

Template Week 6 – Networking

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Assignment 6.1: Working from home

Screenshot installation openssh-server:

```
[sudo] password for wbacon:
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; disabled; preset: enabled)
   Active: active (running) since Fri 2026-01-09 23:05:33 CET; 4min 24s ago
 TriggeredBy: ● ssh.socket
    Docs: man:sshd(8)
          man:sshd_config(5)
   Process: 4342 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
  Main PID: 4343 (sshd)
    Tasks: 1 (limit: 4545)
   Memory: 3.2M (peak: 4.2M)
      CPU: 92ms
   CGroup: /system.slice/ssh.service
           └─4343 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jan 09 23:05:33 wbacon-VMware-Virtual-Platform systemd[1]: Starting ssh.service>
Jan 09 23:05:33 wbacon-VMware-Virtual-Platform sshd[4343]: Server listening on >
Jan 09 23:05:33 wbacon-VMware-Virtual-Platform systemd[1]: Started ssh.service >
Jan 09 23:05:33 wbacon-VMware-Virtual-Platform sshd[4343]: Server listening on >
Jan 09 23:05:49 wbacon-VMware-Virtual-Platform sshd[4345]: Accepted password fo>
Jan 09 23:05:49 wbacon-VMware-Virtual-Platform sshd[4345]: pam_unix(sshd:sessio>
Jan 09 23:07:01 wbacon-VMware-Virtual-Platform sshd[4537]: Accepted password fo>
Jan 09 23:07:01 wbacon-VMware-Virtual-Platform sshd[4537]: pam_unix(sshd:sessio>
```

Screenshot successful SSH command execution:

```
wbacon@wbacon-VMware-Vi X + v
Microsoft Windows [Version 10.0.26200.7462]
(c) Microsoft Corporation. All rights reserved.

C:\Users\wbacon>ssh wbacon@192.168.2.34
The authenticity of host '192.168.2.34 (192.168.2.34)' can't be established.
ED25519 key fingerprint is SHA256:j5V+vPf0LSc/RhHsMMTl9grOp3fWcE6lJWmaur1eKtI.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.2.34' (ED25519) to the list of known hosts.
wbacon@192.168.2.34's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-37-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.

143 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

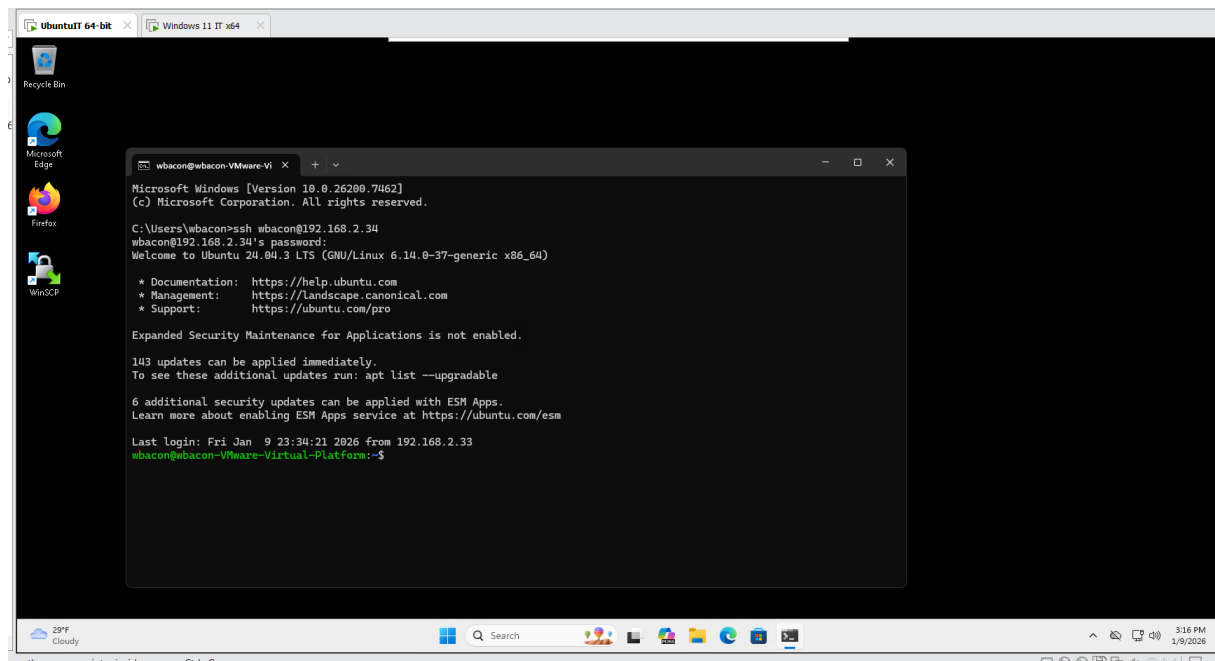
6 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

Last login: Fri Jan  9 23:05:49 2026 from 192.168.2.12
wbacon@wbacon-VMware-Virtual-Platform:~$
```

