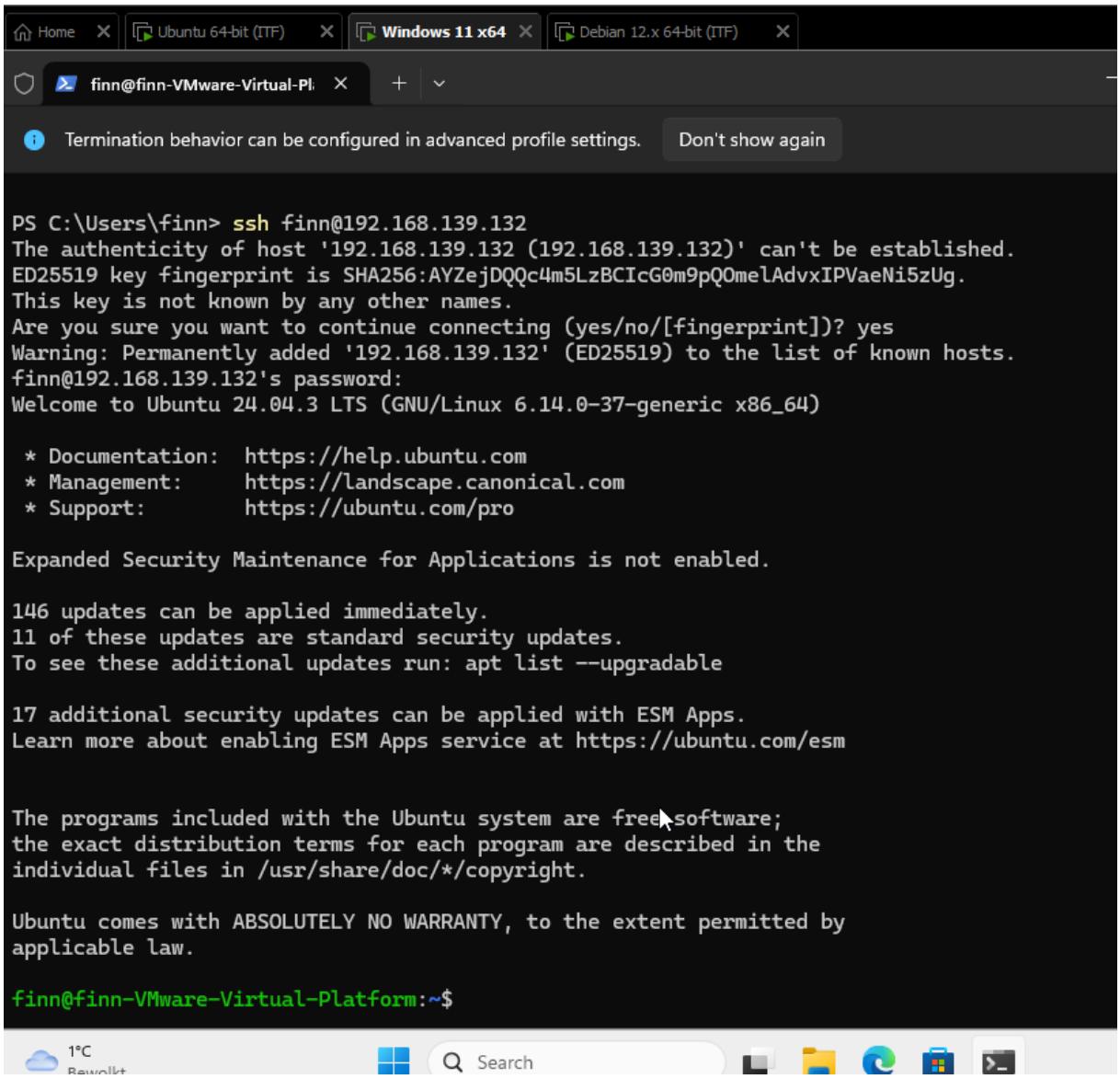
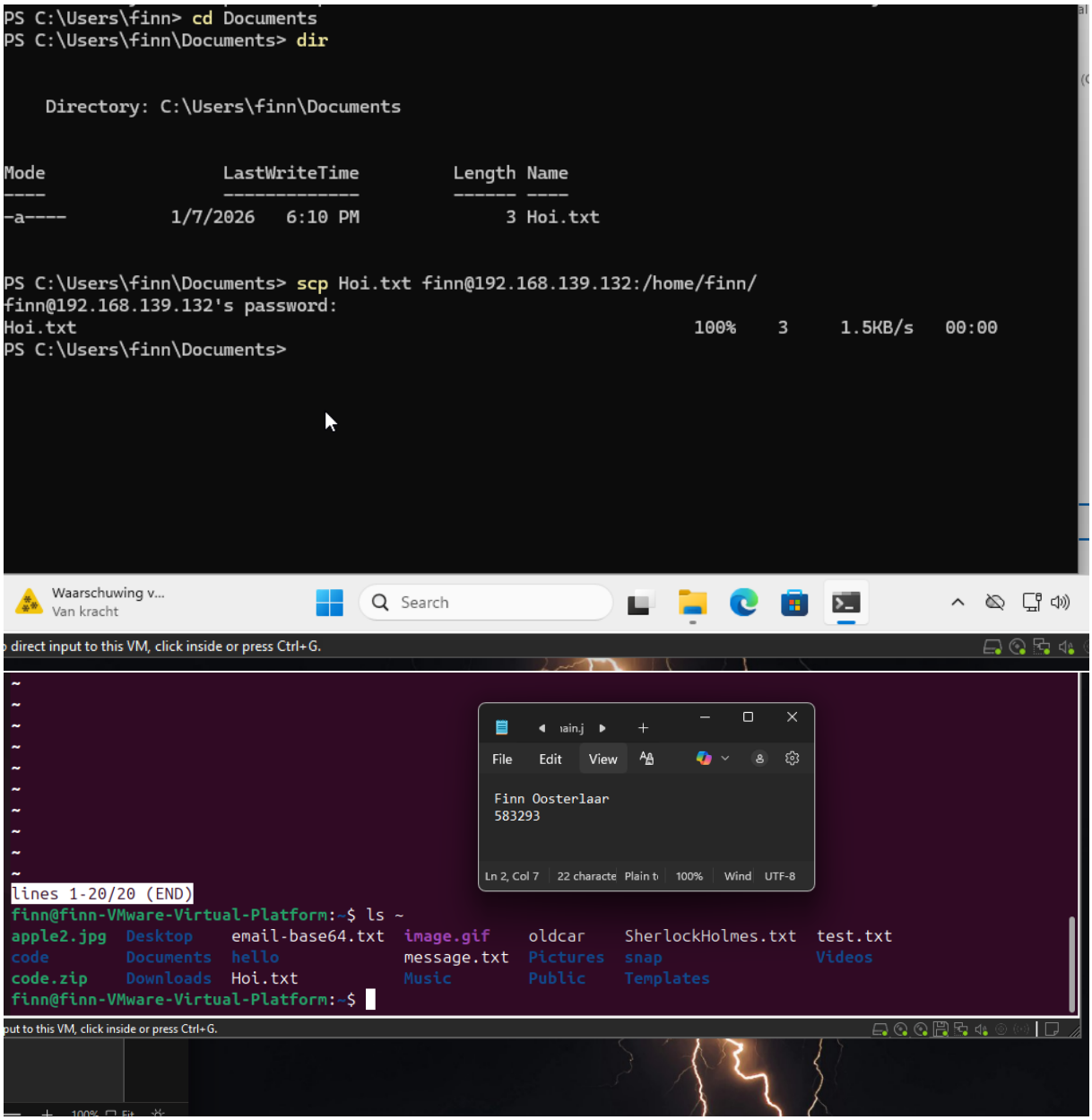
Ln 2, Col 7
22 characte
Plain t
100%
Wind
UTF-8
ut to this VM, click inside or press Ctrl+G.



