

Template Week 2 – Logic

Student number:

Assignment 2.1: Parking lot

Which gates do you need? AND

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 or iPhone

Which gates do you need? XOR

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

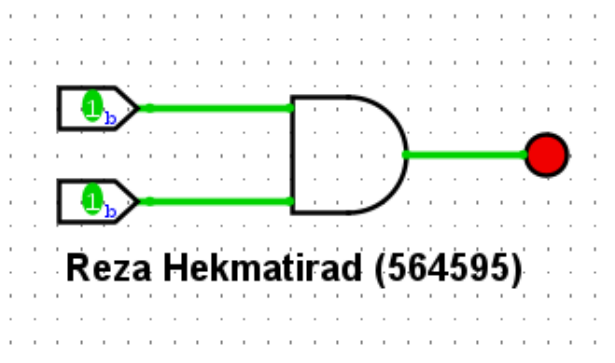
Complete this table

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

How can the design be simplified? By designing a XOR gate.

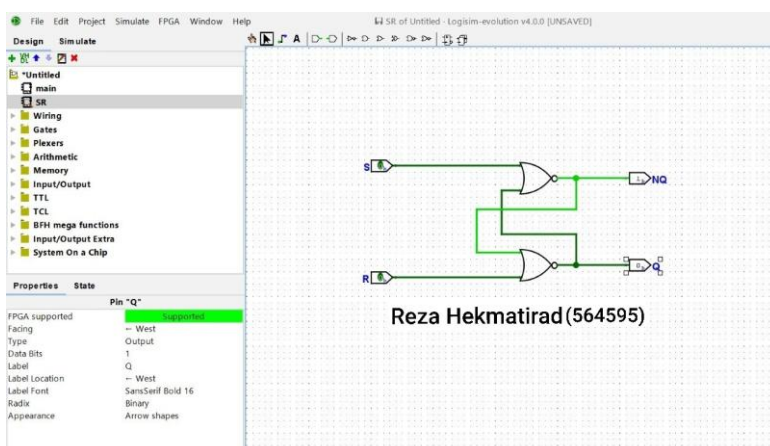
Assignment 2.4: Getting to know Logisim evolution

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



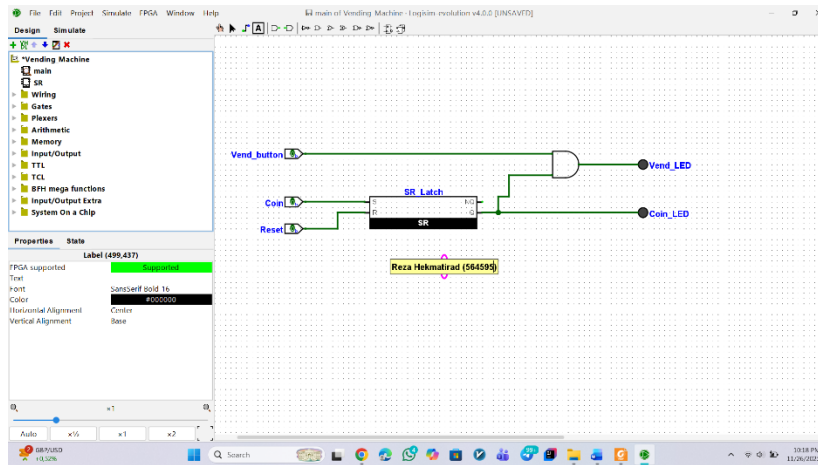
Assignment 2.5: SR Latch

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.

#1 even or odd

```
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");
    }
}
```

#2 power of 2

```
public class Main {
    public static void main(String[] args) {
        int number = 4;
        if((number & number - 1) == 0) System.out.println("number is a power of 2");
        else System.out.println("number isn't a power of 2");
    }
}
```

#3 Check permissions

```
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) == READ) System.out.println("User has read permissions");  
        else System.out.println("User can't read. No permissions.");  
    }  
}
```

#4 Assign permissions

```
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 = userPermissions | READ | EXECUTE;  
        System.out.println("User permissions: "+userPermissions);  
    }  
}
```

#5 Update permissions

```
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);  
    }  
}
```

```
}  
}
```

#6 Two's complement

```
public class Main {  
  
    public static void main(String[] args) {  
  
        int number = 5;  
  
        number = ~ number + 1;  
  
        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.

The screenshot shows an IDE with a Java file named 'Main.java'. The code defines a 'Main' class with a 'main' method. It prompts the user to enter a number and then presents a menu with three options: '1. Is number odd?', '2. Is number a power of 2?', and '3. Two's complement of number?'. The user has entered '10' and chosen option '1', resulting in the output 'Even'. The code uses bitwise operators to check for odd/even and power of 2, and calculates the two's complement. The IDE's run console shows the execution flow and user input/output.

```
public class Main {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
        System.out.println("Enter a number:");  
        int input = scanner.nextInt();  
        if (choice == 1) {  
            System.out.println((input & 1) == 1 ? "Odd" : "Even");  
        } else if (choice == 2) {  
            System.out.println((input > 0 && (input & (input - 1)) == 0) ? "Power of 2" : "Not power of 2");  
        } else if (choice == 3) {  
            System.out.println("Two's complement: " + ((~input) + 1));  
        } else {  
            System.out.println("Invalid input!");  
        }  
        scanner.close();  
    }  
}
```

Run Main
"C:\Program Files\Java\jdk-21\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2023.3.2\lib\idea_rt.jar=S2901" -Dfile.encoding=UTF-8 -Dsun.java2d.crispness=10
Enter a number: 10
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
Choice: 1
Even

```

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: ");
        int input = scanner.nextInt();

        System.out.println("1. Is number odd?");
        System.out.println("2. Is number a power of 2?");
        System.out.println("3. Two's complement?");
        System.out.print("Choice: ");
        int choice = scanner.nextInt();

        if (choice == 1) {
            System.out.println((input & 1) == 1 ? "Odd" : "Even");
        } else if (choice == 2) {
            System.out.println((input > 0 && (input & (input - 1)) == 0) ? "Power of 2" : "Not power of 2");
        } else if (choice == 3) {
            System.out.println("Two's complement: " + ((~input) + 1));
        } else {
            System.out.println("Invalid input!");
        }

        scanner.close();
    }
}

```

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