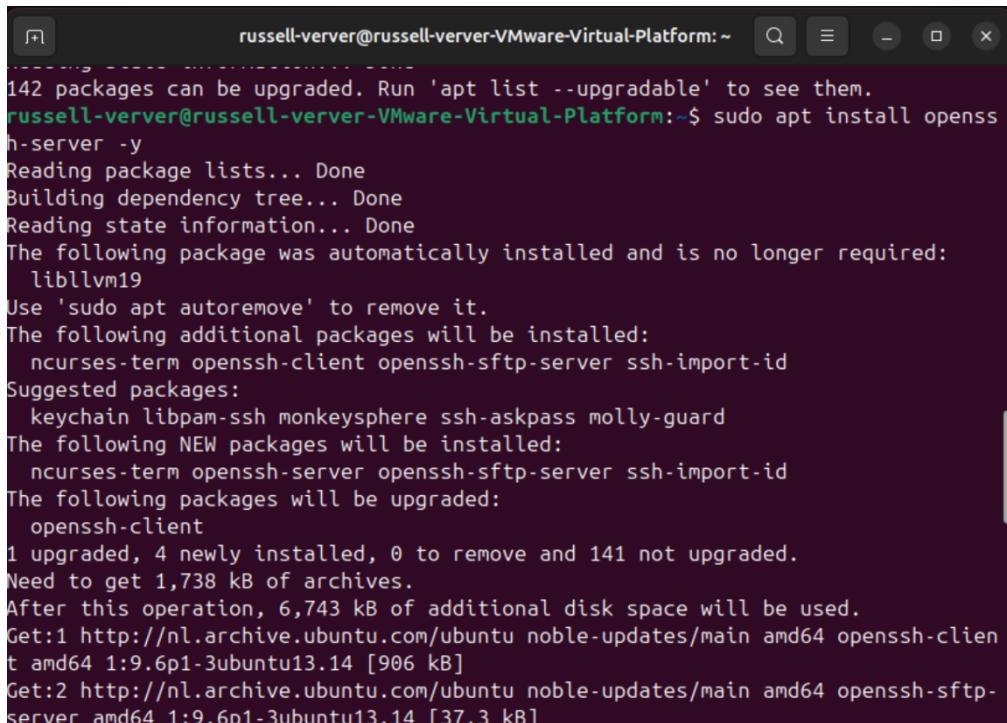


Template Week 6 – Networking

Student number:589768

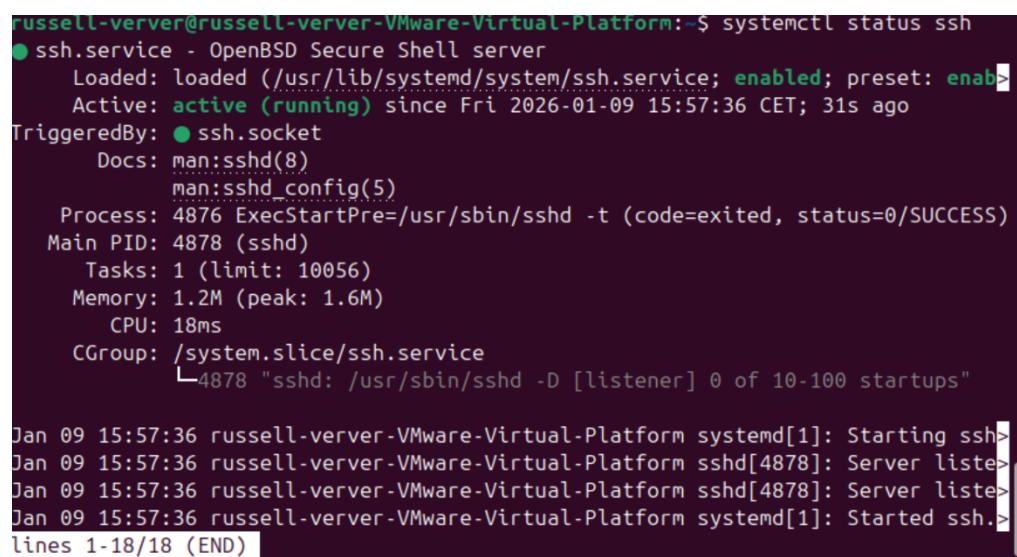
Assignment 6.1: Working from home

Screenshot installation openssh-server:



```
russell-verver@russell-verver-VMware-Virtual-Platform:~$ sudo apt install openssh-server -y
142 packages can be upgraded. Run 'apt list --upgradable' to see them.
russell-verver@russell-verver-VMware-Virtual-Platform:~$ sudo apt install openssh-server -y
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-client openssh-sftp-server ssh-import-id
Suggested packages:
  keychain libpam-ssh monkeysphere ssh-askpass molly-guard
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
The following packages will be upgraded:
  openssh-client
1 upgraded, 4 newly installed, 0 to remove and 141 not upgraded.
Need to get 1,738 kB of archives.
After this operation, 6,743 kB of additional disk space will be used.
Get:1 http://nl.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-client amd64 1:9.6p1-3ubuntu13.14 [906 kB]
Get:2 http://nl.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-sftp-server amd64 1:9.6p1-3ubuntu13.14 [37.3 kB]
