Template Week 2 – Logic

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Assignment 2.1: Parking lot

Which gates do you need?

Je hebt een NAND poort nodig, als alle inputs true zijn (alle parkeerplaatsen zijn bezet) dan wordt er een false signaal gedisplayt (rood), in alle andere gevallen is het signaal true (groen)

Complete this table

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

Assignment 2.2: Android or iPhone

Which gates do you need?

Een XOR gate, true signal wanneer 1 van de inputs true is, false signal als allebei true zijn of allebei false. Dus als je er geen telefoon selecteerd is het false en als je ze allebei selecteerd is het false

Complete this table

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

Assignment 2.3: Four NAND gates

Complete this table

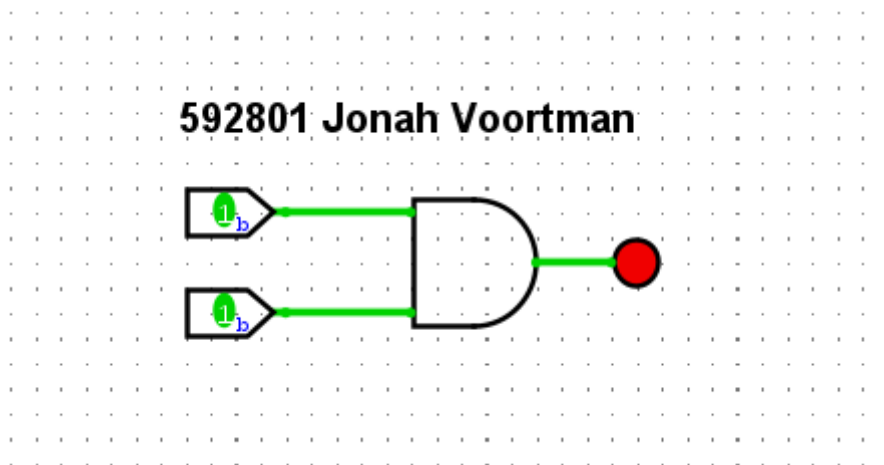| A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

In de table zie je dat q allene 1 is als A en B verschillend zijn. Dat hoort bij een XOR poort.

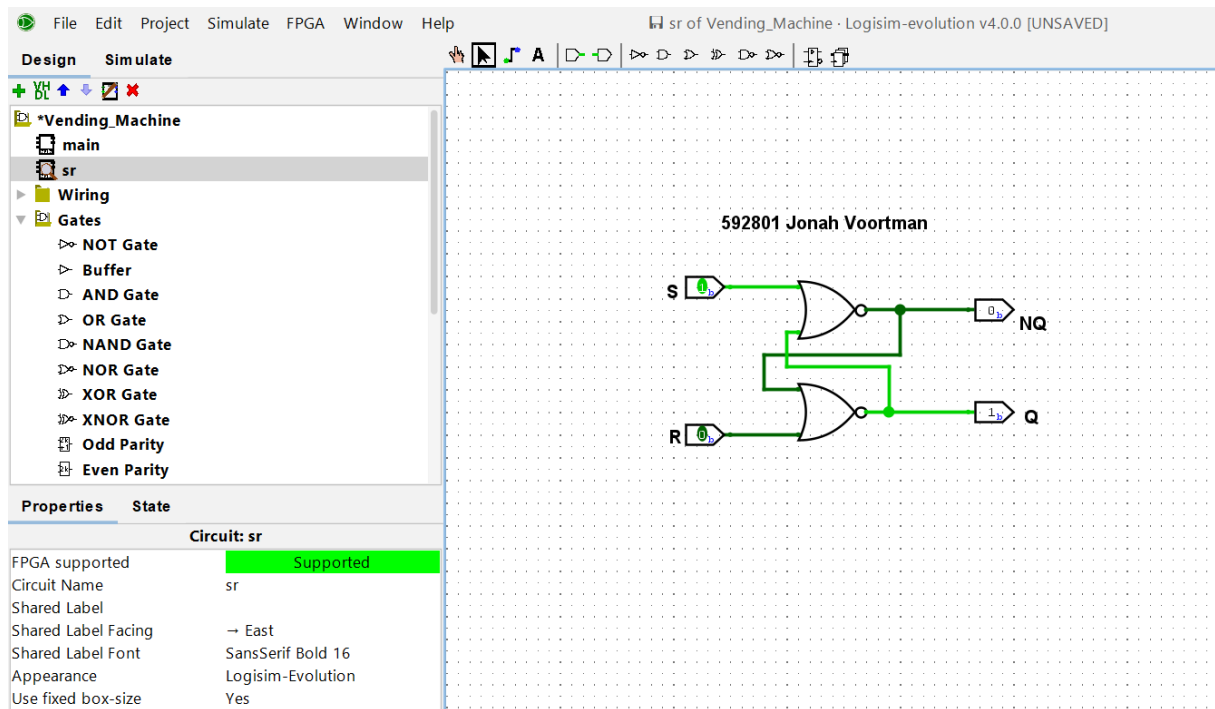Als je dus 1 XOR poort maakt met 2 inputs kun je het versimpelen

