Week 2 – Logic

Student number: 564530

Assignment 2.1: Parking lot

Which gates do you need?

We must use AND gateways, and as a result, we get eight possible variations in the result table because we have three different options, and 2^3 is 8. We do

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

Assignment 2.2: Android/iPhone

Which gates do you need?

In our case, we need an **XOR logic gate** because a worker must choose only one appliance, and exclusive OR will ensure that.

Complete this table

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

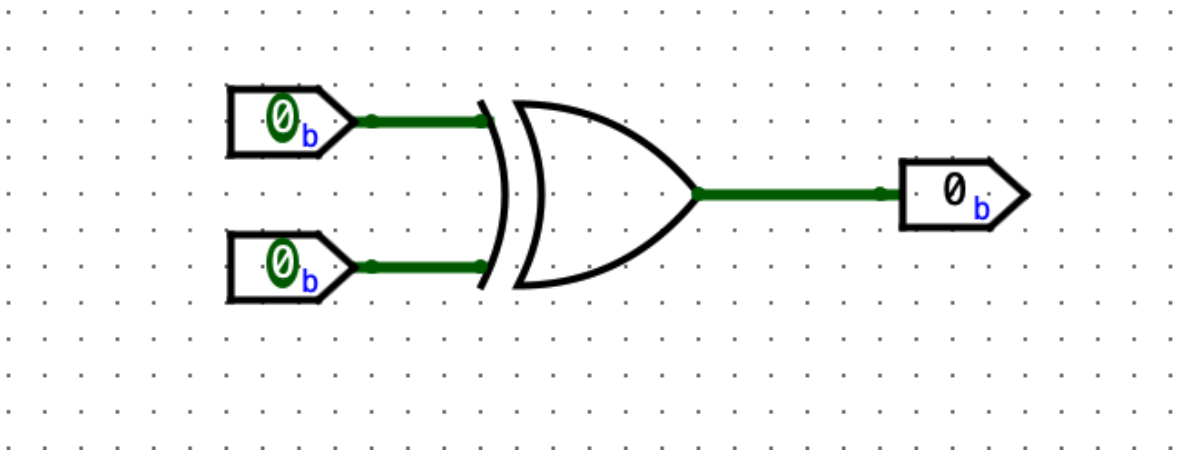
Assignment 2.3: Four NAND gates

Complete this table

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

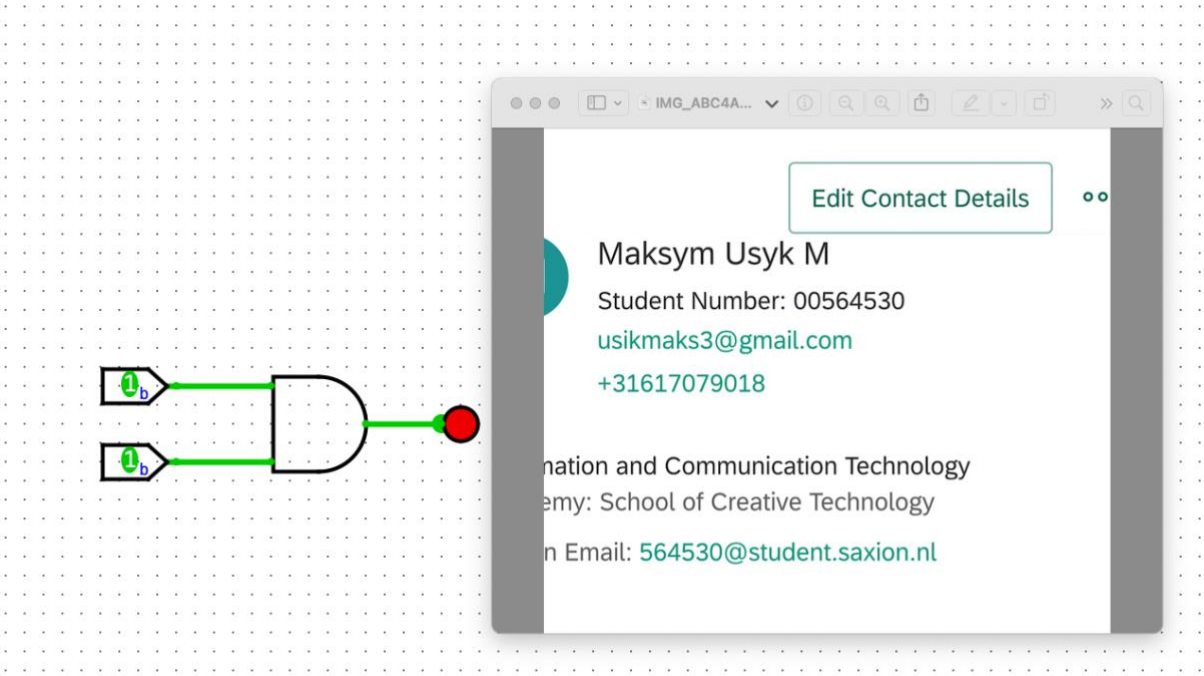
How can the design be simplified?