```

Screenshot successful SSH command execution:



```
russell-verver@russell-verver-VMware-Virtual-Platform:~$ systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
  Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: enabled)
  Active: active (running) since Fri 2026-01-09 15:57:36 CET; 31s ago
    TriggeredBy: ● ssh.socket
      Docs: man:sshd(8)
             man:sshd_config(5)
    Process: 4876 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 4878 (sshd)
     Tasks: 1 (limit: 10056)
    Memory: 1.2M (peak: 1.6M)
       CPU: 18ms
      CGroup: /system.slice/ssh.service
              └─4878 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

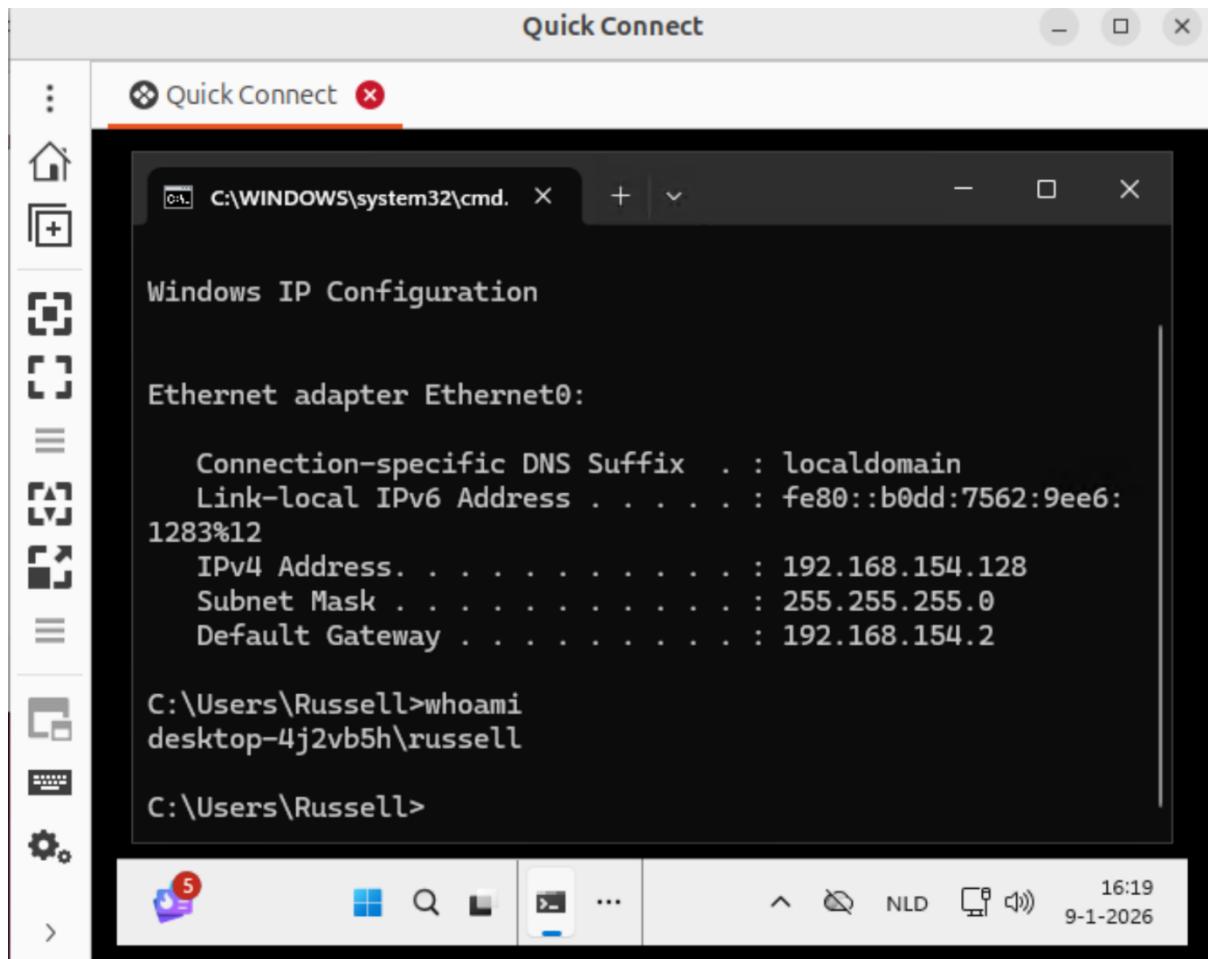
Jan 09 15:57:36 russell-verver-VMware-Virtual-Platform systemd[1]: Starting ssh...
Jan 09 15:57:36 russell-verver-VMware-Virtual-Platform sshd[4878]: Server listening on port 22...
Jan 09 15:57:36 russell-verver-VMware-Virtual-Platform sshd[4878]: Server listening on port 22...
Jan 09 15:57:36 russell-verver-VMware-Virtual-Platform systemd[1]: Started ssh...
lines 1-18/18 (END)
```