Screenshot successful execution SCP command:

```
wbacon@wbacon-VMware-Virtual-Platform:~$ ls
assignment6.txt  Documents  hello      Music      Public     Templates  Videos
Desktop          Downloads  info.txt   Pictures   snap       test.txt
```

Screenshot remmina:



Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

```
> dns.google.com
Server: mijnmodem.kpn
Address: 2a02:a446:461a:0:a622:49ff:fe81:6830

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

> bol.com
Server: mijnmodem.kpn
Address: 2a02:a446:461a:0:a622:49ff:fe81:6830

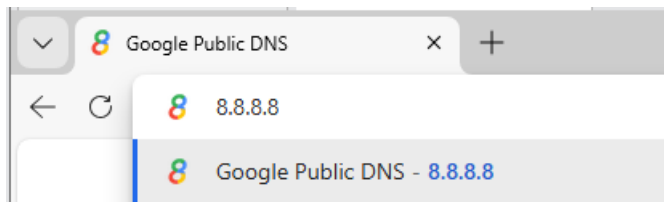
Non-authoritative answer:
Name: bol.com
Address: 79.170.100.62

> w3schools.com
Server: mijnmodem.kpn
Address: 2a02:a446:461a:0:a622:49ff:fe81:6830

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

>
```

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

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

126

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

```

Processing triggers for man-db (2.12.0-4build2) ...
wbacon@wbacon-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

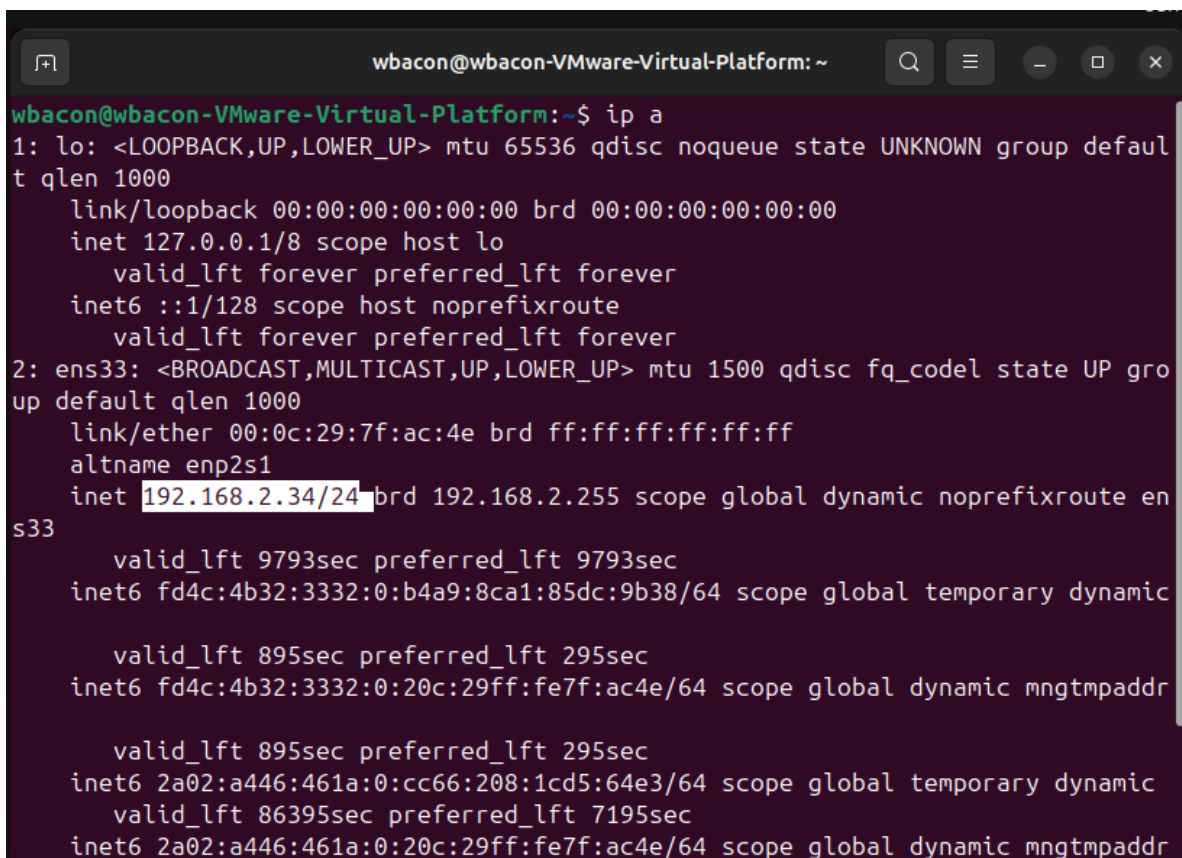
```