Those four NAND gates an XOR gates, that is how it can be implemented.



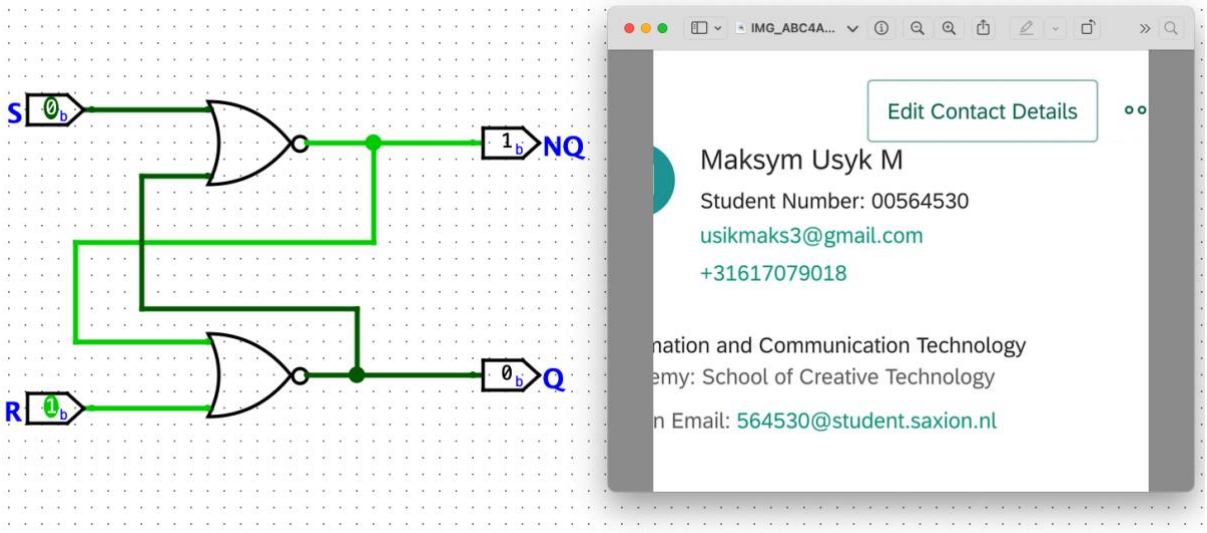
Assignment 2.4: Getting to know Logisim evolution

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



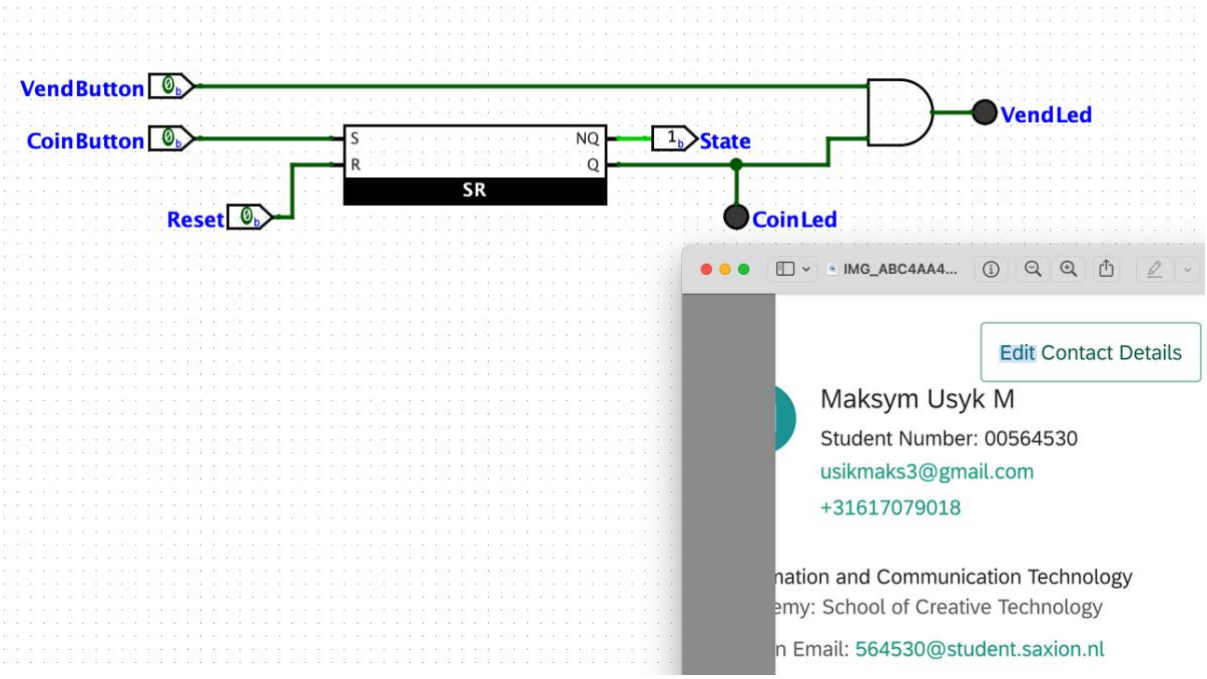
Assignment 2.5: SR Latch

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:

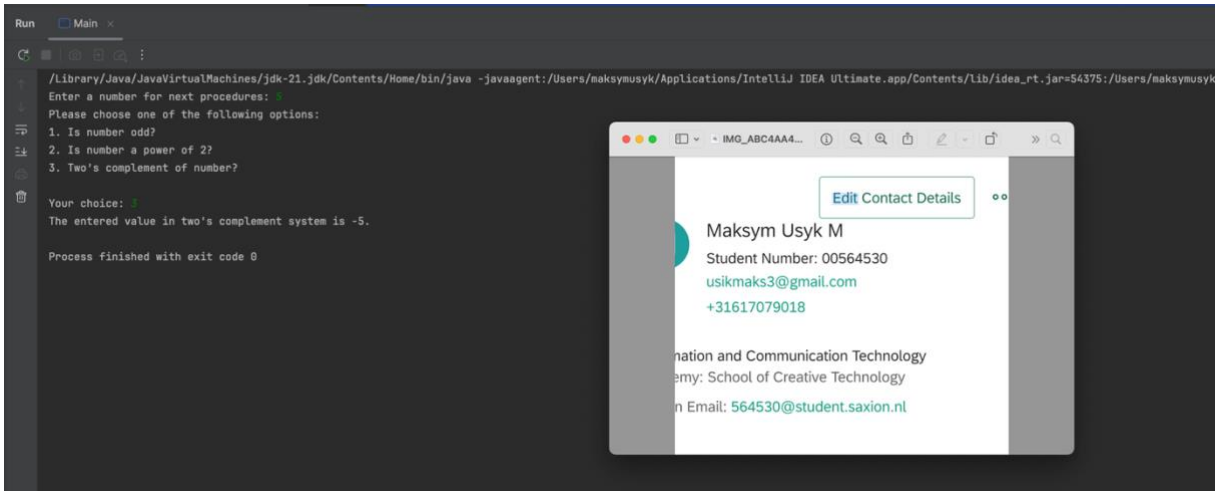


Bonus point assignment – week 2

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

1. Is the number odd?
2. Is the number a power of 2?
3. Two's complement of number?

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number for next procedures: ");
        int number = scanner.nextInt();

        // Display menu
        System.out.print("""
                Please choose one of the following options:
                1. Is number odd?
                2. Is number a power of 2?
                3. Two's complement of number?

                Your choice:\s""");

        int choiceNumber = scanner.nextInt();
        switch (choiceNumber) {
            case 1 -> isOdd(number);
            case 2 -> isNumberPowerOfTwo(number);
            case 3 -> toTwosComplement(number);
            default -> System.out.println("Invalid choice");
        }
    }

    private static void toTwosComplement(int number) {
        System.out.println("The entered value in two's complement system is
" + ((~number) + 1 )+ ".");
    }

    private static void isNumberPowerOfTwo(int number) {
        if (number > 0 && (number & (number - 1)) == 0) {
            System.out.println("Number is power of two");
        } else {
            System.out.println("Number is not power of two");
        }
    }

    public static void isOdd(int number) {
        if ((number & 1) == 1) {
            System.out.println("number is odd");
        } else {
            System.out.println("number is even");
        }
    }

}
```



3,2.

```java
public class Main {
    public static void main(String[] args) {
        final int READ = 4;
        final int WRITE = 2;
        final int EXECUTE = 1;

        int userPermissions = 3;

        // Check if user has read permission
        if (userPermissions < 0 || userPermissions > 7) {
            System.out.println("Invalid user permissions");
        } else if ((userPermissions & READ) != 0) {
            System.out.println("User has read permissions");
        } else {
            System.out.println("User can't read. No permissions.");
        }
    }
}
```

4.

```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);
    }
}
```

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 &= READ;

        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 after negating: " + number);

        number = ~number + 1;
        System.out.println("Number after positive: " + number);
    }
}
```

7.

```
public class Main {
    public static void main(String[] args) {
        int number = 10;
        System.out.println("Decimal integer: " + number);

        String binary = Integer.toBinaryString(number);
        String octal = Integer.toOctalString(number);
        String hexadecimal = Integer.toHexString(number);

        System.out.println("Binary representation: " + binary);
        System.out.println("Octal representation: " + octal);
        System.out.println("Hexadecimal representation: " + hexadecimal);
    }
}
```