Screenshot successful execution SCP command:

```
russell-verver@russell-verver-VMware-Virtual-Platform:~$ echo testbestand > test.txt
russell-verver@russell-verver-VMware-Virtual-Platform:~$ scp test.txt russell-verver@192.168.154.129:/home/russell-verver
russell-verver@192.168.154.129's password:
test.txt                                              100%   12    12.7KB/s   00:00
russell-verver@russell-verver-VMware-Virtual-Platform:~$ |
```

```
russell-verver@russell-verver-VMware-Virtual-Platform:~$ whoami
russell-verver
russell-verver@russell-verver-VMware-Virtual-Platform:~$ ls ~
apple.jpg  Downloads  hiding.txt  oldcar      Public      Templates
Desktop   email.txt  message.txt  output.gif  Sherlock.txt  test.txt
Documents  hello     Music       Pictures    snap        Videos
russell-verver@russell-verver-VMware-Virtual-Platform:~$ cat ~/test.txt
testbestand
russell-verver@russell-verver-VMware-Virtual-Platform:~$
```

Screenshot remmina:

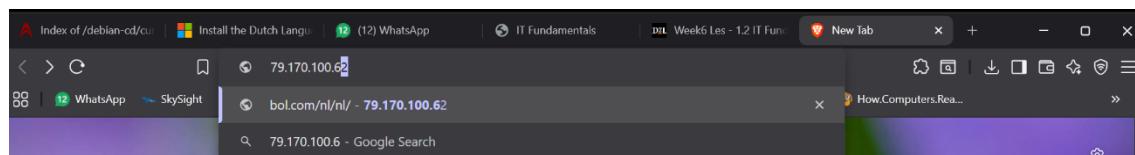


Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

```
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  
> [REDACTED]
```

Screenshot website visit via IP address:



Assignment 6.3: subnetting

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

Het Antwoord is 128, want het ip adres bestaat uit 25 bits eengewoon ip4 ip adres bestaat uit 32 bits als je 32-25 hou je 7bit over als je dit dan berekend door 2 tot de macht 7 te doen kom je op 128 ip-adressen.

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

als je een ip-adress hebt, bijvoorbeeld het ip-adress van hier boven 192.168.110.128 dan zit de range tussen 192.168.110.255 en 192.110.128 als je deze van elkaar aftrekt kom je op 128 ip adressen 2 van deze ip adressen zijn niet bruikbaar dus 126 ip adressen

Check your two previous answers with this Linux command:

```
russell-vverver@russell-vverver-VMware-Virtual-Platform:~$ ipcalc 192.168.110.128  
/25  
Address: 192.168.110.128      11000000.10101000.01101110.1 00000000  
Netmask: 255.255.255.128 = 25 11111111.11111111.11111111.1 00000000  
Wildcard: 0.0.0.127          00000000.00000000.00000000.0 11111111  
=>  
Network: 192.168.110.128/25  11000000.10101000.01101110.1 00000000  
HostMin: 192.168.110.129      11000000.10101000.01101110.1 00000001  
HostMax: 192.168.110.254      11000000.10101000.01101110.1 11111110  
Broadcast: 192.168.110.255    11000000.10101000.01101110.1 11111111  
Hosts/Net: 126                Class C, Private Internet  
  
russell-vverver@russell-vverver-VMware-Virtual-Platform:~$
```

