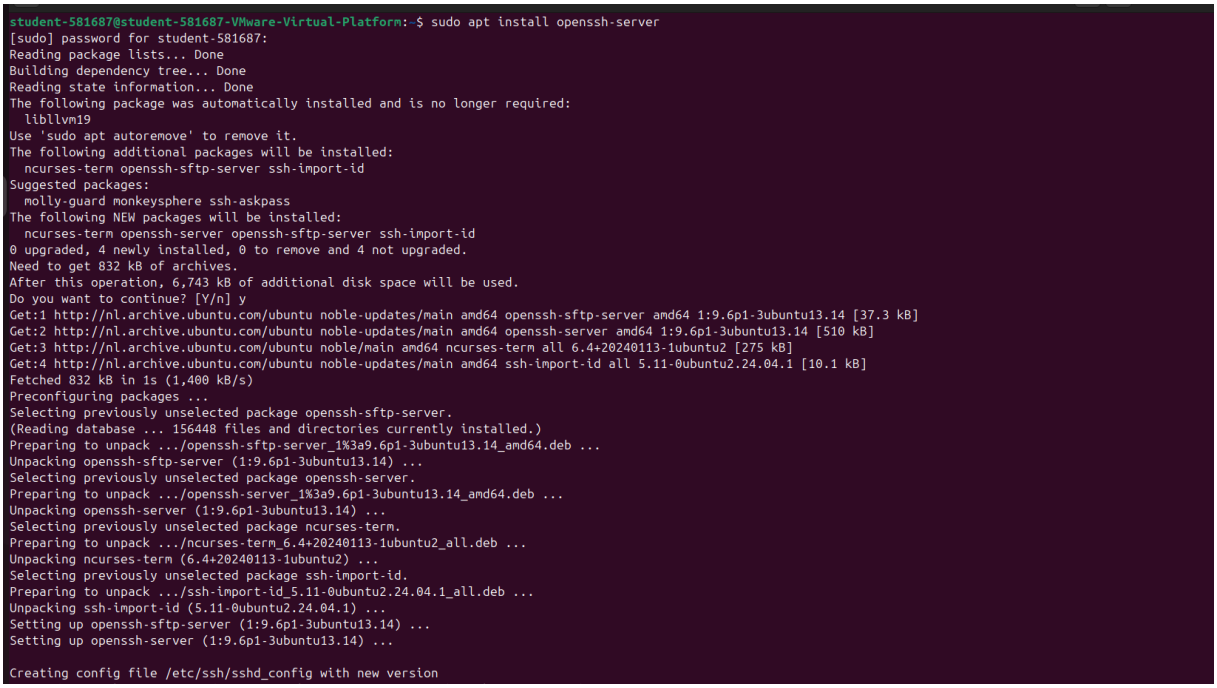
Template Week 6 – Networking

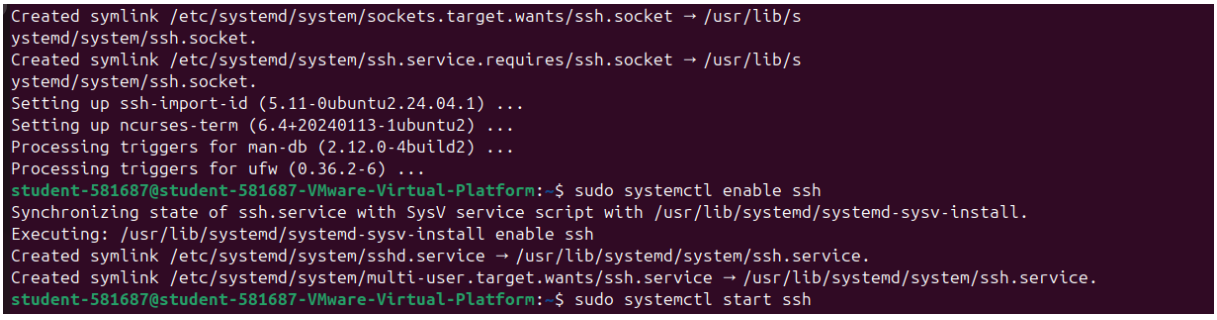
Student number:

Assignment 6.1: Working from home

Screenshot installation openssh-server:

