Template Week 2 – Logic

Student number: **592964**

Assignment 2.1: Parking lot

Which gates do you need?

I will need **2 AND gates**. This will check all spots and if any of them is empty, the light will stay off.

1st AND gate – Connected to Parking Lot 1 and 2 (I will refer to this as 'AB').

2nd AND gate – Connected to Previous pair 'AB' and parking lot 3.

Complete this table:

Parking lot 1	Parking lot 2	Parking lot 3	Result (full)
0	0	0	0
0	0	1	0
0	1	0	0
1	0	0	0
0	1	1	0
1	1	0	0
1	0	1	0
1	1	1	1

Assignment 2.2: Android or iPhone

Which gates do you need?

I will need **1 XOR gate**. This way employee can choose only one unlike with OR gate.

Complete this table:

Android phone	iPhone	Result (Phone in possession)
0	0	0
1	0	1
0	1	1
1	1	0

Assignment 2.3: Four NAND gates

Complete this table

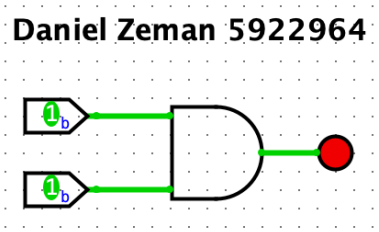
A	B	Q
0	0	0
1	0	1
0	1	1
1	1	0

How can the design be simplified?

By implementing **XOR gate**.

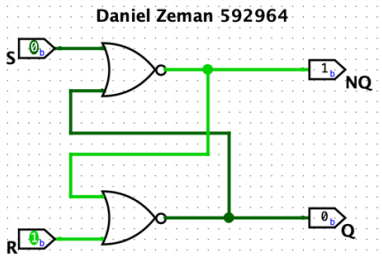
Assignment 2.4: Getting to know Logisim evolution

Screenshot of the design with your name and student number in it:



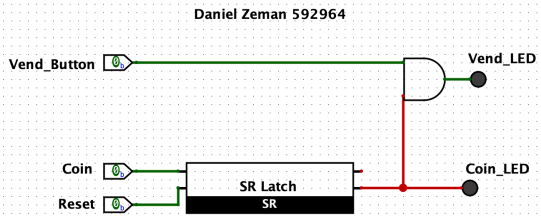
Assignment 2.5: SR Latch

Screenshot SR Latch in Logisim with your name and student number:



Assignment 2.6: Vending Machine

Screenshot Vending Machine in Logisim with your name and student number:



Assignment 2.7: Bitwise operators

Complete the java source code for bitwise operators. Put the source code here.

```
public class Main {
   public static void main(String[] args) {
      exercise1();
      exercise2();
      exerceise3();
      exerceise4();
      exerceise5();
      exerceise6();
      exerceise7();
   }

   public static void  exercise1(){
      int number = 5;
      if((number & 1) == 1){
         System.out.println("number is odd");
      }else{
         System.out.println("number is even");
      }
   }
   public static void  exercise2(){
      int number = 3;
      if((number & (number-1)) == 0){
         System.out.println("number is a power of 2");
      }
      else System.out.println("number isn’t a power of 2");
   }
   public static void exerceise3(){
      final int READ = 4;
      final int WRITE = 2;
```

```
    final int EXECUTE = 1;

    int userPermissions = 7;
    if ((userPermissions & READ) == 4 ){
        System.out.println("User has read permissions");
    }else {
        System.out.println("User can't read. No permissions.");
    }
}
public static void exerceise4(){
    final int READ = 4;
    final int WRITE = 2;
    final int EXECUTE = 1;

    int userPermissions = READ | EXECUTE;
    System.out.println("User permissions: "+userPermissions);
}

public static void exerceise5(){
    final int READ = 4;
    final int WRITE = 2;
    final int EXECUTE = 1;

    int userPermissions = 6;
    userPermissions = userPermissions ^ WRITE;
    System.out.println("User permissions: "+userPermissions);
}
public static void exerceise6(){
    int number = 5;
    number = ~ (number - 1);
    System.out.println("Number: " + number);
```

```
    }
    public static void exerceise7(){
        int number = 10;
        System.out.println("Decimal number is: " + number);

        String binary = Integer.toBinaryString(number);
        String octal = Integer.toOctalString(number);
        String hex = Integer.toHexString(number);

        System.out.println("Binary number: " + binary);
        System.out.println("Octal number: " + octal);
        System.out.println("Hex number: " + hex);
    }
}
```

Assignment 2.8: Java Application Bit Calculations

Create a java program that accepts user input and presents a menu with options.

1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?

Implement the methods by using the bitwise operators you have just learned.

Organize your source code in a readable manner with the use of control flow and methods.

Keep this application because you need to expand it in week 6 for calculating network segments.

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);
        boolean continueProgram = true;
```

```
        System.out.print("Please, enter a decimal number: ");
        int decimalNumber = scanner.nextInt();

        while (continueProgram){
            printMenu();
            System.out.print("Please, select and option: ");
            int pickedOption = scanner.nextInt();
            System.out.println();

            if (pickedOption == 1){
                oddOrEven(decimalNumber);
            }else if(pickedOption == 2){
                checkIfPowerOfTwo(decimalNumber);
            }else if(pickedOption == 3 ){
                twosComplementNumber(decimalNumber);
            } else if (pickedOption == 0){
                continueProgram = false;
            }else {
                System.out.println("Invalid menu option");
            }
        }
        System.out.println("This is the end of a program");
    }

    public static void printMenu(){
        System.out.println("1. Is number odd or even?");
        System.out.println("2. Is number power of 2?");
        System.out.println("3. Two's complement number?");
        System.out.println("0. Exit a program");
    }
```

```
    public static void oddOrEven(int number){
        if ((number & 1) == 0){
            System.out.println("The number " + number + " is even");
        }else {
            System.out.println("The number " + number + " is odd");
        }
        System.out.println();
    }
    public static void checkIfPowerOfTwo(int number){
        if ((number & (number-1)) == 0){
            System.out.println("The number " + number + " is a power of 2");
        }else {
            System.out.println("The number " + number + " is NOT a power of 2");
        }
        System.out.println();

    }
    public static void twosComplementNumber(int number){
        int result = (~number + 1);
        System.out.println("The two's complement of number " + number + " is " + result);
        System.out.println();
    }
}
```

Ready? Then save this file and export it as a pdf file with the name: **week2.pdf**