Week 2 – Logic

Student number: 579444

Assignment 2.1: Parking lot

Which gates do you need?

We need 2 AND logic gates to check if there is a free parking space.

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	0	1	0
1	1	0	0
1	1	1	1

Assignment 2.2: Android or iPhone

Which gates do you need?

We need an XOR gate for this.

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

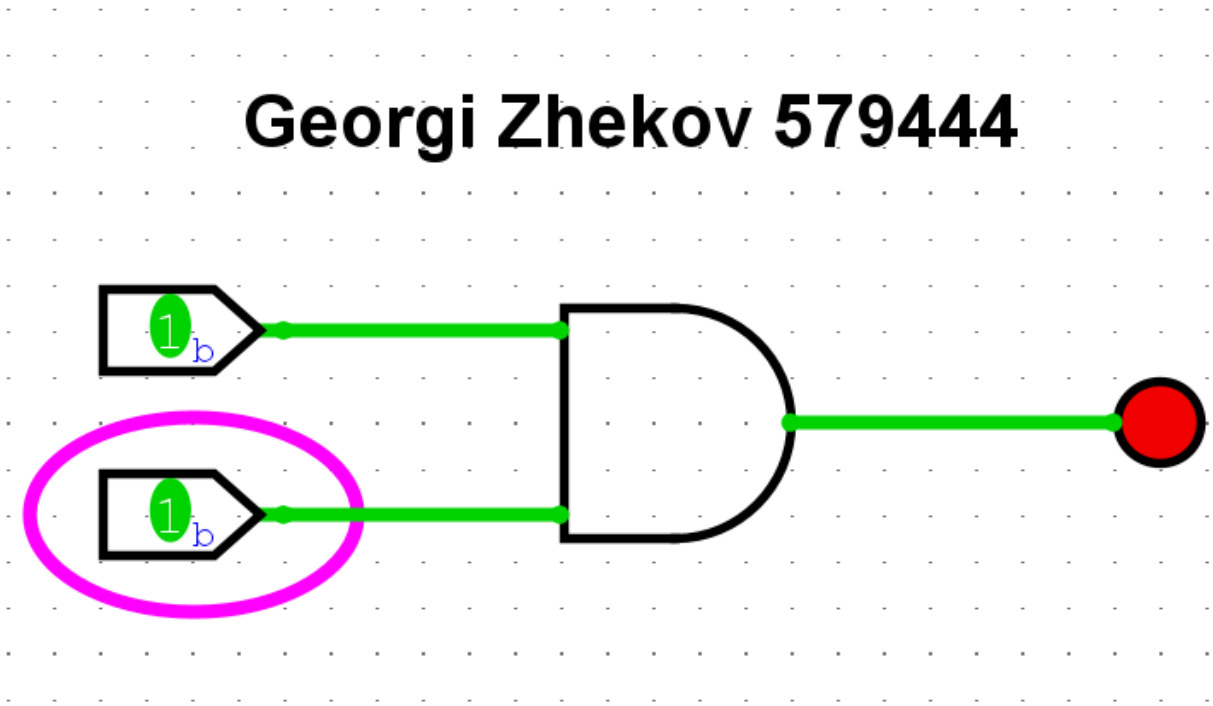
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

With using an XOR gate instead of NAND gates.

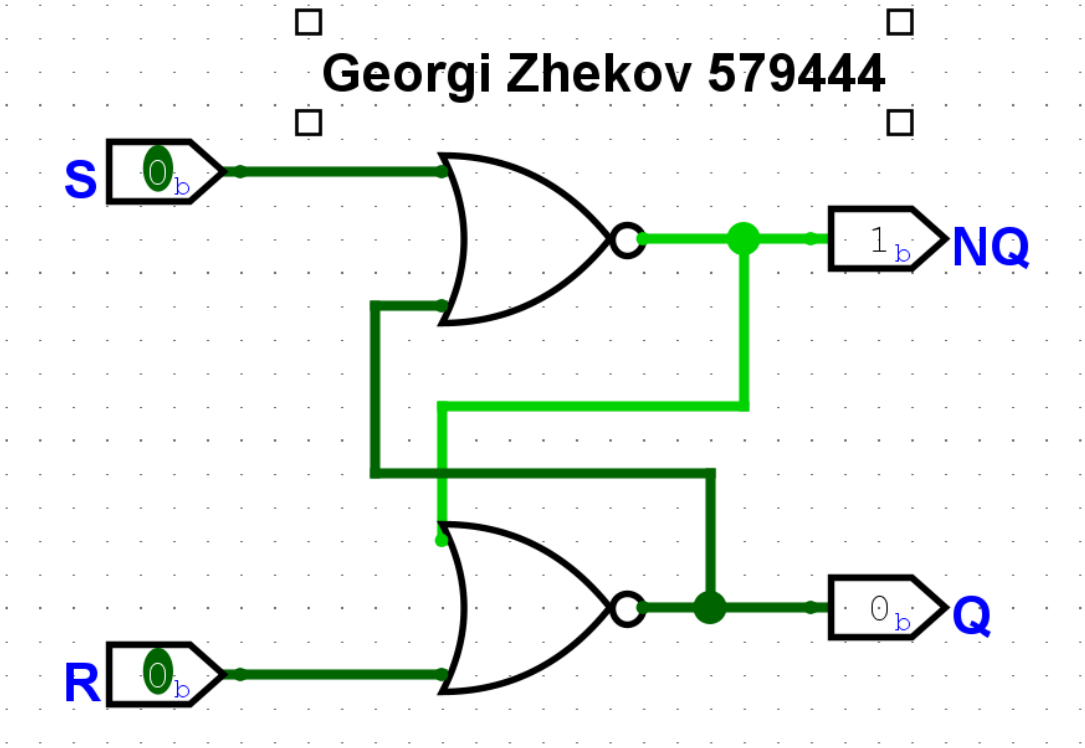
Assignment 2.4: Getting to know Logisim evolution