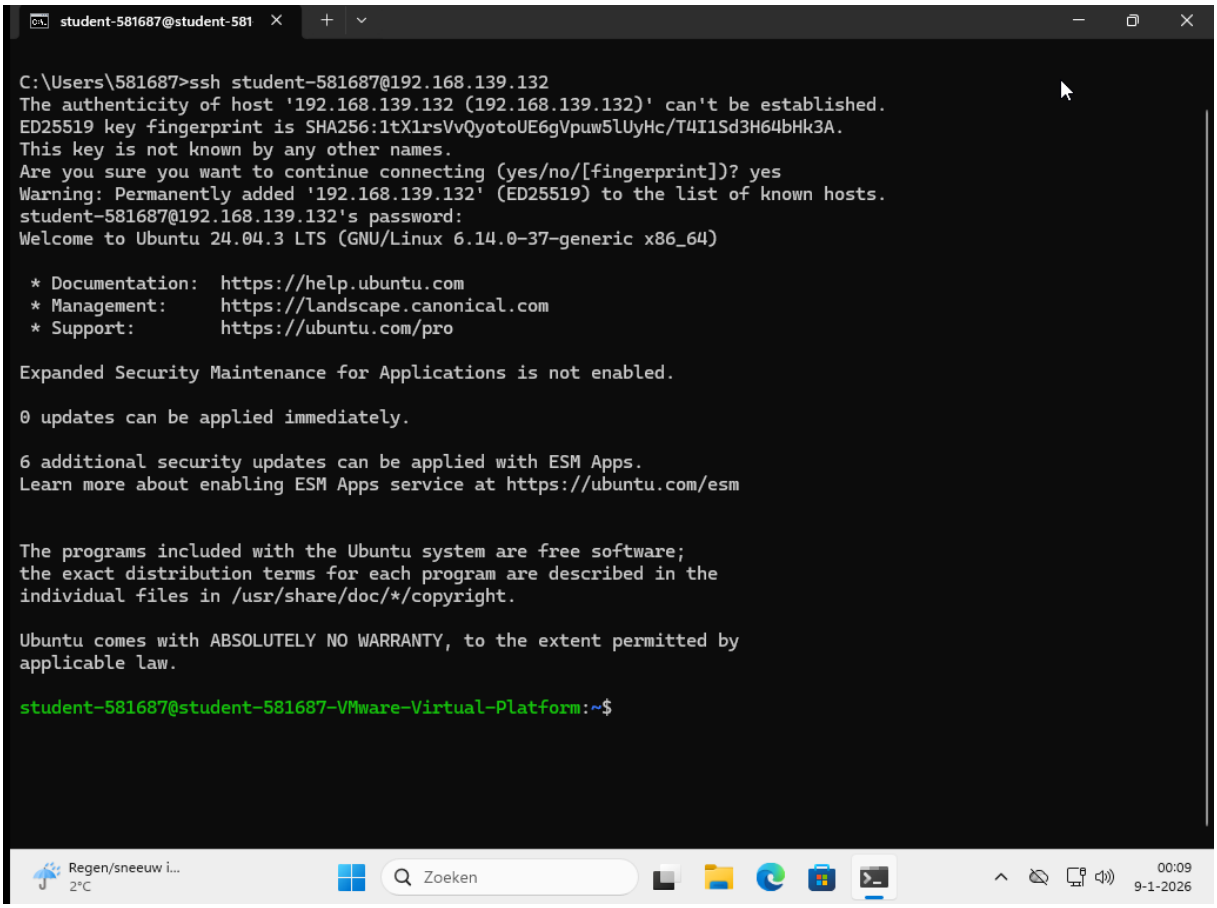


```
student-581687@student-581687-VMware-Virtual-Platform:~$ sudo apt install openssh-server
[sudo] password for student-581687:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  libllvm19
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 4 not upgraded.
Need to get 832 kB of archives.
After this operation, 6,743 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://nl.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-sftp-server amd64 1:9.6p1-3ubuntu13.14 [37.3 kB]
Get:2 http://nl.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-server amd64 1:9.6p1-3ubuntu13.14 [510 kB]
Get:3 http://nl.archive.ubuntu.com/ubuntu noble/main amd64 ncurses-term all 6.4+20240113-1ubuntu2 [275 kB]
Get:4 http://nl.archive.ubuntu.com/ubuntu noble-updates/main amd64 ssh-import-id all 5.11-0ubuntu2.24.04.1 [10.1 kB]
Fetched 832 kB in 1s (1,400 kB/s)
Preconfiguring packages ...
Selecting previously unselected package openssh-sftp-server.
(Reading database ... 156448 files and directories currently installed.)
Preparing to unpack .../openssh-sftp-server_1%3a9.6p1-3ubuntu13.14_amd64.deb ...
Unpacking openssh-sftp-server (1:9.6p1-3ubuntu13.14) ...
Selecting previously unselected package openssh-server.
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-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
```

