

Template Week 2 – Logic

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Assignment 2.1: Parking lot

Which gates do you need?

- **AND** gates between them

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?

- We will need the **XOR** gate

Complete this table

| Android phone | iPhone | Result (Phone in possession) |
|---------------|--------|------------------------------|
| 0 | 0 | None |
| 0 | 1 | Iphone |
| 1 | 0 | Android |
| 1 | 1 | None |

Assignment 2.3: Four NAND gates

Complete this table

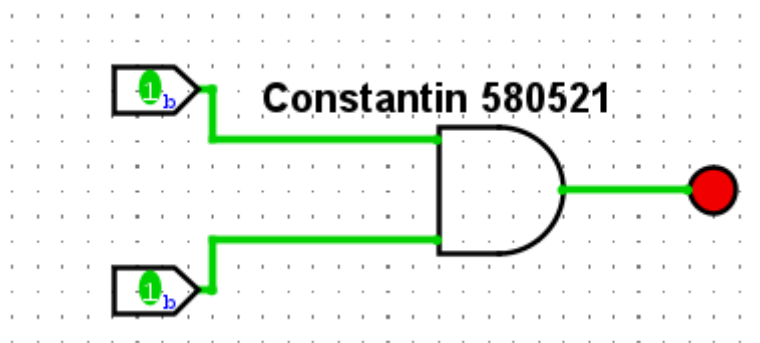
| A | B | Q |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

How can the design be simplified?

- XOR gate will simplify this

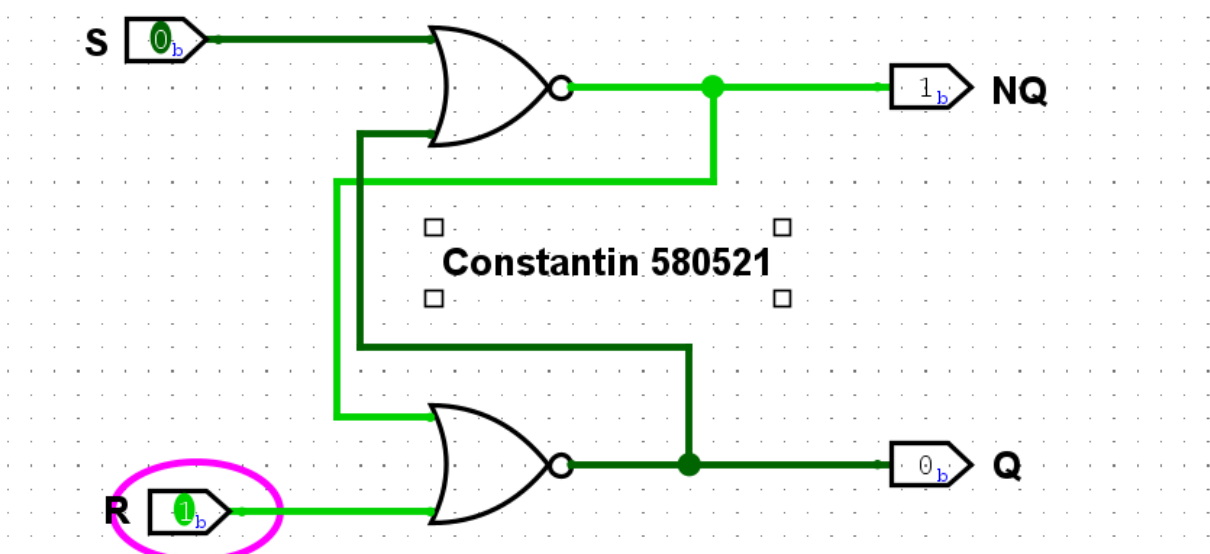
Assignment 2.4: Getting to know Logisim evolution

