

Template Week 2 – Logic

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Assignment 2.1: Parking lot

Which gates do you need? Two AND gates or a single AND gate with three inputs, because only when all the spots are taken the lot is full (1 and 2 and 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
1	1	0	0
0	1	1	0
1	0	1	0
1	1	1	1 (full)

Assignment 2.2: Android or iPhone

Which gates do you need? XOR gates. Exactly one of the inputs must be true, it's either Android or iPhone.

Complete this table

Android phone	iPhone	Result (Phone in possession)
0	0	none
0	1	iphone
1	0	android
1	1	none

Assignment 2.3: Four NAND gates

Complete this table

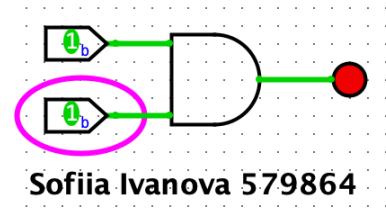
A	B	Q
0	0	0
1	0	1
0	1	1
1	1	0

How can the design be simplified?

With a single XOR gate the truth table would have the same results.

Assignment 2.4: Getting to know Logisim evolution

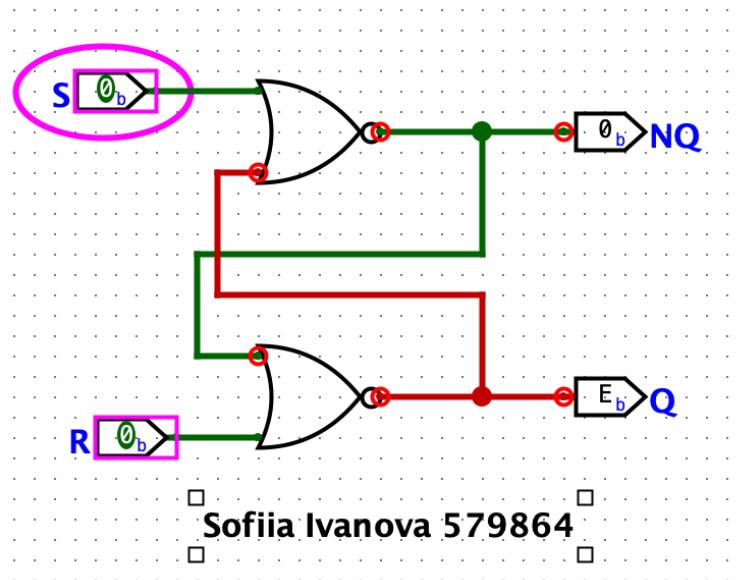
Screenshot of the design with your name and student number in it:



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Assignment 2.5: SR Latch

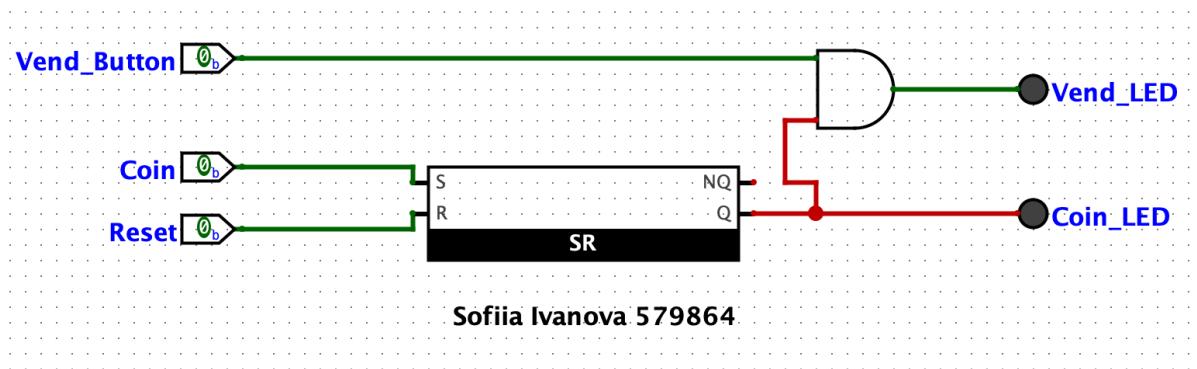
Screenshot SR Latch in Logisim with your name and student number:



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Assignment 2.6: Vending Machine

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



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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) {  
        int number = 5;  
        if((number & 1)==1) System.out.println("number is odd");  
        else System.out.println("number is even");  
    }  
}
```

```
public class Main {  
    public static void main(String[] args) {  
        int number = 4;  
        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 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)==4) System.out.println("User  
has read permissions");  
        else System.out.println("User can't read. No  
permissions.");  
    }  
}
```

```
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);  
    }  
}
```

```
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);

    }
}

```

```

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.

```

import nl.saxion.app.SaxionApp;

public class Application implements Runnable {
    public static void main(String[] args) {
        SaxionApp.start(new Application(), 800, 768);
    }

    public void run() {
        boolean continueProgram = true;
        while (continueProgram) {
            SaxionApp.printLine("1. Is number odd?");
            SaxionApp.printLine("2. Is number a power of 2?");
            SaxionApp.printLine("3. Two's complement of number?");
            SaxionApp.print("Please select an option: ");
            int input = SaxionApp.readInt();
            if (input == 1) {
                isNumberOdd();
            } else if (input == 2) {
                isNumberAPowerOfTwo();
            }
        }
    }
}

class Application {
    public void printLine(String text) {
        System.out.println(text);
    }

    public int readInt() {
        Scanner scanner = new Scanner(System.in);
        return scanner.nextInt();
    }
}

```

```

        } else if (input == 3) {
            twosComplementOfANumber();
        } else if (input == 0) {
            continueProgram = false;
        }
        SaxonApp.pause();
        SaxonApp.clear();
    }
}
public int askForInput(){
    SaxonApp.printLine("Enter number: ");
    return SaxonApp.readInt();
}
public void twosComplementOfANumber(){
    int userInput=askForInput();
    userInput = ~userInput+1;
    SaxonApp.printLine("Number: "+ userInput);
}
public void isNumberOdd(){
    int userInput=askForInput();
    if((userInput & 1)==1) SaxonApp.printLine("number is odd");
    else SaxonApp.printLine("number is even");
}
public void isNumberAPowerOfTwo() {
    int userInput=askForInput();
    if ((userInput & userInput - 1) == 0) SaxonApp.printLine("number
is a power of 2");
    else SaxonApp.printLine("number isn't a power of 2");
}
}

```

1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
Please select an option: 2
Enter number:
5
number isn't a power of 2

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