

Template Week 2 – Logic

Student number: 590620

Assignment 2.1: Parking lot

Which gates do you need?

AND gate met 3 inputs

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 met 2 inputs

Complete this table

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

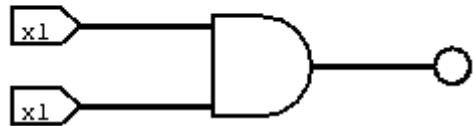
How can the design be simplified?

XOR gate met 2 inputs gebruiken

Assignment 2.4: Getting to know Logisim evolution

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

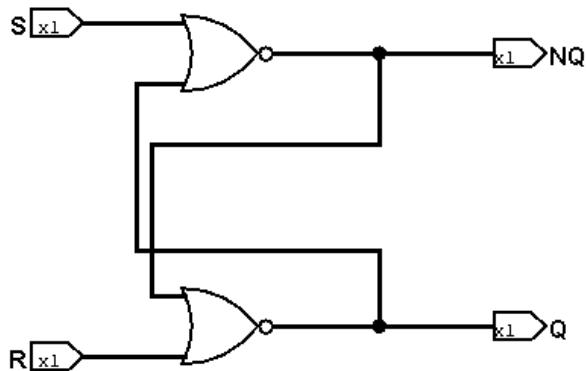
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Assignment 2.5: SR Latch

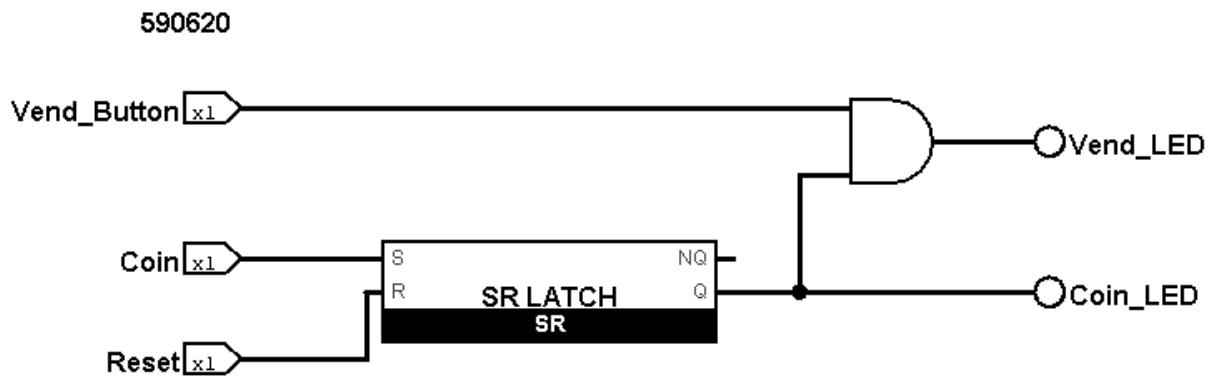
Screenshot SR Latch in Logisim with your name and student number:

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Assignment 2.6: Vending Machine

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



Assignment 2.7: Bitwise operators

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

Is number odd?:

```
public class Main {  
    public static void main(String[] args) {  
        int number = 6;  
  
        if ((number & 1) == 1)  
            System.out.println("number is odd");  
        else  
            System.out.println("number is even");  
    }  
}
```

Is number a power of 2?:

```
public class Main {  
    public static void main(String[] args) {  
        int number = 16;  
  
        if (number > 0 && (number & (number - 1)) == 0)  
            System.out.println("number is a power of 2");  
    }  
}
```

```
        else
            System.out.println("number isn't a power of 2");
    }
}
```

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) != 0) System.out.println("User has read permissions");
        else System.out.println("User can't read. No permissions.");
    }
}
```

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

    }
}
```

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);  
  
    }  
}
```

Two's complement:

```
public class Main {  
    public static void main(String[] args) {  
        int number = 5;  
        number = ~number + 1;  
        System.out.println("Number: "+number);  
        number = ~number + 1;  
        System.out.println("positief weer: " + 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.

```
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.println("Enter a number:");
        int number = scanner.nextInt();

        System.out.println("\n--- MENU ---");
        System.out.println("1. Is number odd?");
        System.out.println("2. Is number a power of 2?");
        System.out.println("3. Twos complement of number");
        System.out.print("Choose an option (1-3): ");

        int choice = scanner.nextInt();

        switch (choice) {
            case 1:
                checkOdd(number);
                break;

            case 2:
                checkPowerOfTwo(number);
                break;

            case 3:
                twosComplement(number);
        }
    }
}
```

```

        break;

    default:
        System.out.println("Invalid choice.");
    }

    scanner.close();
}

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

public static void checkPowerOfTwo(int number) {
    if (number > 0 && (number & (number - 1)) == 0)
        System.out.println(number + " is a power of 2");
    else
        System.out.println(number + " is NOT a power of 2");
}

public static void twosComplement(int number) {
    int twosComp = ~number + 1;
    System.out.println("Twos complement of " + number + " = " + twosComp);

    int backToOriginal = ~twosComp + 1;
    System.out.println("Back to original: " + backToOriginal);
}

```

```
Choose an option:  
1. Is number odd?  
2. Is number a power of 2?  
3. Two's complement of number?  
Enter choice: 1  
Result: number is even  
PS C:\Users\Jos> 3  
3  
PS C:\Users\Jos> [ ]
```

```
--- MENU ---  
1. Is number odd?  
2. Is number a power of 2?  
3. Two's complement of number  
Choose an option (1-3): 3  
Two's complement of 2 = -2  
Back to original: 2  
PS C:\Users\Jos> [ ]
```

```
--- MENU ---  
1. Is number odd?  
2. Is number a power of 2?  
3. Two's complement of number  
Choose an option (1-3): 2  
2 is a power of 2  
PS C:\Users\Jos> [ ]
```

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