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

```
russell-verver@russell-verver-VMware-Virtual-Platform:~/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:da:97:41 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.154.129/24 brd 192.168.154.255 scope global dynamic noprefixroute ens33
        valid_lft 1057sec preferred_lft 1057sec
    inet6 fe80::20c:29ff:feda:9741/64 scope link
        valid_lft forever preferred_lft forever
```

Screenshot of Site directory contents:

```
russell-verver@russell-verver-VMware-Virtual-Platform:~/site$ cd ~/site
russell-verver@russell-verver-VMware-Virtual-Platform:~/site$ ls
css      images      pdf      week2.html  week4.html  week6.html
home.html  index.html  week1.html  week3.html  week5.html  week7.html
russell-verver@russell-verver-VMware-Virtual-Platform:~/site$
```

Screenshot python3 webserver command:

```
russell-verver@russell-verver-VMware-Virtual-Platform:~/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
```

Screenshot web browser visits your site

Mijn Hobby - Zweefvliegen Nieuw tabblad +

← ▲ Niet beveiligd 192.168.154.129:8000/home.html

Zweefvliegen

Mijn hobby is zweefvliegen. Dit is een prachtige manier om zonder motor door de lucht te vliegen. Je gebruikt thermiek en wind om hoogte te winnen en lange afstanden af te leggen.

Het vliegtuig

Dit is de D-0741, een prachtig zweefvliegtuig.



De cockpit

De cockpit van een zweefvliegtuig. Je ziet hier de belangrijkste instrumenten zoals de snelheidsmeter, hoogtemeter en variometer. Met de knuppel bestuur je het vliegtuig.



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

        System.out.println("== Network Segment Calculator ==");
        System.out.print("Enter IP address (e.g., 192.168.1.100): ");
        String ipAddress = scanner.nextLine();

        System.out.print("Enter subnet mask (e.g., 255.255.255.224): ");
        String subnetMask = scanner.nextLine();

        String[] ip = ipAddress.split("\\.");
        String[] mask = subnetMask.split("\\.");

        int[] ipOctet = new int[4];
        int[] maskOctet = new int[4];
        int[] network = new int[4];
        int[] broadcast = new int[4];

        for (int i = 0; i < 4; i++) {
            ipOctet[i] = Integer.parseInt(ip[i]);
            maskOctet[i] = Integer.parseInt(mask[i]);
            network[i] = ipOctet[i] & maskOctet[i];
            broadcast[i] = network[i] | (~maskOctet[i] & 0xFF);
        }

        System.out.println("\nCalculate the network segment");
        System.out.print("IP Address:   ");
        for (int i = 0; i < 4; i++) {
            System.out.print(String.format("%8s",
                Integer.toBinaryString(ipOctet[i]).replace(' ', '0')));
            if (i < 3) System.out.print(".");
        }
    }
}
```

```

System.out.println();

System.out.print("Subnet Mask:  ");
for (int i = 0; i < 4; i++) {
    System.out.print(String.format("%8s",
Integer.toBinaryString(maskOctet[i])).replace(' ', '0'));
    if (i < 3) System.out.print(".");
}
System.out.println();

System.out.println("-----");
System.out.print("Network Addr: ");
for (int i = 0; i < 4; i++) {
    System.out.print(String.format("%8s",
Integer.toBinaryString(network[i])).replace(' ', '0'));
    if (i < 3) System.out.print(".");
}
System.out.println();

System.out.print("\nThis gives ");
for (int i = 0; i < 4; i++) {
    System.out.print(network[i]);
    if (i < 3) System.out.print(".");
}
System.out.println(" in decimal as the network address.");

int hostBits = 0;
for (int i = 0; i < 4; i++) {
    for (int bit = 0; bit < 8; bit++) {
        if ((maskOctet[i] & (1 << bit)) == 0)
            hostBits++;
    }
}

int totalHosts = (int) Math.pow(2, hostBits);
System.out.println("For a /" + (32 - hostBits) + " subnet, each
segment has " + totalHosts + " IP addresses (2^" + hostBits + ").");

System.out.print("The range of this network segment is from ");
for (int i = 0; i < 4; i++) {
    System.out.print(network[i]);
    if (i < 3) System.out.print(".");
}
System.out.print(" to ");
for (int i = 0; i < 4; i++) {
    System.out.print(broadcast[i]);
    if (i < 3) System.out.print(".");
}
System.out.println(".");

scanner.close();
}
}

```

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