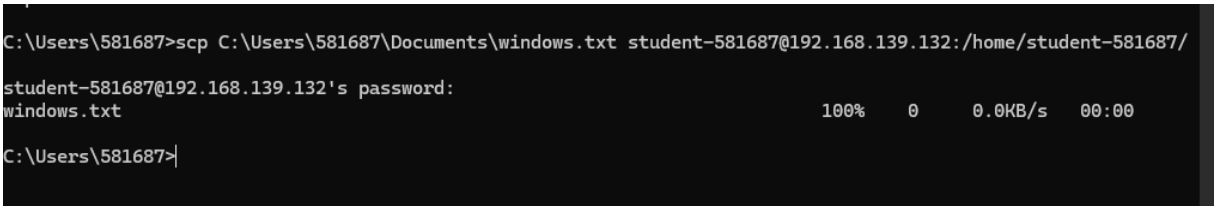


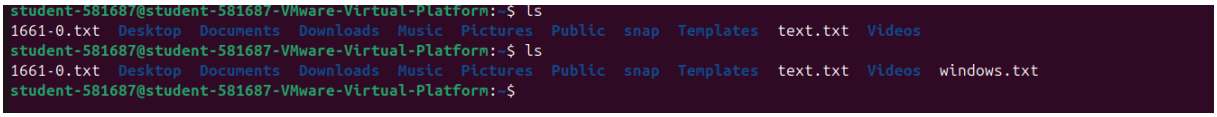
```
Created symlink /etc/systemd/system/sockets.target.wants/ssh.socket → /usr/lib/s
ystemd/system/ssh.socket.
Created symlink /etc/systemd/system/ssh.service.requires/ssh.socket → /usr/lib/s
ystemd/system/ssh.socket.
Setting up ssh-import-id (5.11-0ubuntu2.24.04.1) ...
Setting up ncurses-term (6.4+20240113-1ubuntu2) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for ufw (0.36.2-6) ...
student-581687@student-581687-VMware-Virtual-Platform:~$ sudo systemctl enable ssh
Synchronizing state of ssh.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
Created symlink /etc/systemd/system/sshd.service → /usr/lib/systemd/system/ssh.service.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /usr/lib/systemd/system/ssh.service.
student-581687@student-581687-VMware-Virtual-Platform:~$ sudo systemctl start ssh
```

Screenshot successful SSH command execution:



Screenshot successful execution SCP command:



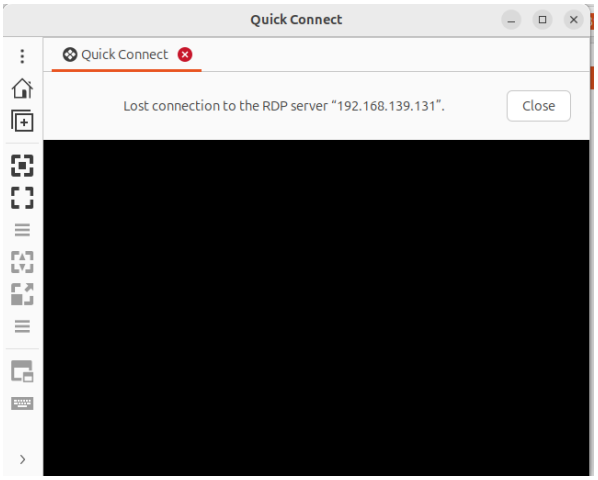


Screenshot remmina:

```
student-581687@student-581687-VMware-Virtual-Platform:~$ sudo apt install remmina remmina-plugin-rdp
[sudo] password for student-581687:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
```