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



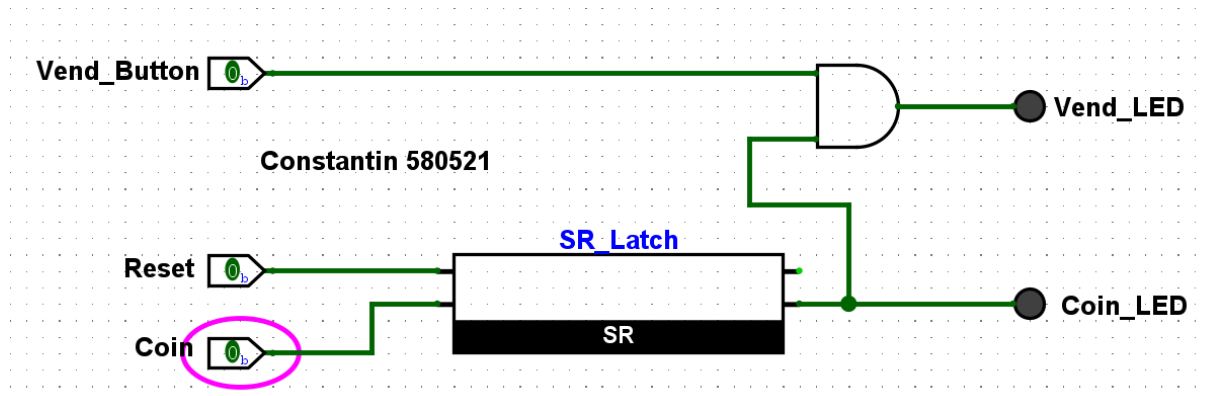
Assignment 2.5: SR Latch

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.

```
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");  
    }  
}
```

```
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");  
        }  
    }  
}
```

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?

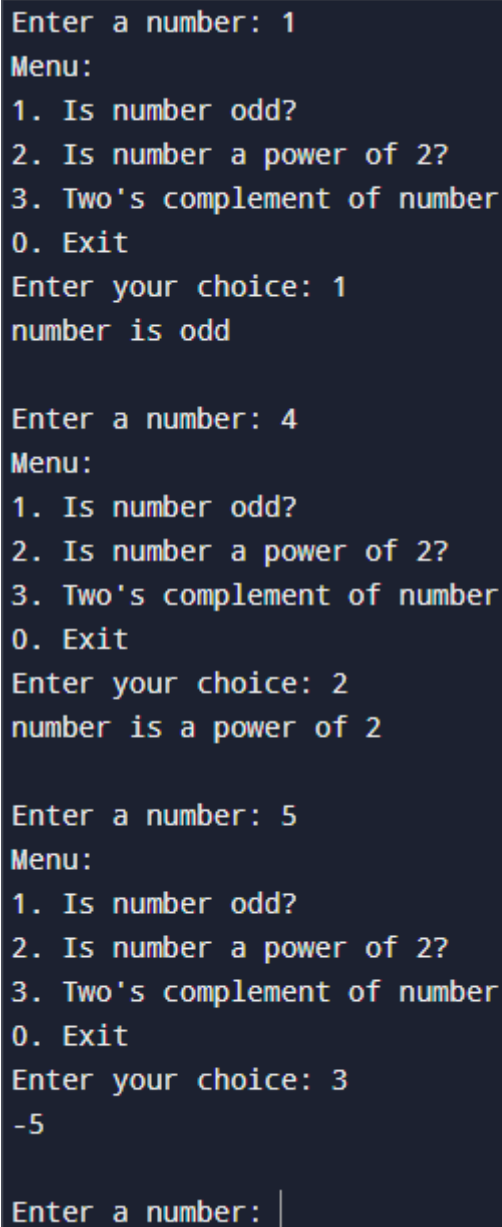
3. Two's complement of number?

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.



```
Enter a number: 1
Menu:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
0. Exit
Enter your choice: 1
number is odd

Enter a number: 4
Menu:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
0. Exit
Enter your choice: 2
number is a power of 2

Enter a number: 5
Menu:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
0. Exit
Enter your choice: 3
-5

Enter a number: |
```

```
import java.util.Scanner;
```

```
public class Main {
    public static void main(String[] args) {
```

```

final Scanner scanner = new Scanner(System.in);
int number;
int choice;

do {
    System.out.print("Enter a number: ");
    number = scanner.nextInt();

    System.out.println("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("0. Exit");
    System.out.print("Enter your choice: ");
    choice = scanner.nextInt();

    switch (choice) {
        case 1:
            isOdd(number);
            break;
        case 2:
            isPowerOfTwo(number);
            break;
        case 3:
            twosComplement(number);
            break;
        case 0:
            System.out.println("Exiting program.");
            break;
        default:
            System.out.println("Invalid choice. Try again.");
    }

    System.out.println();

} while (choice != 0);

scanner.close();
}

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

public static void isPowerOfTwo(int number){

```

```
    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");
}

public static void twosComplement(int number){
    System.out.println(~number + 1);
}
}
```

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