Template Week 6 – Networking

Student number: 563437

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

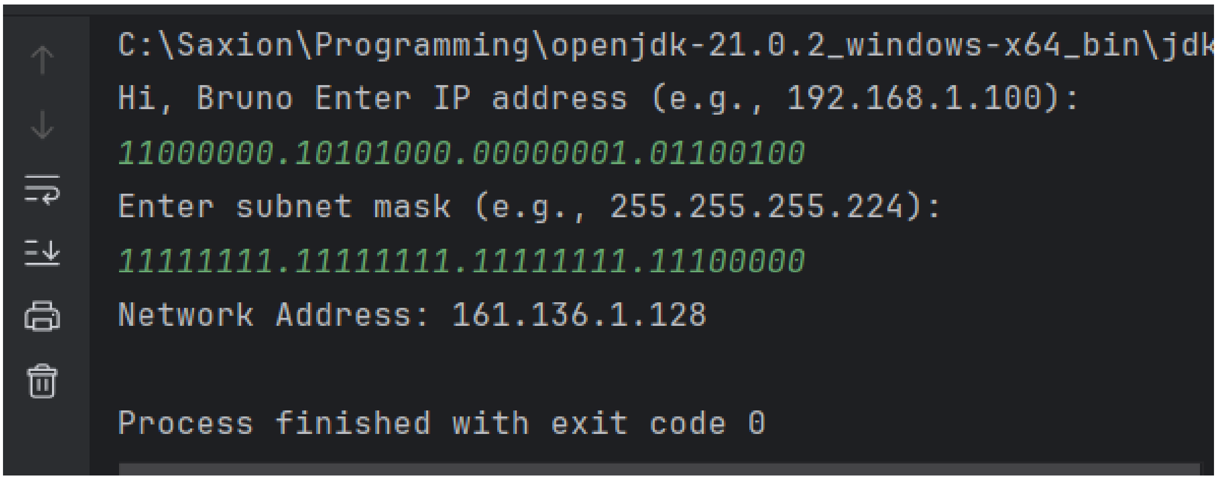
```
Example: 192.168.1.100/27
Calculate the network segment
IP Address:   11000000.10101000.00000001.01100100
Subnet Mask:  11111111.11111111.11111111.11100000
-------------------------------------------------
Network Addr: 11000000.10101000.00000001.01100000

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.

Code:

```
import java.util.Scanner;

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

        System.out.println("Hi, Bruno Enter IP address (e.g., 192.168.1.100):");
        String ipAddress = scanner.nextLine();

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

        // Convert IP and subnet mask to binary form
        int[] ipBinary = convertToBinary(ipAddress);
        int[] maskBinary = convertToBinary(subnetMask);

        if (ipBinary == null || maskBinary == null) {
            System.out.println("Invalid input. Please enter valid IP and subnet mask.");
            return;
        }

        // Calculate network address
        int[] networkAddress = calculateNetworkAddress(ipBinary, maskBinary);

        // Convert binary network address back to decimal
        String networkAddressDecimal = convertToDecimal(networkAddress);

        System.out.println("Network Address: " + 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();
    }
}
```

Screenshot:



```
C:\Saxion\Programming\openjdk-21.0.2_windows-x64_bin\jdk
Hi, Bruno Enter IP address (e.g., 192.168.1.100):
11000000.10101000.00000001.01100100
Enter subnet mask (e.g., 255.255.255.224):
11111111.11111111.11111111.11100000
Network Address: 161.136.1.128

Process finished with exit code 0
```

Ready? Save this file and export it as a pdf file with the name: **week6.pdf**