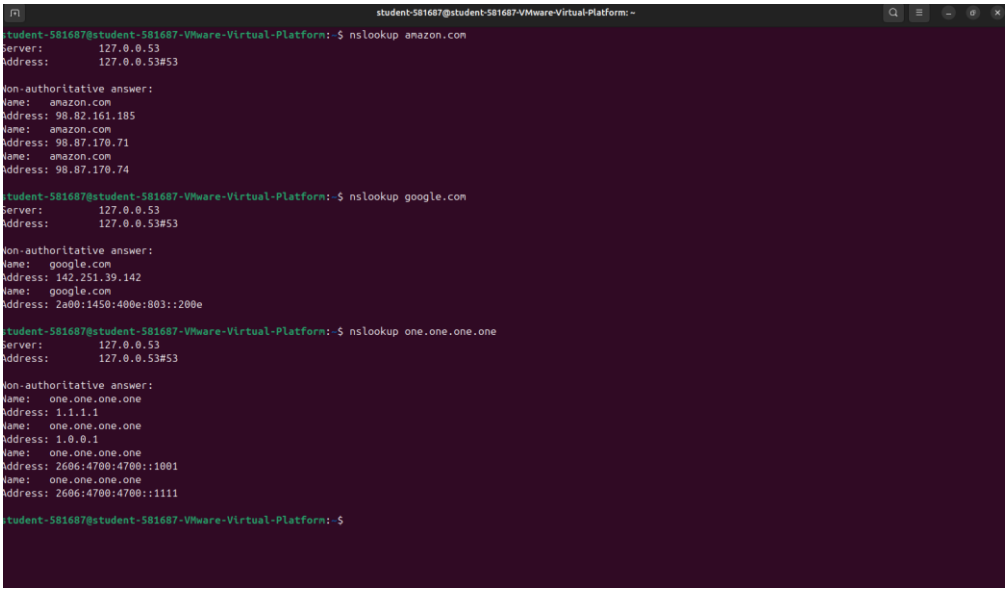
```
Processing triggers for desktop-file-utils (0.27-2build1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
student-581687@student-581687-VMware-Virtual-Platform:~$
```

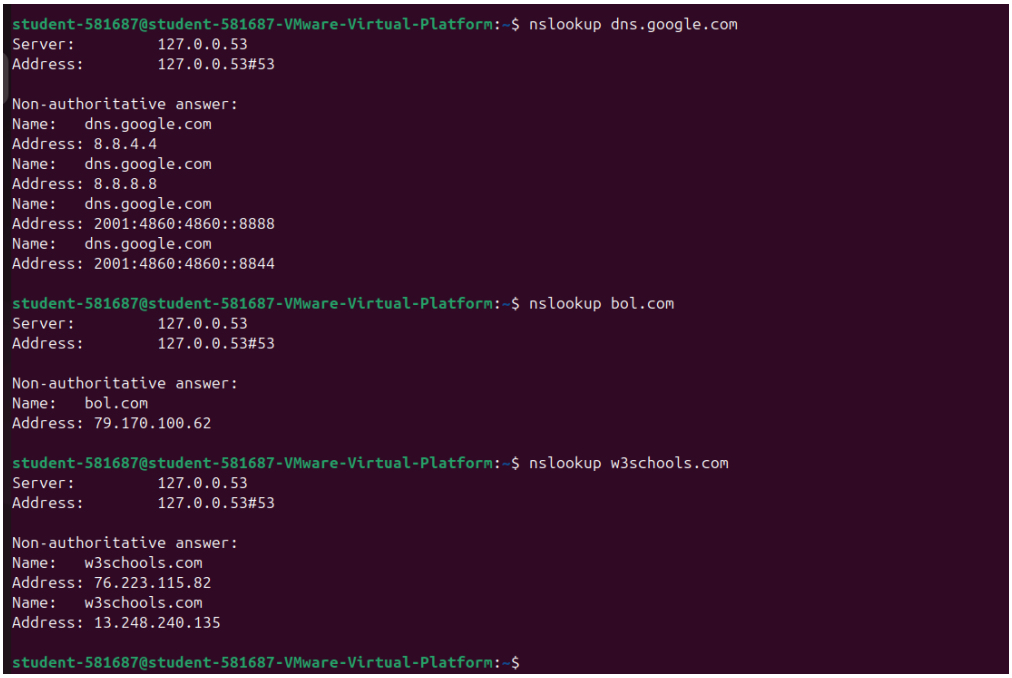
Ik krijg continu een rdp error vanuit ubuntu met remmina. Alles is up to date en vanuit windows staan alle instellingen in orde. Rdp stond uit en geblokkeerd vanuit de firewall en ik heb dit omgedraaid. Het lukt alsnog niet om een connectie te krijgen.



