Template Week 2 – Logic

Student number: 580606

Assignment 2.1: Parking lot

Which gates do you need?

The AND gate, because the light should be on only in case all the parking lots are occupied

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

Assignment 2.2: Android or iPhone

Which gates do you need?

The XOR gate, because the employee has to choose only one option.

Complete this table

Android phone	iPhone	Result (Phone in possession)
0	0	No phone
1	0	Android
0	1	iPhone
1	1	No phone

Assignment 2.3: Four NAND gates

Complete this table

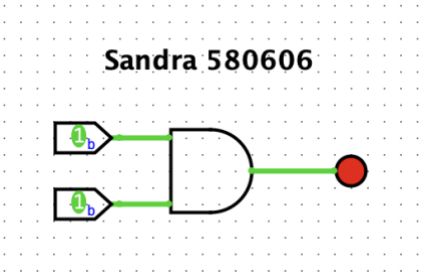
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

This logic circuit can be simplified to an XOR gate.

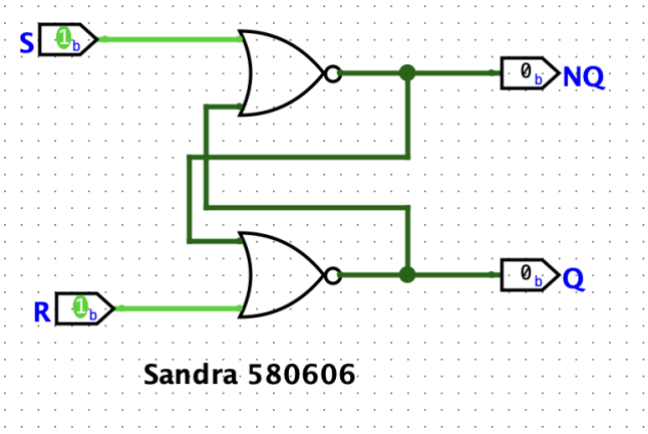
Assignment 2.4: Getting to know Logisim evolution

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



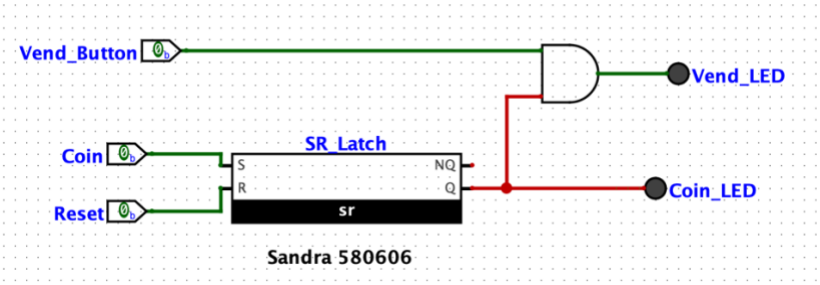
Assignment 2.5: SR Latch

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.

#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

```
public class Main {
        public static void main(String[] args) {
                int number = 15;
                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");
        }
}
```

#3

The file permissions for verse: 644

```
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) >> 2) == 1) System.out.println("User has read permissions");
                else System.out.println("User can't read. No permissions.");
        }
}
```

#4

```
public class Main {
        public static void main(String[] args) {
                final int READ = 4;
                final int WRITE = 2;
                final int EXECUTE = 1;
                int userPermissions = READ | EXECUTE;
                System.out.println("User permissions: "+userPermissions);
```

```
 }
}
```

#5

```
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);
		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.

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

import java.awt.*;

public class Application implements Runnable {

    public static void main(String[] args) {
        SaxionApp.start(new Application(), 800, 800);
    }

    public void run() {
        int input = 1;
        while (input != 0) {
            SaxionApp.printLine("-----Menu-----");
            SaxionApp.printLine("1. Is the number odd?");
            SaxionApp.printLine("2. Is the number a power 0f 2?");
            SaxionApp.printLine("3. Two complement of number?");
            SaxionApp.printLine("0. Exit");
            SaxionApp.print("Provide input number: ");
            int number = SaxionApp.readInt();
            SaxionApp.print("Choose option: ");
            input = SaxionApp.readInt();
            switch (input) {
                case 1:
                    if (isOdd(number)) {
                        SaxionApp.printLine("Number " + number + " is odd.");
                    } else {
                        SaxionApp.printLine("Number " + number + " is even.");
                    }
                    break;
                case 2:
                    if (isAPowerOfTwo(number)) {
                        SaxionApp.printLine("Number " + number + " is a power
of 2.");
                    } else {
                        SaxionApp.printLine("Number " + number + " is not a
power of 2.");
                    }
                    break;
                case 3:
                    SaxionApp.printLine("Two compliment of " + number + " is "
+ twoCompliment(number));
                    break;
                case 0:
                    SaxionApp.quit();
                    break;
                default:
                    SaxionApp.printLine("Invalid input, try again", Color.RED);
            }
            SaxionApp.pause();
            SaxionApp.clear();

        }


    }

    public boolean isOdd(int number) {
        return (number & 1) == 1;
    }
```

```
    public boolean isAPowerOfTwo(int number) {
        return (number & (number - 1)) == 0;
    }

    public int twoCompliment(int number) {
        return ~number + 1;
    }
}
```

```
-----Menu-----
1. Is the number odd?
2. Is the number a power 0f 2?
3. Two complement of number?
0. Exit
Provide input number: 16
Choose option: 2
Number 16 is a power of 2.
```