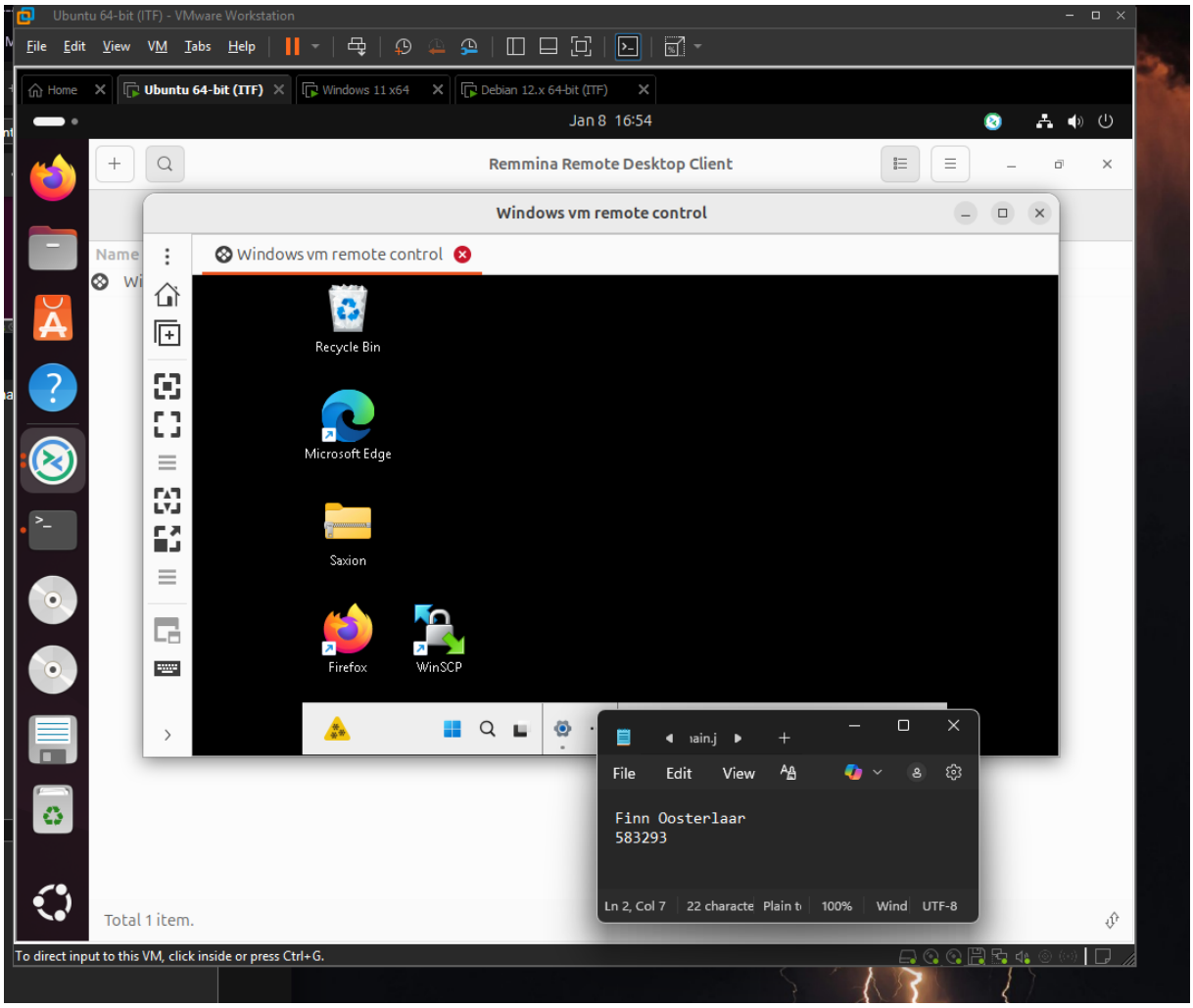
Screenshot successful execution SCP command:



De eerste screenshot laat zien dat ik op mijn windows vm het bestand Hoi.txt stuur naar de ubuntu vm via ssh.

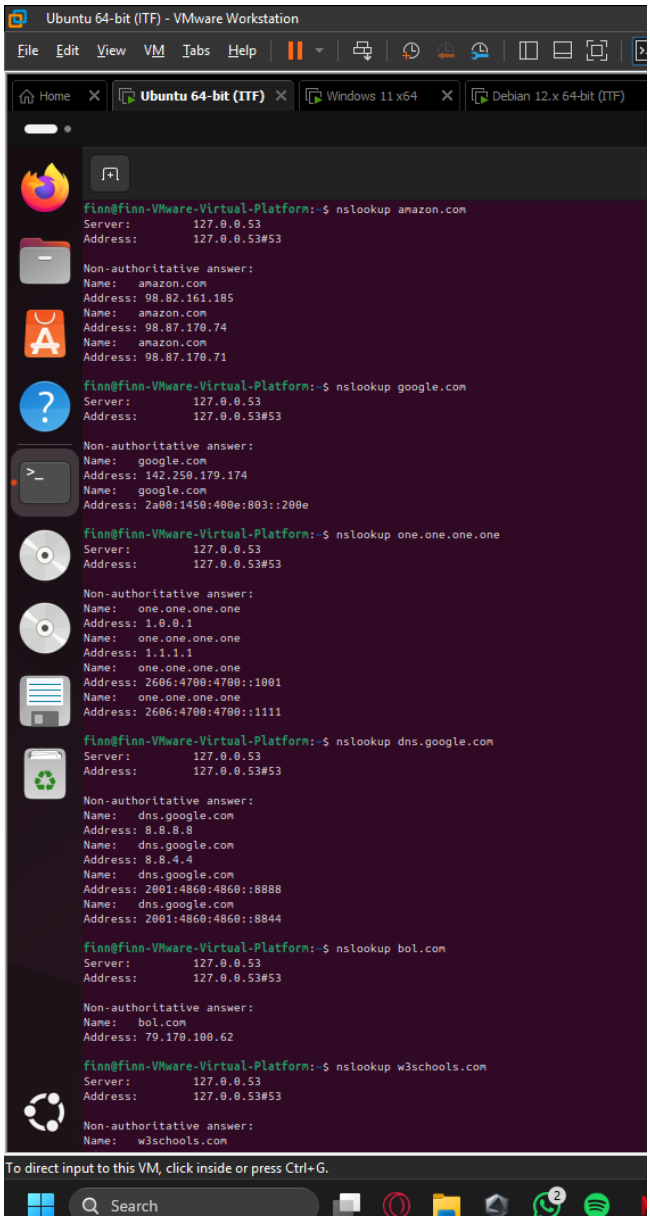
De tweede screenshot laat het bestand Hoi.txt zien op de ubuntu vm.

Screenshot remmina:

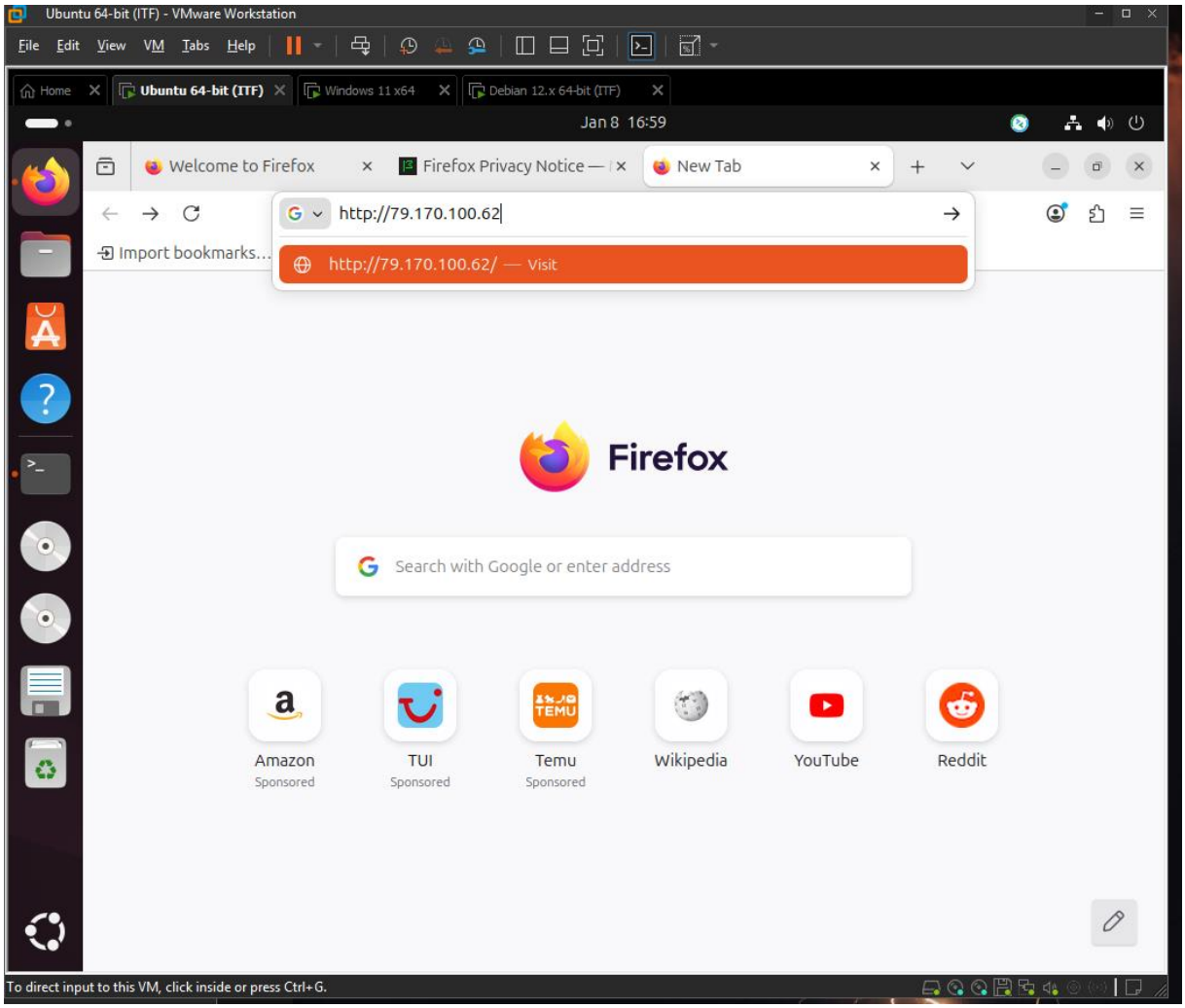


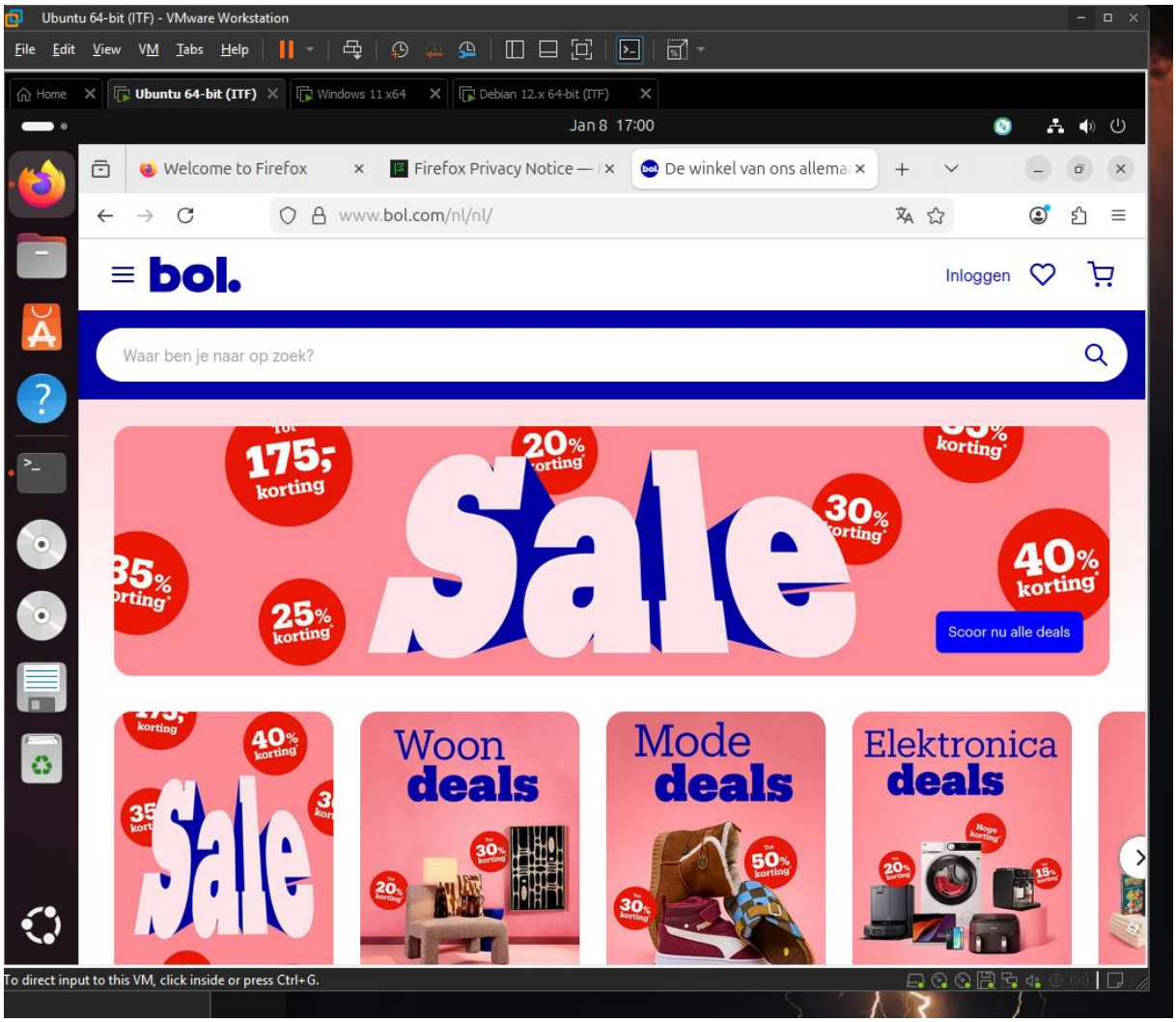
Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:



Screenshot website visit via IP address:


Ubuntu 64-bit (ITF) - VMware Workstation
File Edit View VM Tabs Help
Home
Ubuntu 64-bit (ITF)
Windows 11 x64
Debian 12.x 64-bit (ITF)
Jan 8 16:59
Welcome to Firefox
Firefox Privacy Notice —
New Tab
http://79.170.100.62
Import bookmarks...
http://79.170.100.62/ — Visit
Firefox
Search with Google or enter address
Amazon
Sponsored
TUI
Sponsored
Temu
Sponsored
Wikipedia
YouTube
Reddit
To direct input to this VM, click inside or press Ctrl+G.



Assignment 6.3: subnetting

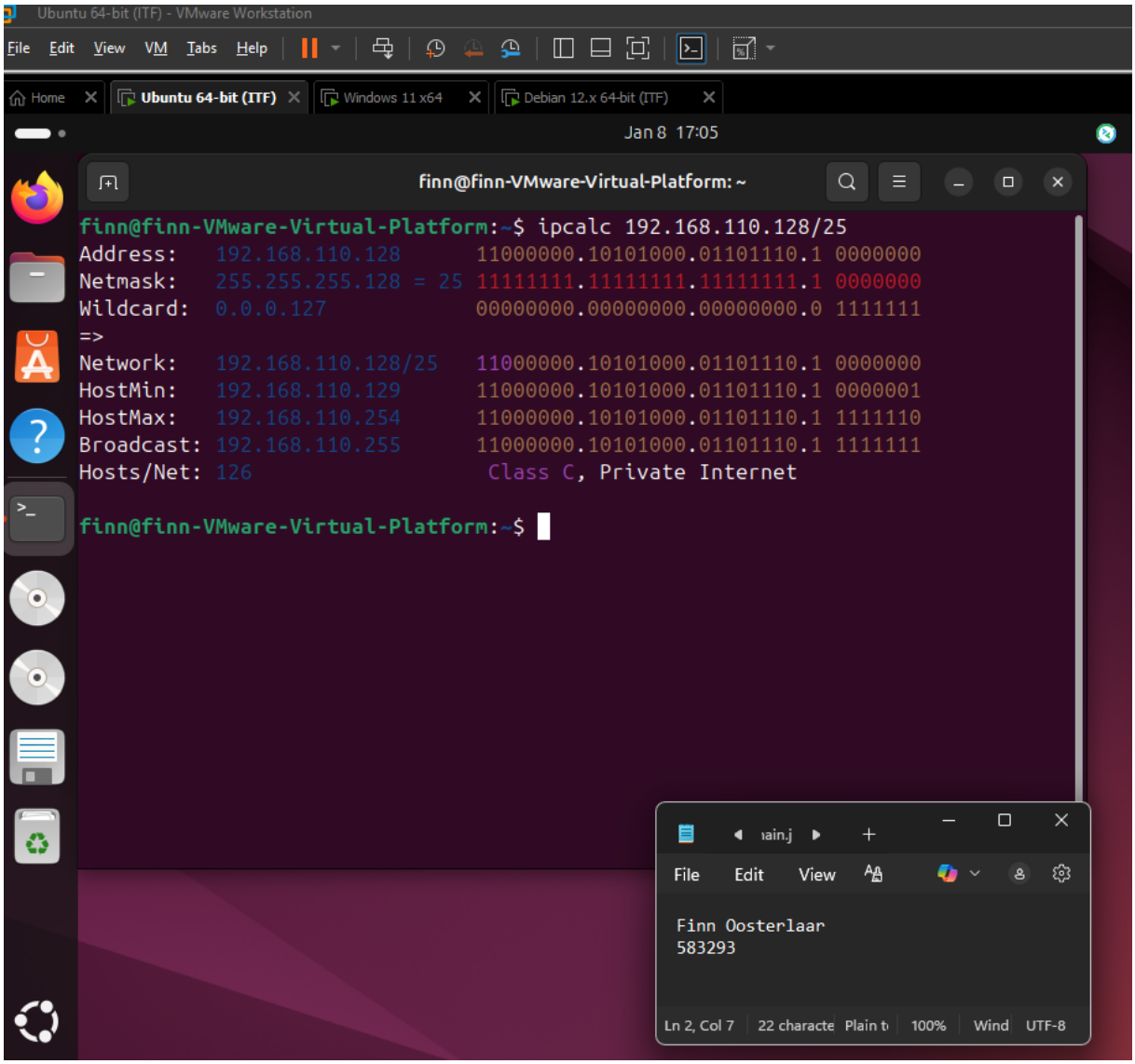
How many IP addresses are in this network configuration 192.168.110.128/25?

De /25 betekent dat er 7 bits over zijn voor hosts. Dus er zijn 2 tot de macht 7 = 128 ip adressen.

