Template Week 2 – Logic

Student number:582840

Assignment 2.1: Parking lot

Which gates do you need?

Een AND gate

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?

Een NOR gate

Complete this table

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

Assignment 2.3: Four NAND gates

Complete this table

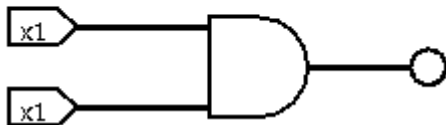| A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

Door een NOR gate

Assignment 2.4: Getting to know Logisim evolution

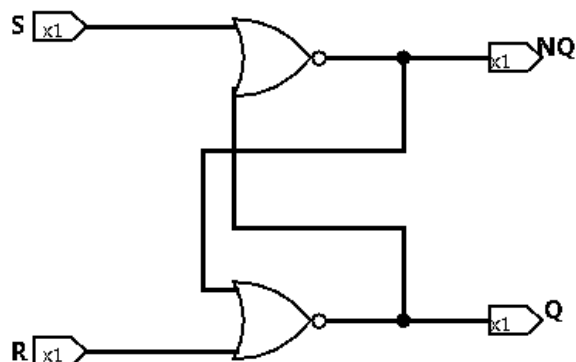Screenshot of the design with your name and student number in it:

Assignment 2.5: SR Latch

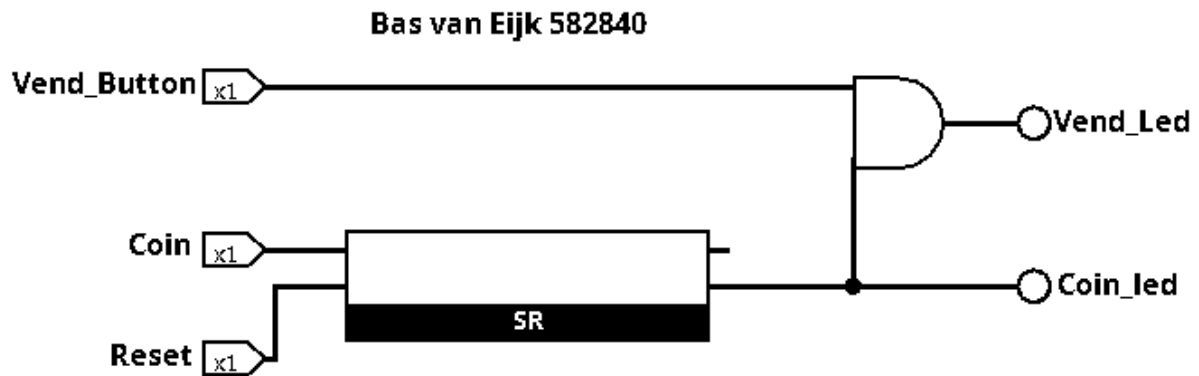Screenshot SR Latch in Logisim with your name and student number:

Assignment 2.6: Vending Machine

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

Vend_Button x1)——————————————————○ Vend_Led

Coin x1)

SR

Reset x1)

○ Coin_led

Assignment 2.7: Bitwise operators

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

#1

```
public class Main {
  public static void main(String[] args) {
    int number = 5;
    if ((number & 1) == 1) System.out.println("Number is odd");
    else System.out.println("number is even");
  }
}
```

#2

```java
public class Main {
  public static void main(String[] args) {
    int number = 1;
    if ((number & (number - 1)) == 0) System.out.println("Number is a power of 2");
    else System.out.println("number isnt a power of 2");
  }
}
```

#3

```java
public class Main {
        public static void main(String[] args) {
                final int READ = 4;
                final int WRITE = 2;
                final int EXECUTE = 1;
                int userPermissions = 7;
                if((userPermissions & READ) != 0) System.out.println("User has read permissions");
                else System.out.println("User can't read. No permissions.");
        }
}
```

#4

```java
public class Main {
    public static void main(String[] args) {
        final int READ = 4;
        final int WRITE = 2;
        final int EXECUTE = 1;

        int userPermissions = 0;

        // Geef de gebruiker READ en EXECUTE permissies
        userPermissions = READ | EXECUTE;

        System.out.println("User permissions: " + userPermissions);
    }
}
```

#5

```java
public class Main {
    public static void main(String[] args) {
        final int READ = 4;
        final int WRITE = 2;
        final int EXECUTE = 1;

        int userPermissions = 6;

        userPermissions = userPermissions ^ WRITE;

        System.out.println("User permissions: " + userPermissions);
    }
}
```

#6

```
public class Main {

    public static void main(String[] args) {

        int number = 5;


        number = ~number + 1;


        System.out.println("Number: " + number);

    }

}
```

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.

```java
import java.util.Scanner;

public class Main {

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

        System.out.print("Enter a number: ");
        int number = scanner.nextInt();

        System.out.println("\nChoose an option:");
        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.print("Option: ");
        int option = scanner.nextInt();
```

```java
        switch(option) {
            case 1:
                if (isOdd(number)) {
                    System.out.println(number + " is odd.");
                } else {
                    System.out.println(number + " is even.");
                }
                break;
            case 2:
                if (isPowerOfTwo(number)) {
                    System.out.println(number + " is a power of 2.");
                } else {
                    System.out.println(number + " is not a power of 2.");
                }
                break;
            case 3:
                int twosComp = twosComplement(number);
                System.out.println("Two's complement: " + twosComp);
                break;
            default:
                System.out.println("Invalid option.");
        }

        scanner.close();
    }

    public static boolean isOdd(int n) {
        return (n & 1) != 0;
    }

    public static boolean isPowerOfTwo(int n) {
        return n > 0 && (n & (n - 1)) == 0;
    }

    public static int twosComplement(int n) {
        return ~n + 1;
    }
}
```

```
/home/bas/.jdks/ms-21.0.8/bin/java -javaagent:/home/bas/.local/share/JetBrains/Toolbox/apps/intellij-idea-ultimate/lib/idea_rt.jar=32805 -Dfile.encod
Enter a number: 3

Choose an option:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
Option: 1
3 is odd.

Process finished with exit code 0
```

```
> src > ⓒ Main > 🔴 isOdd
```

```
/home/bas/.jdks/ms-21.0.8/bin/java -javaagent:/home/bas/.local/share/JetBrains/Toolbox/apps/intellij-idea-ultimate/lib/idea_rt.jar=33127 -Dfile.encod
Enter a number: 8

Choose an option:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
Option: 2
8 is a power of 2.

Process finished with exit code 0
|
```

```
> src > ⓒ Main > 🔴 isOdd
```

```
/home/bas/.jdks/ms-21.0.8/bin/java -javaagent:/home/bas/.local/share/JetBrains/Toolbox/apps/intellij-idea-ultimate/lib/idea_rt.jar=34129 -Dfile.encod
Enter a number: 3

Choose an option:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
Option: 3
Two's complement: -3

Process finished with exit code 0
```

```
> src > ⓒ Main > 🔴 isOdd
```

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