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:

Screenshot remmina:

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?

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

Check your two previous answers with this calculator:
https://www.calculator.net/ip-subnet-calculator.html

Explain the above calculation in your own words.

Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

```
abdullah@abdullah-VMware-Virtual-Platform:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defau
t 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 pfifo_fast state UP
roup default qlen 1000
    link/ether 00:0c:29:1a:05:27 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.231.136/24 brd 192.168.231.255 scope global dynamic noprefixro
te ens33
       valid_lft 978sec preferred_lft 978sec
    inet6 fe80::20c:29ff:fe1a:527/64 scope link
       valid_lft forever preferred_lft forever
```

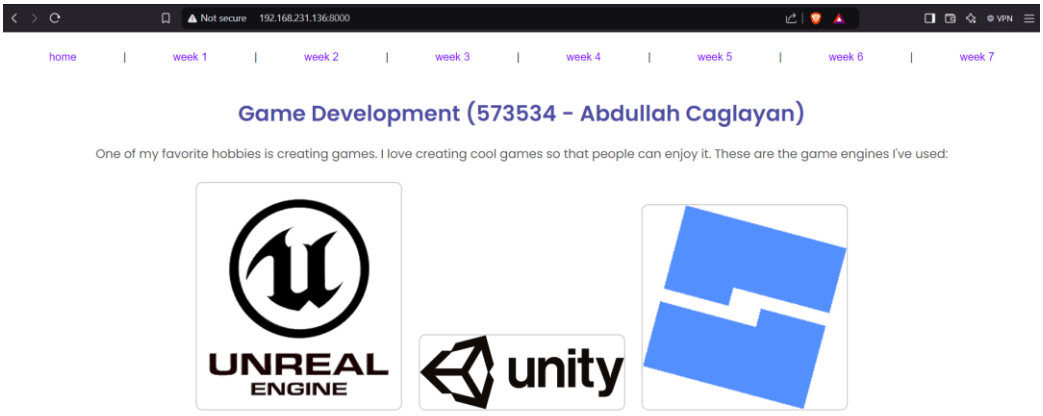
Screenshot of Site directory contents:

```
abdullah@abdullah-VMware-Virtual-Platform:~/Documents/IT Fundamentals 1.2/site$
ls
css         index.html  week1.html  week4.html  week7.html
home.html   pdf         week2.html  week5.html
images      style.css   week3.html  week6.html
```

Screenshot python3 webserver command:

```
abdullah@abdullah-VMware-Virtual-Platform:~/Documents/IT Fundamentals 1.2/site$
python3 -m http.server 8000 --bind 192.168.231.136
```

Screenshot web browser visits your site



Bonus point assignment – week 6

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 java.util.Scanner;

public class Main
{
   static Scanner scanner;

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

      while (true) {
         init();
         System.out.println("AGAIN! (Y/N)");
         String choice = scanner.nextLine();
         if (choice.equalsIgnoreCase("Y") || choice.equalsIgnoreCase("YES")) {
            // nothing
         } else if (choice.equalsIgnoreCase("N") || choice.equalsIgnoreCase("NO")) {
            return;
         } else {
            return;
         }
      }
   }

   private static void init() {

      System.out.println("Enter IP-Address like this: 192.168.1.100");
```

```
        String ipAddress = scanner.nextLine();
        if (ipAddress.isEmpty()) { ipAddress = "192.168.1.100"; }

        System.out.println("Enter subnet mask like this: 255.255.255.224");
        String subnetMask = scanner.nextLine();
        if (subnetMask.isEmpty()) { subnetMask = "255.255.255.224"; }

        int[] ip = convertIpAddressToInt(ipAddress);
        int[] subnet = convertIpAddressToInt(subnetMask);
        int[] networkAddress = convertToNetworkAddress(ip, subnet);

        System.out.println("IP Address:   " + addressArrayToBinary(ip));
        System.out.println("Subnet Mask:  " + addressArrayToBinary(subnet));
        System.out.println("Network Address: " + addressArrayToBinary(networkAddress));

    }

    private static int[] convertToNetworkAddress(int[] ip, int[] subnet) {
        int[] networkAddress = new int[4]; // int array van length 4
        for (int i = 0; i < 4; i++) {
            networkAddress[i] = ip[i] & subnet[i];
        }
        return networkAddress;
    }

    private static int[] convertIpAddressToInt(String ipAddress) {
        String[] parts = ipAddress.split("\\."); // De \\. is er voor om een . te vinden en dan de string te
splitten.

        int[] result = new int[4];
        for (int i = 0; i < 4; i++) {
            int part = Integer.parseInt(parts[i]); // parseInt word gebruikt om string naar int te zetten.
            result[i] = part;
        }
        return result;
    }

    private static String addressArrayToBinary(int[] address)
    {
        StringBuilder binaryString = new StringBuilder();
        for (int i = 0; i < address.length; i++) {
            binaryString.append(String.format("%8s", Integer.toBinaryString(address[i])).replace(' ', '0')); //
String word geformat; minimaal 8 characters en de spaces worden veranderd in '0'
            if (i < address.length - 1) {
                binaryString.append(".");
            }
        }
        return binaryString.toString();
```

```
    }
}
```

```
C:\Users\abdul\Documents\openjdk-21.0.2_windows-x64_bin\jd
Enter IP-Address like this: 192.168.1.100
192.168.1.100
Enter subnet mask like this: 255.255.255.224
255.255.255.224
IP Address:   11000000.10101000.00000001.01100100
Subnet Mask:  11111111.11111111.11111111.11100000
Network Address: 11000000.10101000.00000001.01100000
AGAIN! (Y/N)
```