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

192.168.110.128 en 192.168.110.225 zijn niet te gebruiken voor aangesloten computers aangezien die door het netwerk zelf gebruikt worden. Dat betekent dat de ip adressen van 192.168.110.129 tot en met 192.168.110.254 bruikbaar zijn. Dus 126 bruikbare ip adressen.

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

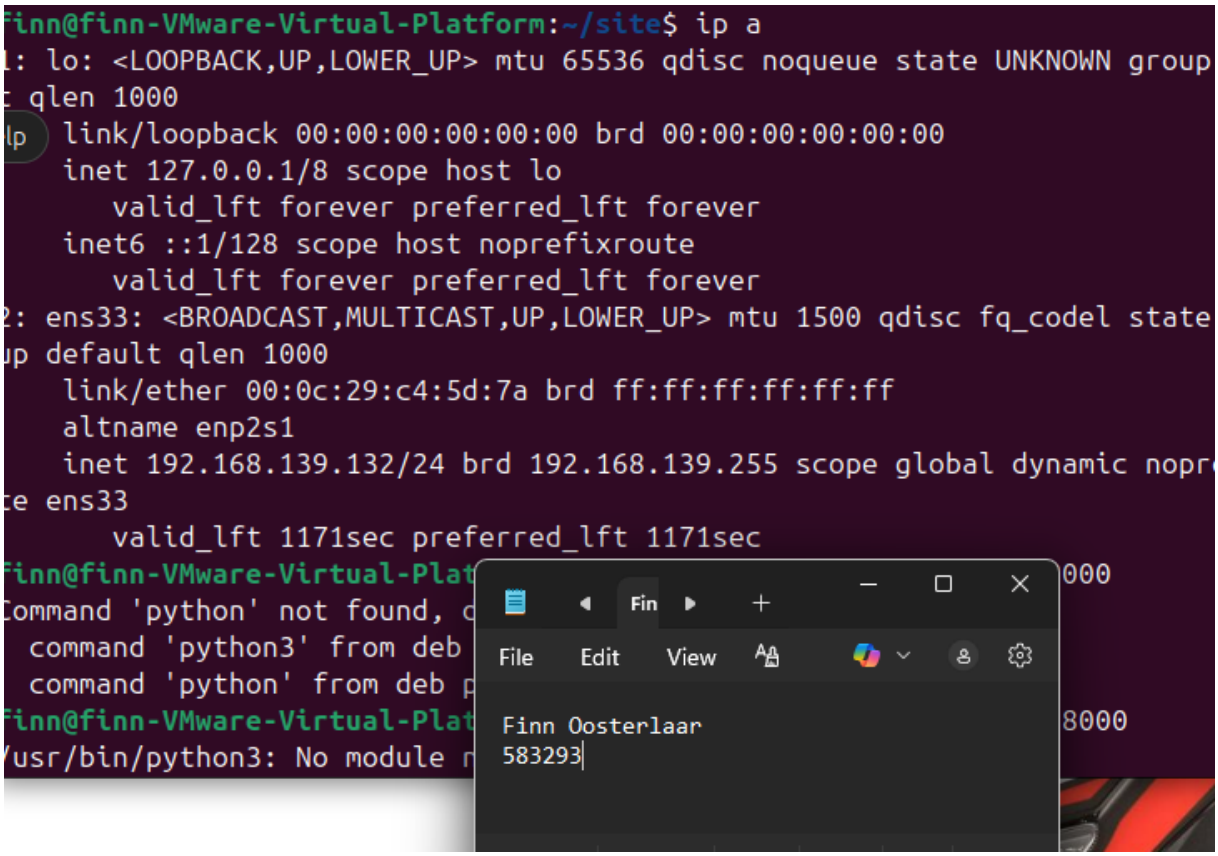


Explain the above calculation in your own words.

