

Template Week 2 – Logic

Student number: 561004

Assignment 2.1: Parking lot

Which gates do you need? – AND logic gate

Complete this table

Parking lot 1	Parking lot 2	Parking lot 3	Result (full)
0	0	0	-
0	0	1	-
0	1	0	-
0	1	1	-
1	0	0	-
1	0	1	-
1	1	0	-
1	1	1	Full (true)

Assignment 2.2: Android/iPhone

Which gates do you need? – XOR logic gate

Complete this table

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

Assignment 2.3: Four NAND gates

Complete this table

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

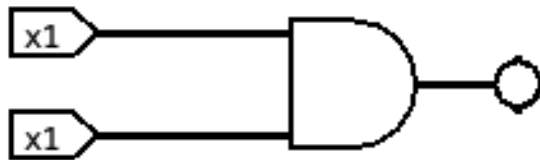
How can the design be simplified?

It can be done with only one XOR gate.

Assignment 2.4: Getting to know Logisim evolution

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

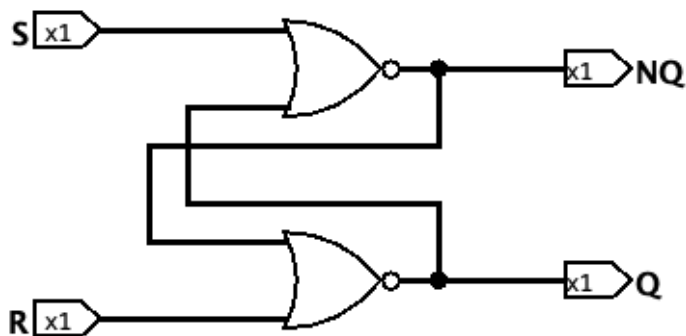
Raya Hristova – 561004



Assignment 2.5: SR Latch

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

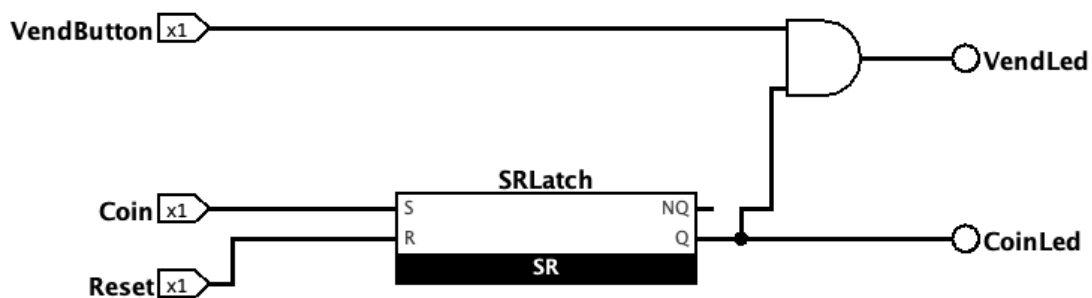
Raya Hristova – 561004



Assignment 2.6: Vending Machine

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

Raya Hristova – 561004



Bonus point assignment – week 2

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

1. Is number odd?

```
public void EvenOrOdd() { 1 usage
    SaxionApp.print("Number: ");
    input = SaxionApp.readInt();

    if((input & 1) == 1) { SaxionApp.println(text: "Number is odd"); }
    else { SaxionApp.println(text: "Number is even"); }
}
```

2. Is number a power of 2?

```
public void PowerOf2() { 1 usage
    SaxionApp.print("Number: ");
    input = SaxionApp.readInt();

    if((input & (input - 1)) == 0) { SaxionApp.println(text: "Number is a power 2"); }
    else { SaxionApp.println(text: "Number is not power of 2"); }
}
```

3. Two's complement of number?

```
public void ComplementOf2() { 1 usage
    SaxionApp.print("Number: ");
    input = SaxionApp.readInt();

    input = ~input + 1;
    SaxionApp.println(text: "Complement number: " + input);
}
```

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.

Source code:

```
import nl.saxion.app.SaxionApp;

import java.awt.*;
import java.nio.channels.SelectableChannel;

public class Application implements Runnable { // There is a green button to the left of the word
"public". Click here!

    public static void main(String[] args) {
        SaxionApp.start(new Application(), 750, 750);
    }

    int input = 0;
    public void run() {
        int function = 0;

        while(true) {
            SaxionApp.println("Bitwise operators");
            SaxionApp.println();
            SaxionApp.println("Select an operation: ");
            SaxionApp.println("1) Check if a number is even or odd");
            SaxionApp.println("2) Check if a number is a power of 2");
            SaxionApp.println("3) Check complement number");
            SaxionApp.println("4) Exit application");
            SaxionApp.println();
            SaxionApp.print("Select an operation: ");

            function = SaxionApp.readInt();

            SaxionApp.println();

            switch (function) {
                case 1:
                    EvenOrOdd();
                    break;

                case 2:
                    PowerOf2();
                    break;

                case 3:
                    ComplementOf2();
                    break;

                case 4:
                    return;
            }
        }
    }
}
```

```

        default:
            SaxionApp.printLine("Invalid function!", Color.RED);
            break;
    }

    SaxionApp.printLine();

    SaxionApp.printLine("Press any key to continue...");
    SaxionApp.readChar();

    SaxionApp.clear();
}

}

public void EvenOrOdd() {
    SaxionApp.print("Number: ");
    input = SaxionApp.readInt();

    if((input & 1) == 1) { SaxionApp.printLine("Number is odd"); }
    else { SaxionApp.printLine("Number is even"); }
}

public void PowerOf2() {
    SaxionApp.print("Number: ");
    input = SaxionApp.readInt();

    if((input & (input - 1)) == 0) { SaxionApp.printLine("Number is a power 2"); }
    else { SaxionApp.printLine("Number is not power of 2"); }
}

public void ComplementOf2() {
    SaxionApp.print("Number: ");
    input = SaxionApp.readInt();

    input = ~input + 1;
    SaxionApp.printLine("Complement number: " + input);
}
}

```

Application:

```
Saxion Drawingboard

Bitwise operators

Select an operation:
1) Check if a number is even or odd
2) Check if a number is a power of 2
3) Check complement number
4) Exit application

Select an operation: 2

Number: 8
Number is a power 2

Press any key to continue...
```

```
Saxion Drawingboard

Bitwise operators

Select an operation:
1) Check if a number is even or odd
2) Check if a number is a power of 2
3) Check complement number
4) Exit application

Select an operation: 1

Number: 4
Number is even

Press any key to continue...
```

```
Saxion Drawingboard

Bitwise operators

Select an operation:
1) Check if a number is even or odd
2) Check if a number is a power of 2
3) Check complement number
4) Exit application

Select an operation: 3

Number: 5
Complement number: -5

Press any key to continue...
```