Assignment 2.4: Getting to know Logisim evolution

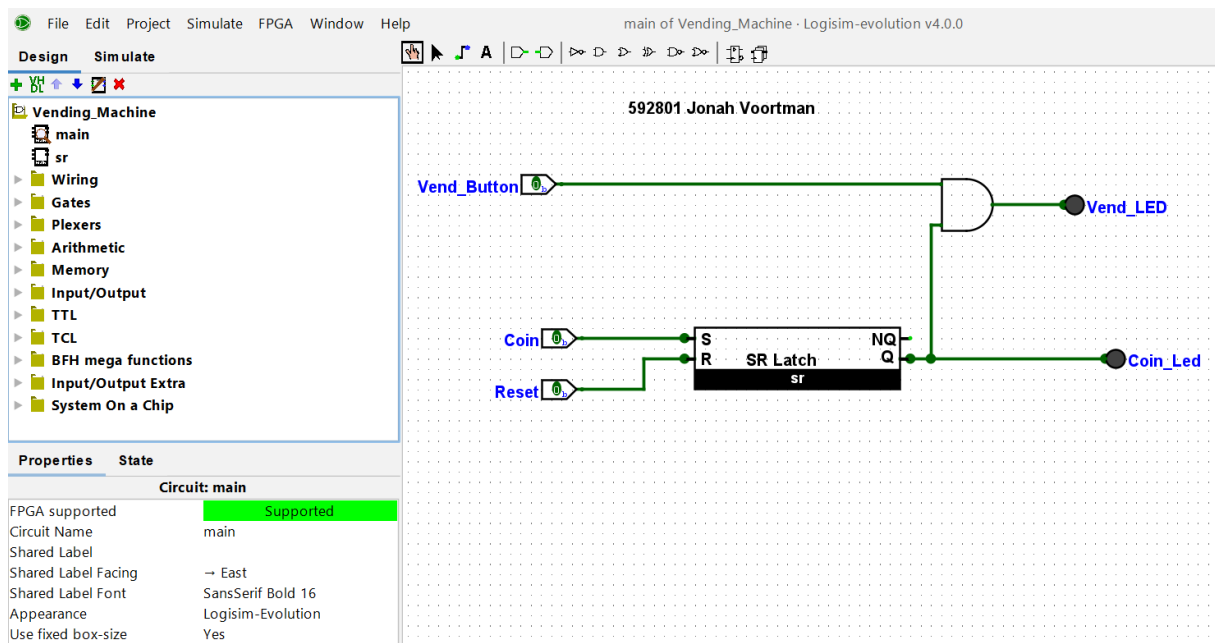Screenshot of the design with your name and student number in it:

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.

Even or odd:

```java
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");
 }
}
```

Power of 2:

```java
public class Main {
   public static void main(String[] args) {
      int number = 4;


      if (number > 0 && (number & (number - 1)) == 0)
        System.out.println("number is a power of 2");
      else
        System.out.println("number isn't a power of 2");
   }
}
```

Check permissions:

```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.");

    }

}
```

Assign permissions:

```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;

        userPermissions = READ | EXECUTE;


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

    }

}
```

Update permissions:

```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);

    }

}
```

Two's complement:

```java
public class Main {

 public static void main(String[] args) {

 int number = 5;

 number = ~number;

 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
package part1;

import java.util.Scanner;

public class test {

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

    public static boolean isPowerOfTwo(int number) {
        if (number <= 0) {
            return false;
        }
        return (number & (number - 1)) == 0;
    }

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

    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);
        boolean running = true;

        while (running) {

            System.out.println("==== Bit Calculations ====");
            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");
```

```java
            System.out.println("0. Exit");
            System.out.print("Choose an option: ");

            int choice = input.nextInt();

            if (choice == 0) {
                running = false;
                System.out.println("Exiting program...");
            } else if (choice >= 1 && choice <= 3) {

                System.out.print("Enter an integer number: ");
                int number = input.nextInt();

                if (choice == 1) {
                    if (isOdd(number)) {
                        System.out.println(number + " is odd");
                    } else {
                        System.out.println(number + " is even");
                    }

                } else if (choice == 2) {
                    if (isPowerOfTwo(number)) {
                        System.out.println(number + " is a power of 2");
                    } else {
                        System.out.println(number + " is NOT a power of 2");
                    }

                } else if (choice == 3) {
                    int result = twosComplement(number);
                    System.out.println("Two's complement of " + number + " = " + result);
                }

                System.out.println();


            } else {
                System.out.println("Unknown option, please try again.\n");
            }
        }

        input.close();
    }
}
```

```
Run    ▣ test  ×

 C  ▣ | ◎  ⊡  ⦿  ⋮

 ↑      0. Exit
 ↓      Choose an option: 3
 ⇶      Enter an integer number: 2
 ⇲↓     Two's complement of 2 = -2
 🖶
 🗑      ==== Bit Calculations ====
        1. Is number odd?
        2. Is number a power of 2?
racticeExamSolution  >  src  >  part1  >  ⓒ test  >  ⓜ isPowerOfTwo
```

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