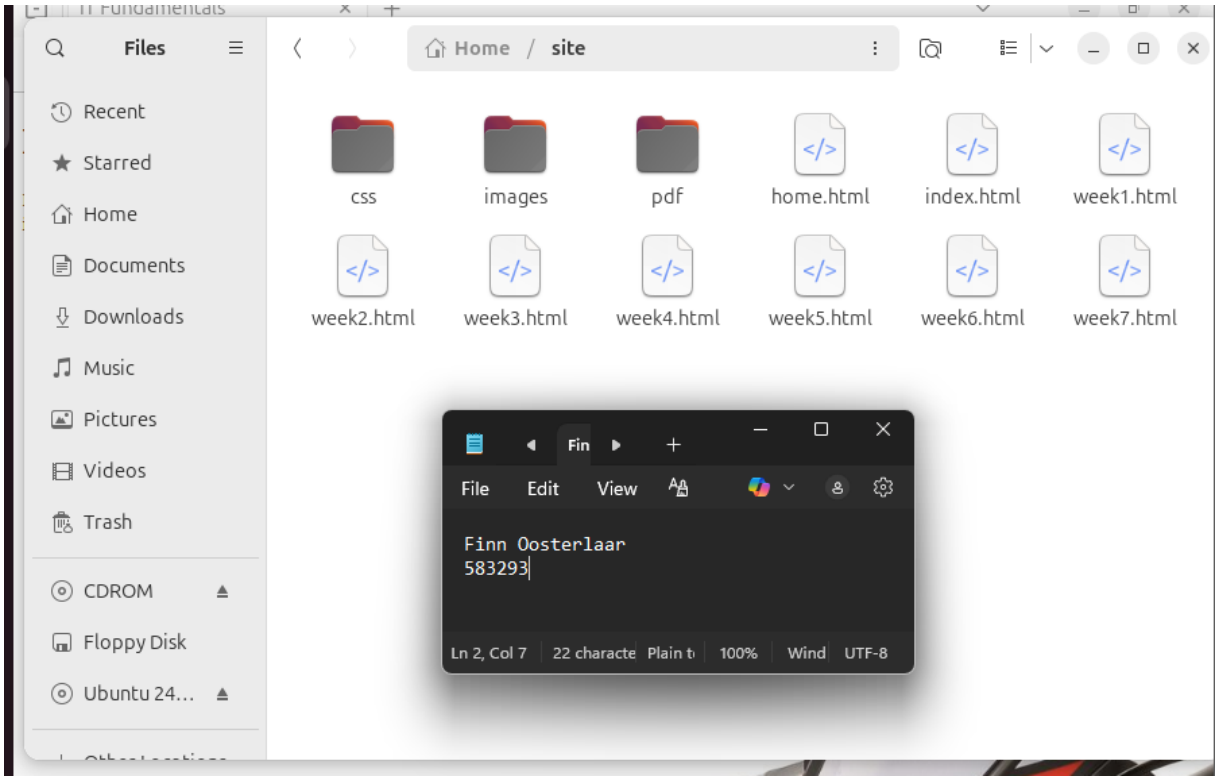
Bij een /25 netwerk wordt het normale /24 netwerk in twee gelijke delen gesplitst. Daardoor blijver er dus 7 bits over voor de hostadressen. Daarom heb je dus 128 IP adressen waarvan er twee gereserveerd zijn, een voor het netwerk en een voor het broadcasten van het netwerk. De rest kun je dus andere apparaten aan koppelen binnen je netwerk.

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

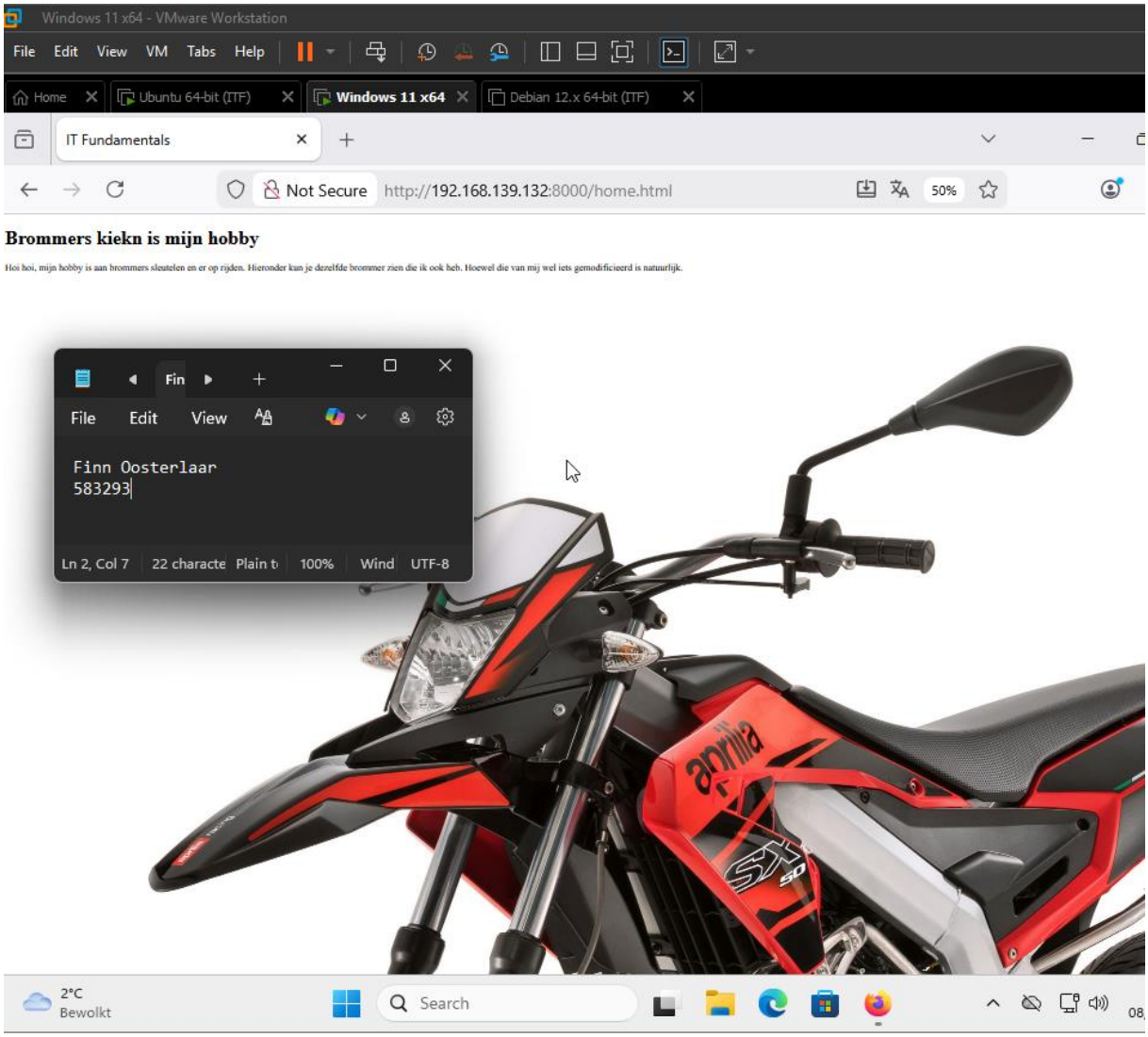


Screenshot of Site directory contents:



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 (2^5).
The range of this network segment is from 192.168.1.96 to 192.168.1.127.
```

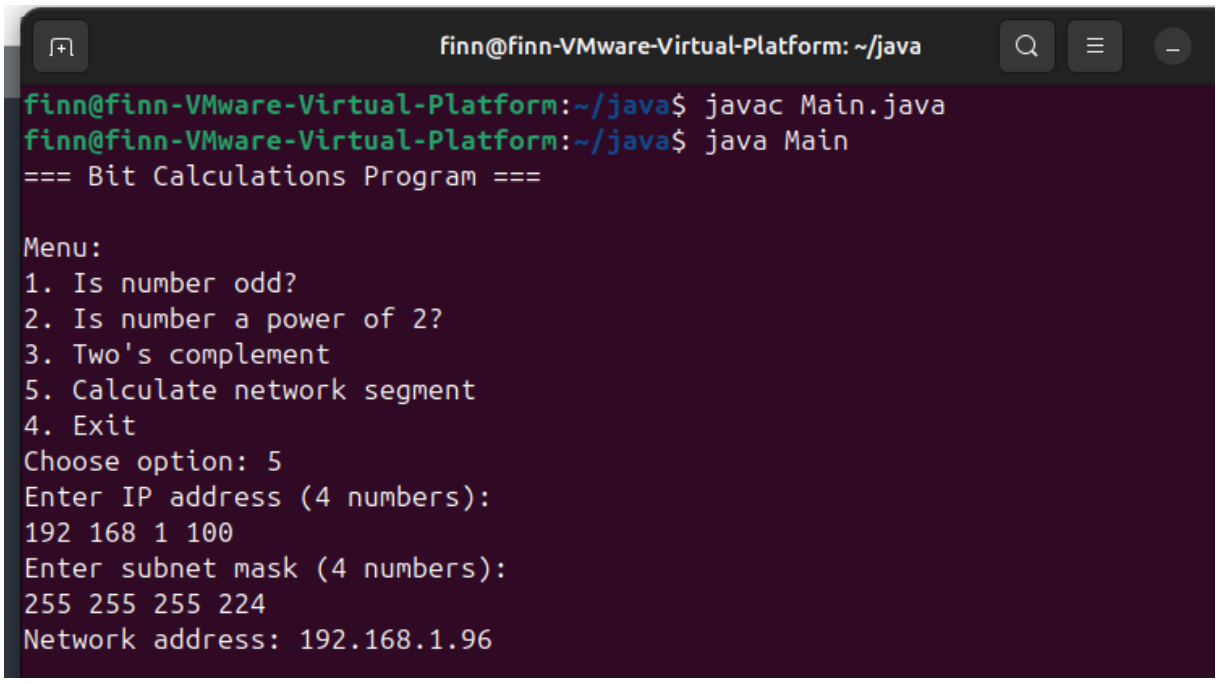
Paste source code here, with a screenshot of a working application.

```
import java.util.Scanner;


public class Main {


   public static void main(String[] args) {


      Scanner scanner = new Scanner(System.in);
      int choice;


      System.out.println("=== Bit Calculations Program ===");


      do {
         System.out.println("\nMenu:");
         System.out.println("1. Is number odd?");
         System.out.println("2. Is number a power of 2?");
         System.out.println("3. Two's complement");
         System.out.println("5. Calculate network segment");
         System.out.println("4. Exit");
         System.out.print("Choose option: ");


         choice = scanner.nextInt();
```

```
switch (choice) {
    case 1:
        System.out.print("Enter number: ");
        System.out.println("Odd? " + isOdd(scanner.nextInt()));
        break;

    case 2:
        System.out.print("Enter number: ");
        System.out.println("Power of 2? " + isPowerOfTwo(scanner.nextInt()));
        break;

    case 3:
        System.out.print("Enter number: ");
        System.out.println("Two's complement: " +
                twosComplement(scanner.nextInt()));
        break;

    case 5:
        int[] ip = new int[4];
        int[] subnet = new int[4];

        System.out.println("Enter IP address (4 numbers):");
        for (int i = 0; i < 4; i++) {
            ip[i] = scanner.nextInt();
        }

        System.out.println("Enter subnet mask (4 numbers):");
        for (int i = 0; i < 4; i++) {
            subnet[i] = scanner.nextInt();
        }
```

```
            int[] network = calculateNetwork(ip, subnet);

            System.out.println("Network address: "
                    + network[0] + "." + network[1] + "."
                    + network[2] + "." + network[3]);
            break;

        case 4:
            System.out.println("Exiting...");
            break;

        default:
            System.out.println("Invalid option!");
      }

    } while (choice != 4);

    scanner.close();
}

//week 2 methoden

public static boolean isOdd(int number) {
    return (number & 1) == 1;
}

public static boolean isPowerOfTwo(int number) {
    return number > 0 && (number & (number - 1)) == 0;
}
```

```
    public static int twosComplement(int number) {
        return (~number) + 1;
    }

    // week 6 uitbreiding

    public static int[] calculateNetwork(int[] ip, int[] subnet) {
        int[] network = new int[4];
        for (int i = 0; i < 4; i++) {
            network[i] = ip[i] & subnet[i];
        }
        return network;
    }
}
```



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