

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

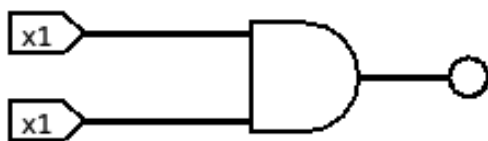
| A | B | Q |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

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:

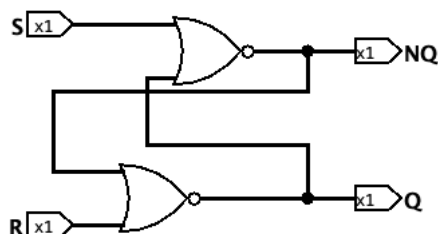


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(in Logisim LED is glowing)

Assignment 2.5: SR Latch

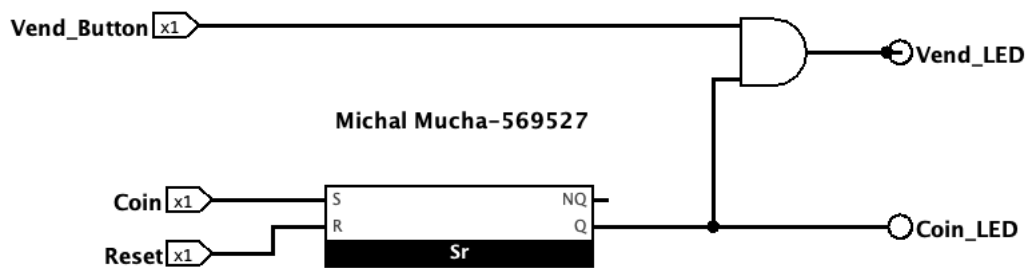
Screenshot SR Latch in Logisim with your name and student number:



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Assignment 2.6: Vending Machine

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



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;
}
}

```

The screenshot shows an IDE with a dark theme. The Explorer panel on the left shows a project named 'WEEK 2' containing files like 'Main.java', 'Mucha-andgate.png', 'Mucha-SR-latch.png', 'Mucha-vendingmachine.png', 'Practical Assignments.pdf', 'Vending_machine.circ', and 'week2.docx'. The Main.java file is open in the editor, showing the following code:

```
1 import java.util.Scanner;
2
3 public class Main {
4     public static void main(String[] args) {
5         Scanner scanner = new Scanner(System.in);
6         boolean exit = false;
7
8         while (!exit) {
9             System.out.println("\nMenu:");
10            System.out.println("1. Is number odd?");
11            System.out.println("2. Is number a power of 2?");
12            System.out.println("3. Two's complement of number?");
13            System.out.println("4. Exit");
14            System.out.print("Choose an option: ");
15            int choice = scanner.nextInt();
```

The Output panel at the bottom shows the program's execution:

```
3. Two's complement of number?
4. Exit
Choose an option: 2
Enter a number: 8
The number 8 is a power of 2.

Menu:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
4. Exit
Choose an option: 3
Enter a number: 10
The two's complement of 10 is -10.

Menu:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
4. Exit
Choose an option: 3
Enter a number: 12
The two's complement of 12 is -12.

Menu:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
4. Exit
Choose an option: 
```

The status bar at the bottom indicates 'Ln 24, Col 22', 'Spaces: 4', 'UTF-8', 'LF', and 'Java'.

Ready? Then save this file and export it as a pdf file with the name: [week2.pdf](#)