Explain the above calculation in your own words.

Een IPV4 code is geschreven in een 32-bit systeem. Dit zie je door te kijken naar de range van een ip. Een ip gaat altijd van 0 tot 255, met 256 verschillende mogelijkheden. $2^8 = 256$. Dit bewijst dat het eerste gedeelte van een ip een 8-bit is. $8 \times 4 = 32$. Omdat er /25 achter de ip staat, betekent dit dus dat er 25 bits afgaan en 7 bits overblijven voor de hosts. In totaal wordt dat 128 verschillende adressen. De eerste en de laatste adressen zijn al bezet. (Broadcasting en netwerk), dus er zijn in totaal 126 bruikbare ip's.

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:



```

wbacon@wbacon-VMware-Virtual-Platform:~$ 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:29:7f:ac:4e brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.2.34/24 brd 192.168.2.255 scope global dynamic noprefixroute ens33
        valid_lft 9793sec preferred_lft 9793sec
    inet6 fd4c:4b32:3332:0:b4a9:8ca1:85dc:9b38/64 scope global temporary dynamic
        valid_lft 895sec preferred_lft 295sec
    inet6 fd4c:4b32:3332:0:20c:29ff:fe7f:ac4e/64 scope global dynamic mngtmpaddr
        valid_lft 895sec preferred_lft 295sec
    inet6 2a02:a446:461a:0:cc66:208:1cd5:64e3/64 scope global temporary dynamic
        valid_lft 86395sec preferred_lft 7195sec
    inet6 2a02:a446:461a:0:20c:29ff:fe7f:ac4e/64 scope global dynamic mngtmpaddr