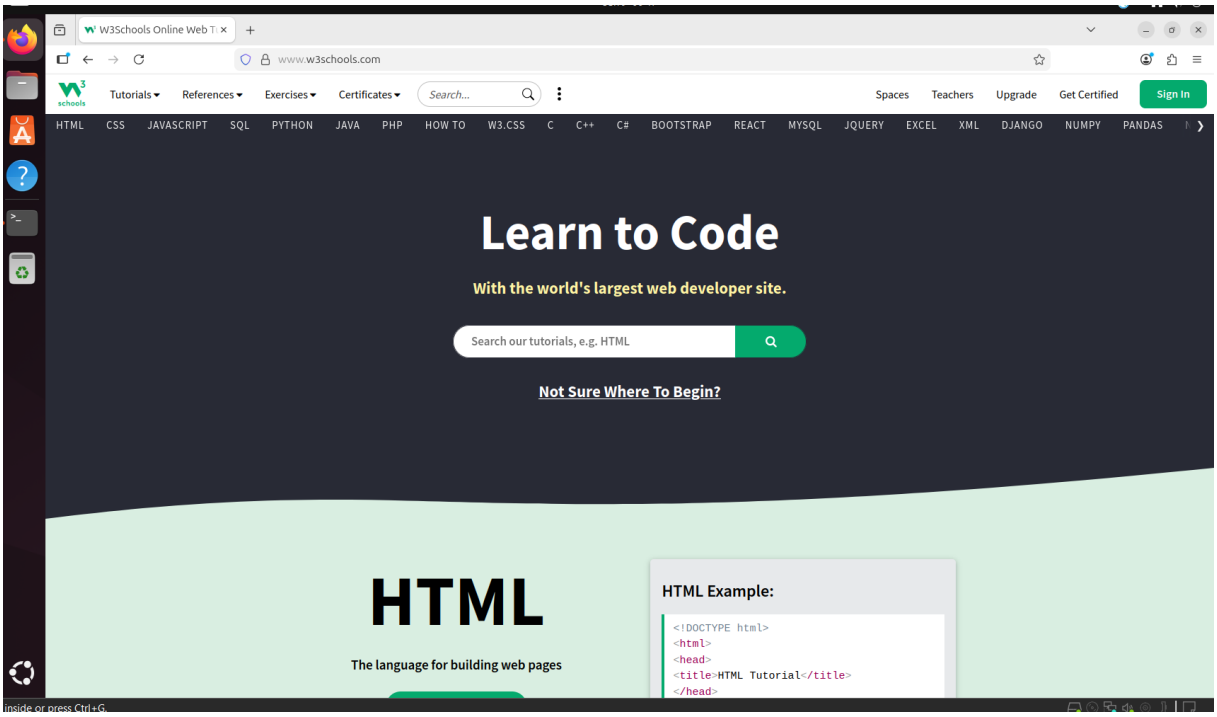
Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:





Screenshot website visit via IP address:



Assignment 6.3: subnetting

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

What is the usable IP range to hand out to the connected computers?
x.x.x.128-x.x.x.254
dus 126 addressen in totaal. Het eerste en laatste zijn gereserveerd.
Check your two previous answers with this Linux command: `ipcalc 192.168.110.128/25`

