Template Week 6 – Networking

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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: 11111111.1111111.1111111.11100000
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<sup>5</sup>).
The range of this network segment is from 192.168.1.96 to 192.168.1.127.
import java.util.Scanner;
public class bitwiseMenu {
  public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);
    while (true) {
     showMenu();
     int choice = scanner.nextInt();
      if (choice == 5) {
        System.out.println("Goodbye!");
       break;
     }
     if (choice == 4) {
        System.out.print("Enter IP address (example: 192.168.1.100): ");
        String ip = scanner.next();
        System.out.print("Enter subnet mask (example: 255.255.255.224): ");
        String subnet = scanner.next();
       System.out.println("Network segment starts at: " + calculateNetworkSegment(ip, subnet));
        continue;
     }
```

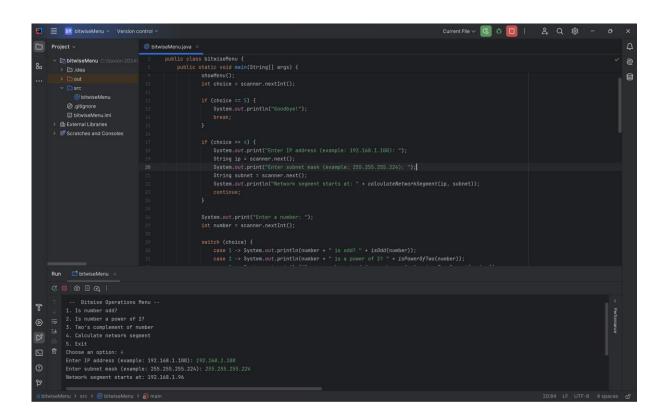
IT FUNDAMENTALS 1

```
System.out.print("Enter a number: ");
      int number = scanner.nextInt();
      switch (choice) {
        case 1 -> System.out.println(number + " is odd? " + isOdd(number));
        case 2 -> System.out.println(number + " is a power of 2? " + isPowerOfTwo(number));
        case 3 -> System.out.println("Two's complement of " + number + ": " +
twosComplement(number));
        default -> System.out.println("Invalid choice, try again.");
      }
    }
    scanner.close();
  }
  private static void showMenu() {
    System.out.println("\n -- Bitwise Operations Menu --");
    System.out.println("1. Is number odd?");
    System.out.println("2. Is number a power of 2?");
    System.out.println("3. Two's complement of number");
    System.out.println("4. Calculate network segment");
    System.out.println("5. Exit");
    System.out.print("Choose an option: ");
  }
  private static boolean isOdd(int number) {
    return (number & 1) == 1;
  }
  private static boolean isPowerOfTwo(int number) {
    return number > 0 \&\& (number \& (number - 1)) == 0;
  }
  private static int twosComplement(int number) {
    return ~number + 1;
  }
  private static String calculateNetworkSegment(String ip, String subnet) {
    int ipInt = ipToInt(ip);
    int subnetInt = ipToInt(subnet);
    int networkInt = ipInt & subnetInt;
    return intToIp(networkInt);
  }
```

IT FUNDAMENTALS 2

```
private static int ipToInt(String ip) {
    String[] parts = ip.split("\\.");
    int result = 0;
    for (int i = 0; i < 4; i++) {
        result |= (Integer.parseInt(parts[i]) << (24 - (8 * i)));
    }
    return result;
}

private static String intToIp(int ipInt) {
    return ((ipInt >> 24) & 0xFF) + "." +
        ((ipInt >> 16) & 0xFF) + "." +
        ((ipInt >> 8) & 0xFF) + "." +
        (ipInt & 0xFF);
}
```



IT FUNDAMENTALS 3