Template Week 2 – Logic

Student number: 569527

Assignment 2.1: Parking lot

Which gates do you need?

AND Gates

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
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

Assignment 2.2: Android/iPhone

Which gates do you need?

XOR GATE

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

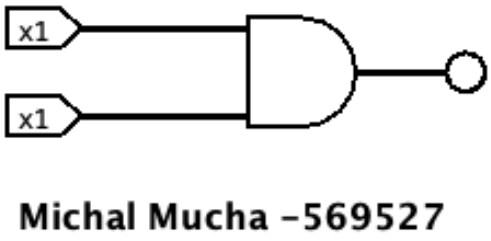
A	B	Q
0	0	1
0	1	0
1	0	0
1	1	1

How can the design be simplified?

Instead of using several components to construct such a circuit-four NAND gates in this case-the design can be dramatically simplified by using a single XOR gate. The XOR does the same operation that the four NANDs do, just in a much simpler way. With an XOR gate

Assignment 2.4: Getting to know Logisim evolution

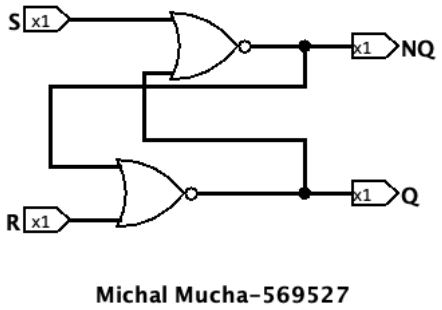
Screenshot of the design with your name and student number in it:



(in Logisim LED is glowing)

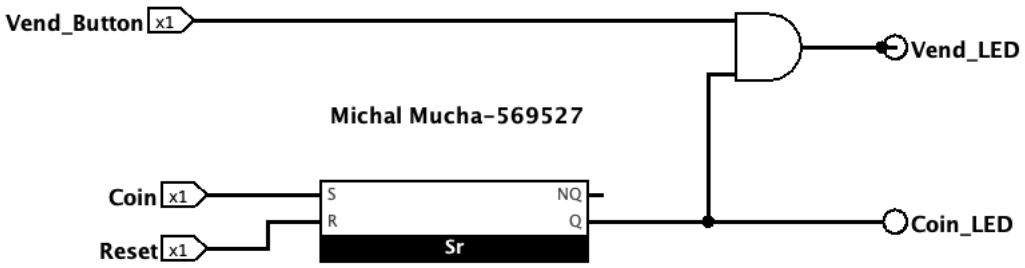
Assignment 2.5: SR Latch

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 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.

Paste source code here, with a screenshot of a working application.

Source code :

```
 import java.util.Scanner;
public class Main {
   public static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);
      boolean exit = false;

      while (!exit) {
         System.out.println("\nMenu:");
         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?");
         System.out.println("4. Exit");
```

```
System.out.print("Choose an option: ");
int choice = scanner.nextInt();
switch (choice) {
    case 1:
        System.out.print("Enter a number: ");
        int number1 = scanner.nextInt();
        if (isOdd(number1)) {
            System.out.println("The number " + number1 + " is odd.");
        } else {
            System.out.println("The number " + number1 + " is even.");
        }
        break;

    case 2:
        System.out.print("Enter a number: ");
        int number2 = scanner.nextInt();
        if (isPowerOfTwo(number2)) {
            System.out.println("The number " + number2 + " is a power of 2.");
        } else {
            System.out.println("The number " + number2 + " is not a power of 2.");
        }
        break;

    case 3:
        System.out.print("Enter a number: ");
        int number3 = scanner.nextInt();
        int complement = twosComplement(number3);
        System.out.println("The two's complement of " + number3 + " is " + complement + ".");
        break;

    case 4:
```

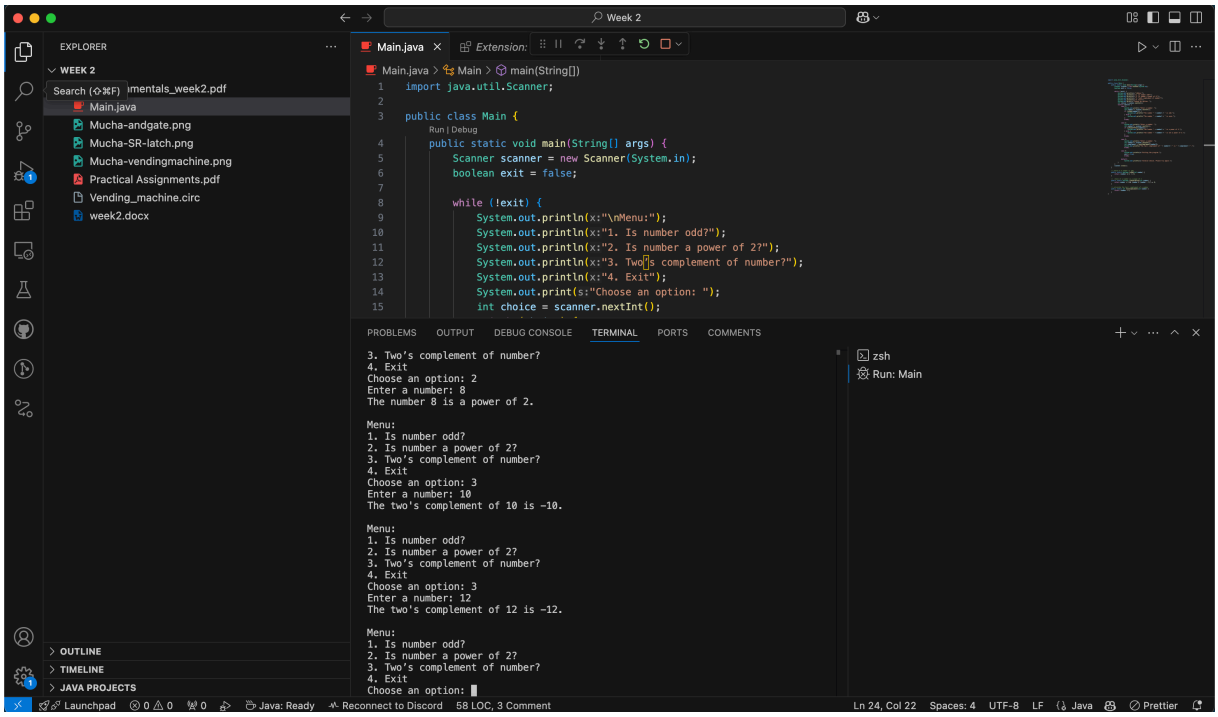
```
                System.out.println("Exiting the program.");
                exit = true;
                break;

            default:
                System.out.println("Invalid choice. Please try again.");
        }
      }
      scanner.close();
   }

   // check if a number is odd
   public static boolean isOdd(int number) {
      return (number & 1) != 0;
   }

   //  check if a number is a power of 2
   public static boolean isPowerOfTwo(int number) {
      return number > 0 && (number & (number - 1)) == 0;
   }

   // calculate the two's complement of a number
   public static int twosComplement(int number) {
      return ~number + 1;
   }
}
```



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