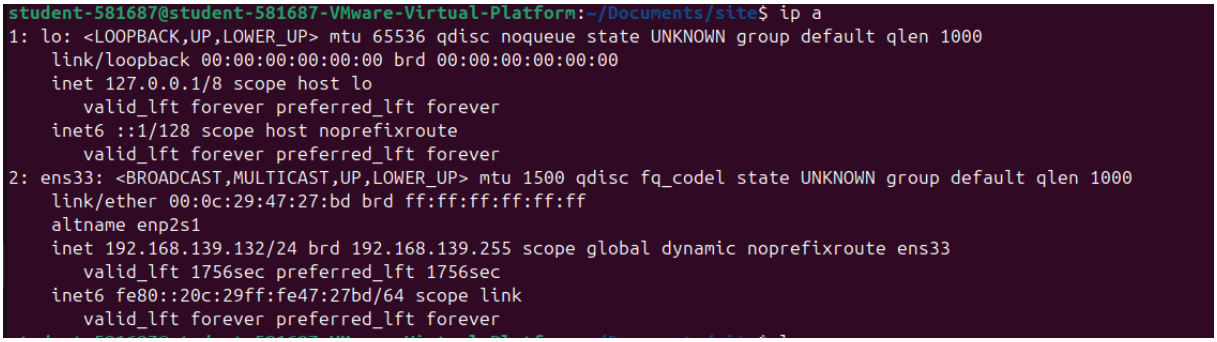
```
student-581687@student-581687-VMware-Virtual-Platform:~$ ipcalc 192.168.110.128/25
Address:   192.168.110.128      11000000.10101000.01101110.1 0000000
Netmask:   255.255.255.128 = 25 11111111.11111111.11111111.1 0000000
Wildcard:  0.0.0.127            00000000.00000000.00000000.0 1111111
=>
Network:   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

student-581687@student-581687-VMware-Virtual-Platform:~$
```

Explain the above calculation in your own words.
/25 betekent dat er in totaal 7 bits beschikbaar zijn van de 32 bits voor de hosts wat op 128 adressen uitkomt

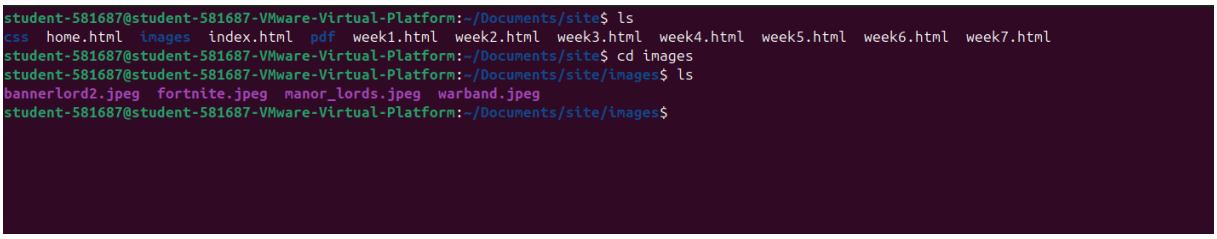
.128 is het netwerkadres en en 255 wordt gebruikt voor het broadcast adres. Dus er zijn 2 adressen gereserveerd wat op 126 adressen uitkomt voor de hosts.

Assignment 6.4: HTML

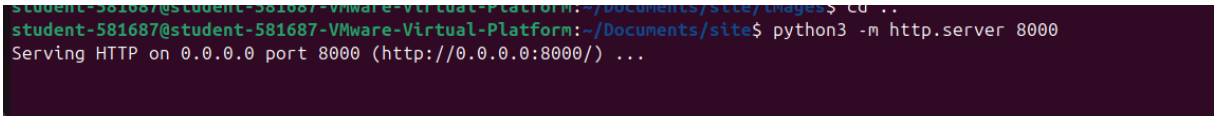
Screenshot IP address Ubuntu VM:



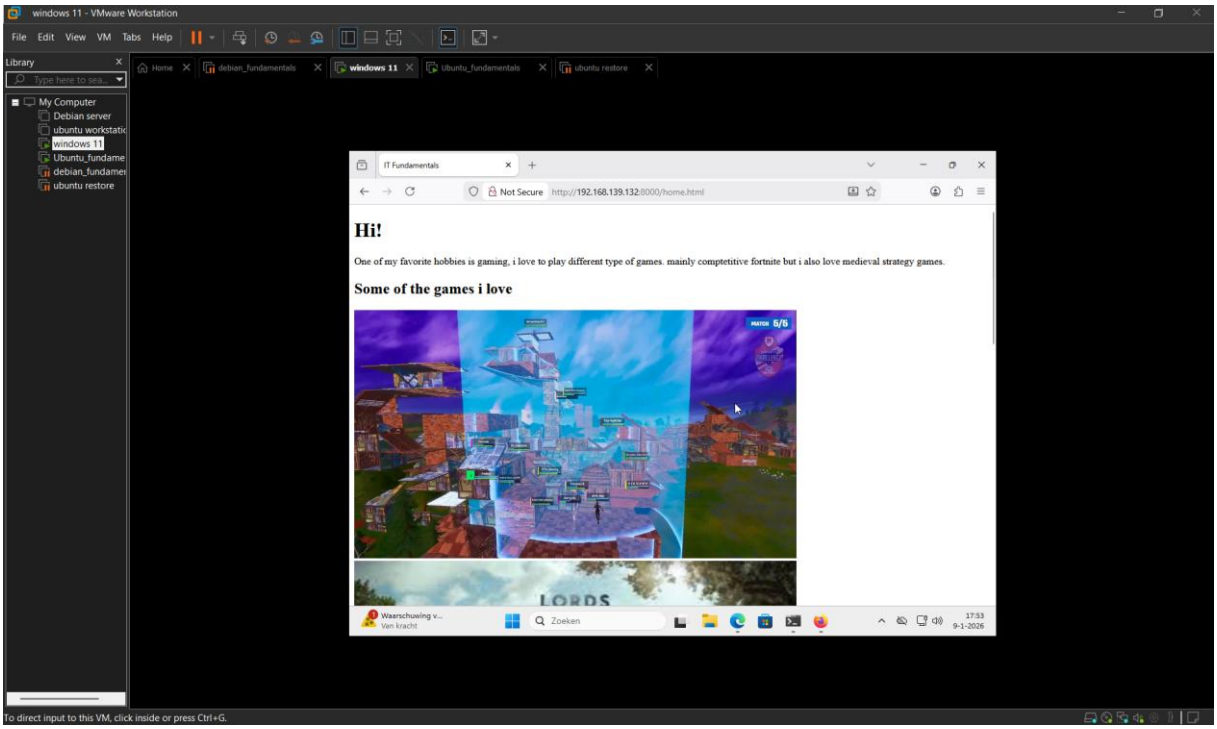
Screenshot of Site directory contents:



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.
```

```
import java.util.Scanner;

public class Main {

   public static void main(String[] args) {

      Scanner input = new Scanner(System.in);

      System.out.print("enter a number: ");
      int number = input.nextInt();
      input.nextLine();

      while (true) {

         System.out.println("\nmenu");
         System.out.println("1. odd or even");
         System.out.println("2. power of two");
         System.out.println("3. twos complement");
         System.out.println("4. network segment");
         System.out.println("5. exit");
         System.out.print("choose: ");

         int choice = input.nextInt();
         input.nextLine();

         if (choice == 1) {
            odd(number);
         } else if (choice == 2) {
            power2(number);
         } else if (choice == 3) {
            twos(number);
         } else if (choice == 4) {
            network(input);
         } else if (choice == 5) {
            break;
         } else {
            System.out.println("wrong choice");
         }
      }

      input.close();
   }
```

```
    public static void odd(int n) {
        if ((n & 1) == 1)
            System.out.println("number is odd");
        else
            System.out.println("number is even");
    }

    public static void power2(int n) {
        if (n > 0 && (n & (n - 1)) == 0)
            System.out.println("number is power of two");
        else
            System.out.println("number is not power of two");
    }

    public static void twos(int n) {
        System.out.println("twos complement: " + (~n + 1));
    }


    public static void network(Scanner input) {

        System.out.print("enter ip: ");
        String ip = input.nextLine();

        System.out.print("enter subnet: ");
        String subnet = input.nextLine();

        String[] ipPart = ip.split("\\.");
        String[] subPart = subnet.split("\\.");

        int[] net = new int[4];

        for (int i = 0; i < 4; i++) {
            net[i] =
                    Integer.parseInt(ipPart[i]) &
                    Integer.parseInt(subPart[i]);
        }

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

        int size = 256 - Integer.parseInt(subPart[3]);

        System.out.println("range: "
                + net[0] + "." + net[1] + "." + net[2] + "." + net[3]
                + " - "
                + net[0] + "." + net[1] + "." + net[2] + "." + (net[3] + size - 1));
    }
}
```

```
choose: 4
enter ip: 192.168.1.100
enter subnet: 255.255.255.224
network address: 192.168.1.96
range: 192.168.1.96 - 192.168.1.127
```

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