

Template Week 6 – Networking

Student number:

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:

Screenshot of Site directory contents:

Screenshot python3 webserver command:

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 (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);
```

```

System.out.println("Enter IP address");
String ipAddress = scanner.nextLine();

System.out.println("Enter subnet mask");
String subnetMask = scanner.nextLine();

int[] ipBinary = convertToBinary(ipAddress);
int[] maskBinary = convertToBinary(subnetMask);

if (ipBinary == null || maskBinary == null) {
    System.out.println("Something went wrong. Please try again.");
    return;
}

int[] networkAddress = calculateNetworkAddress(ipBinary, maskBinary);
String networkAddressDecimal = convertToDecimal(networkAddress);
System.out.println(networkAddressDecimal);
}

public static int[] convertToBinary(String address) {
    String[] parts = address.split("\\.");
    if (parts.length != 4) {
        return null;
    }
    int[] binary = new int[32];
    try {
        for (int i = 0; i < 4; i++) {
            int octet = Integer.parseInt(parts[i]);
            String binaryString = String.format("%8s", Integer.toBinaryString(octet)).replace(' ', '0');
            for (int j = 0; j < 8; j++) {
                binary[i * 8 + j] = binaryString.charAt(j) - '0';
            }
        }
    } catch (NumberFormatException e) {
        return null;
    }
    return binary;
}

public static int[] calculateNetworkAddress(int[] ip, int[] mask) {
    int[] network = new int[32];
    for (int i = 0; i < 32; i++) {
        network[i] = ip[i] & mask[i];
    }
    return network;
}

```

```

public static String convertToDecimal(int[] binary) {
    StringBuilder decimalAddress = new StringBuilder();
    for (int i = 0; i < 4; i++) {
        int octet = 0;
        for (int j = 0; j < 8; j++) {
            octet = (octet << 1) | binary[i * 8 + j];
        }
        decimalAddress.append(octet);
        if (i < 3) {
            decimalAddress.append(".");
        }
    }
    return decimalAddress.toString();
}
}

```

The screenshot shows the IntelliJ IDEA IDE interface. The Project view on the left shows a project named 'untitled' with a source folder 'src' containing a file 'Main'. The Main.java file is open in the editor, showing the following code:

```

1 import java.util.Scanner;
2
3 public class Main {
4     public static void main(String[] args) {
5         Scanner scanner = new Scanner(System.in);
6
7         System.out.println("Enter IP address");
8         String ipAddress = scanner.nextLine();
9
10        System.out.println("Enter subnet mask");
11        String subnetMask = scanner.nextLine();
12
13        int[] ipBinary = convertToBinary(ipAddress);
14        int[] maskBinary = convertToBinary(subnetMask);

```

The Run console at the bottom shows the execution of the program. The command used is:

```

C:\Users\mateu\.jdk\openjdk-22.0.2\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2024.2.1\lib\idea_rt.jar

```

The output of the program is:

```

Enter IP address
192.168.1.100
Enter subnet mask
255.255.255.224
192.168.1.96
Process finished with exit code 0

```

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