```

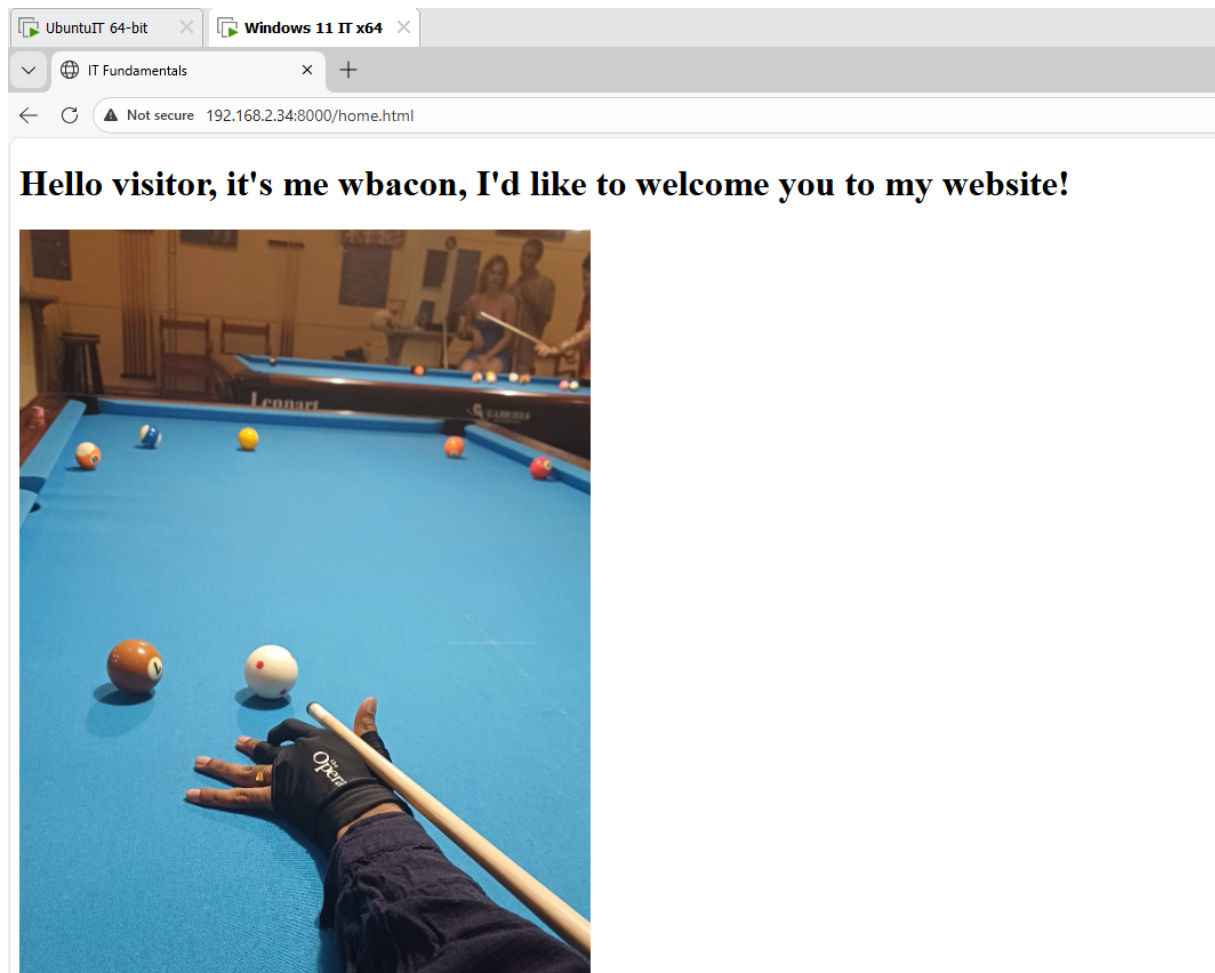
Screenshot of Site directory contents:

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

Screenshot python3 webserver command:

```
wbacon@wbacon-VMware-Virtual-Platform:~/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.2.33 - - [10/Jan/2026 15:38:40] "GET /home.html HTTP/1.1" 200 -
192.168.2.33 - - [10/Jan/2026 15:38:40] "GET /images/Pool.jpeg HTTP/1.1" 200 -
192.168.2.33 - - [10/Jan/2026 15:38:40] code 404, message File not found
192.168.2.33 - - [10/Jan/2026 15:38:40] "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.

(Ik stuur wel de extra regels die ik heb toegevoegd)

```
import java.util.Scanner;

public class Main {

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

        System.out.print("Typ een getal in: ");
        int number = scanner.nextInt();

        System.out.println("De waarde in binair code: " + Integer.toBinaryString(number));

        System.out.println("\nKies een van de opties hieronder, om door te gaan.");
        System.out.println("1. Is het getal oneven?");
        System.out.println("2. Is het nummer een macht van 2?");
        System.out.println("3. 2-complement van uw getal?");
        System.out.println("\n4. Bereken netwerksegment (Dit hoort bij week 6 trouwens.)");
        System.out.print("Uw keuze: ");
        int choice = scanner.nextInt();
    }
}
```

```
case 4:
    calculateNetworkSegment(scanner);
    break;
```

```
public static void calculateNetworkSegment(Scanner scanner) { 1 usage
    System.out.print("Voer IP adres in (format: x.x.x.x): ");
    String ipInput = scanner.next();
    System.out.print("Voer subnet masker in (format: x.x.x.x): ");
    String maskInput = scanner.next();

    String[] ip = ipInput.split( regex: "\\.");
    String[] mask = maskInput.split( regex: "\\.");

    int deel1 = Integer.parseInt(ip[0]) & Integer.parseInt(mask[0]);
    int deel2 = Integer.parseInt(ip[1]) & Integer.parseInt(mask[1]);
    int deel3 = Integer.parseInt(ip[2]) & Integer.parseInt(mask[2]);
    int deel4 = Integer.parseInt(ip[3]) & Integer.parseInt(mask[3]);

    System.out.println("\nIk kan u met tevredenheid vertellen dat de berekening heeft gewerkt!");
    System.out.println("Netwerk adres: " + deel1 + "." + deel2 + "." + deel3 + "." + deel4);
}
```

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