

Template Week 2 – Logic

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Assignment 2.1: Parking lot

Which gates do you need?

We will use AND gate

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 gate

Complete this table

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

Assignment 2.3: Four NAND gates

Complete this table

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

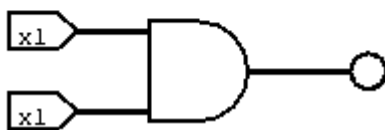
How can the design be simplified?

It can also be done with one NAND gate

Assignment 2.4: Getting to know Logisim evolution

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

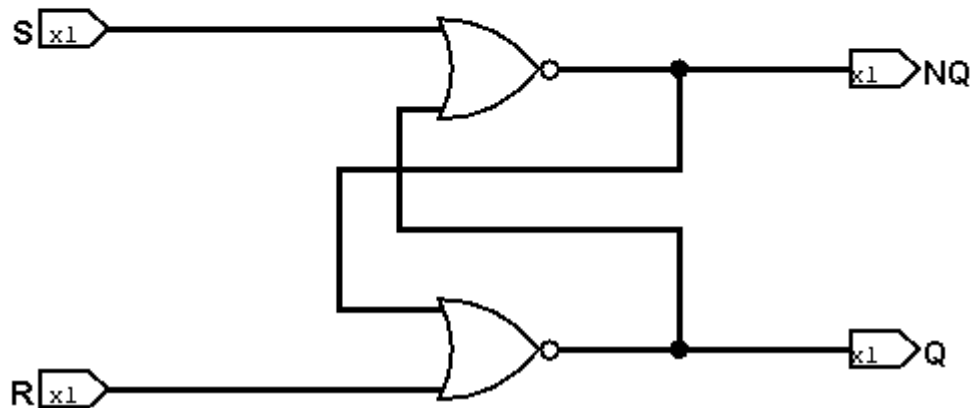
Nafsika Pagkali



Assignment 2.5: SR Latch

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

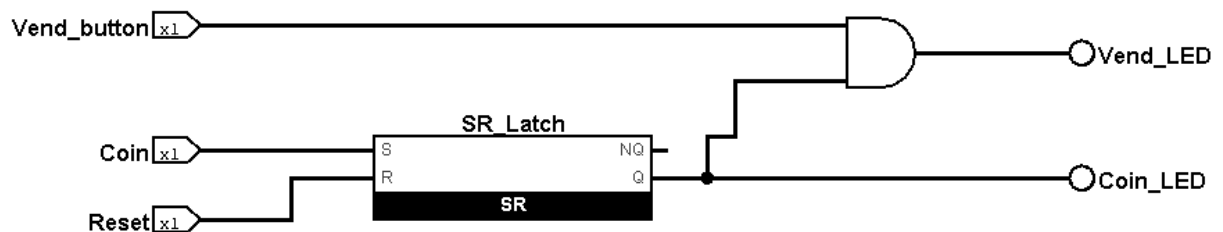
nafsika Pagkali 579185



Assignment 2.6: Vending Machine

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

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Assignment 2.7: Bitwise operators

Complete the java source code for bitwise operators. Put the source code here.

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 static void main(String[] args) {  
  
    Scanner scanner = new Scanner(System.in);  
  
    System.out.print("Enter a number: ");  
    int number = scanner.nextInt();  
  
    int choice = 0;  
  
    while (choice != 4) {  
        System.out.println("\n===== BITWISE OPERATIONS MENU =====");  
        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("Enter your choice: ");

choice = scanner.nextInt();

switch (choice) {
    case 1:
        if (isOdd(number)) {
            System.out.println(number + " is odd.");
        } else {
            System.out.println(number + " is even.");
        }
        break;

    case 2:
        if (isPowerOfTwo(number)) {
            System.out.println(number + " is a power of 2.");
        } else {
            System.out.println(number + " is NOT a power of 2.");
        }
        break;

    case 3:
        System.out.println("Two's complement of " + number + " is: " +
twosComplement(number));
        break;

    case 4:
        System.out.println("Exiting program...");
        break;

    default:
        System.out.println("Invalid option. Try again.");
}
}

scanner.close();
}

// METHODS

// Check if number is odd with AND
public static boolean isOdd(int num) {
    return (num & 1) == 1;
}

// Check if number is power of 2
public static boolean isPowerOfTwo(int num) {
    // Must be positive and only one bit set: n & (n-1) == 0

```

```

        return num > 0 && (num & (num - 1)) == 0;
    }

    // Compute two's complement using bitwise NOT + 1
    public static int twosComplement(int num) {
        return (~num) + 1;
    }
}

```

The screenshot shows an IDE with a file named `Bitwise.java` open. The code defines a `Bitwise` class with a `main` method. The `main` method contains a loop that prompts the user to enter a number. If the number is a power of 2, it prints "is a power of 2."; otherwise, it prints "is NOT a power of 2.". The code also includes a `break;` statement to exit the loop.

Below the code editor, the `Run` tab is active, showing the execution output. The output displays the command used to run the program, the user input "2", and the resulting menu of bitwise operations. The menu options are:

- 1. Is number odd?
- 2. Is number a power of 2?
- 3. Two's complement of number
- 4. Exit

The prompt "Enter your choice:" is visible at the bottom of the output window.

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