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



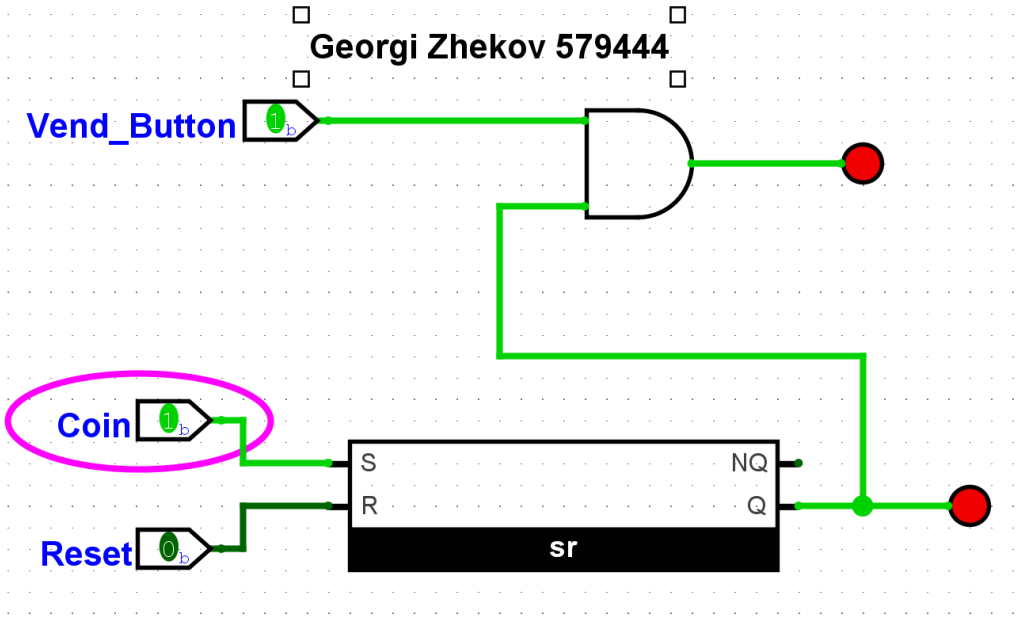
Assignment 2.5: SR Latch

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.

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

// Second task
int number = 4;
if ((number & number - 1) == 0) {
   System.out.println("Number is a power of 2!");
}
else {
   System.out.println("Number is not a power of 2!");
}
```

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.

```
public class Main {
   public static void main(String[] args) {
      System.out.println("1. Check if number is odd");
      System.out.println("2. Check if number is a power of 2");
      System.out.println("3. Check two's complement of a number");
      System.out.println("Choose an operation: ");

      Scanner scanner = new Scanner(System.in);
      int choice = scanner.nextInt();
      int num;
```

```
        switch (choice) {
            case 1:
                System.out.println("Choose a number: ");
                num = scanner.nextInt();
                isNumOdd(num);
                break;

            case 2:
                System.out.println("Choose a number: ");
                num = scanner.nextInt();
                isNumPowerOf2(num);
                break;

            case 3:
                System.out.println("Choose a number: ");
                num = scanner.nextInt();
                twoComplement(num);
                break;
        }
    }

    public static void isNumOdd(int num) {
        if (num % 2 == 0) {
            System.out.println("The number " + num + " is not odd!");
        }
        else {
            System.out.println("The number " + num + " is odd!");
        }
    }

    public static void isNumPowerOf2 (int num) {
        if ((num & num - 1) == 0) {
            System.out.println("The number " + num + " is a power of 2!");
        }
        else {
            System.out.println("The number " + num + " is not a power of 2!");
        }
    }

    public static void twoComplement (int num) {
        num = ~num;
        System.out.println("This is the negative version of your number: " + (num + 1));
        num = ~num;
        System.out.println("And now it's back to a positive: " + num);
    }
}
```

```
1. Check if number is odd
2. Check if number is a power of 2
3. Check two's complement of a number
Choose an operation:
2
Choose a number:
5
The number 5 is not a power of 2!
```

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