Template Week 2 – Logic

Student number:

577534

Assignment 2.1: Parking lot

Which gates do you need?

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	0

Assignment 2.3: Four NAND gates

Complete this table

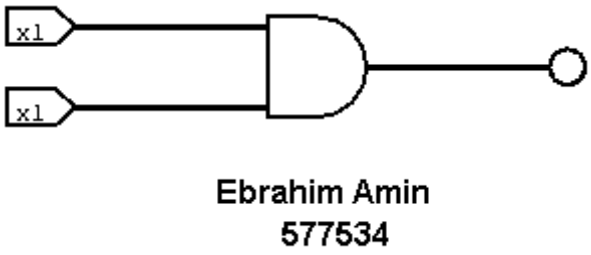
A	B	Q
0	0	0
0	1	0
1	0	0
1	1	1

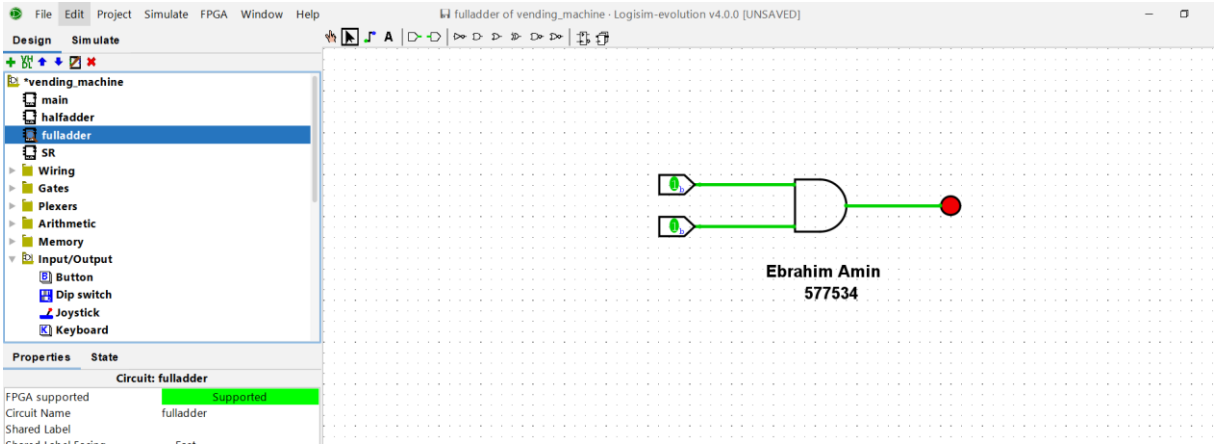
How can the design be simplified?

Use **two NAND gates** to create an AND gate.

Assignment 2.4: Getting to know Logisim evolution

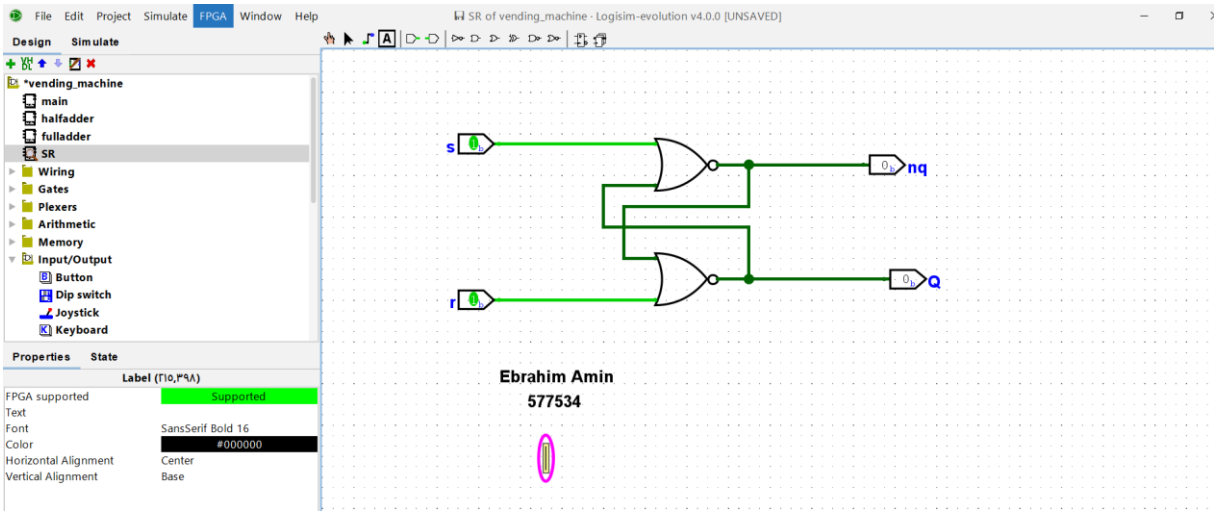
Screenshot of the design with your name and student number in it:





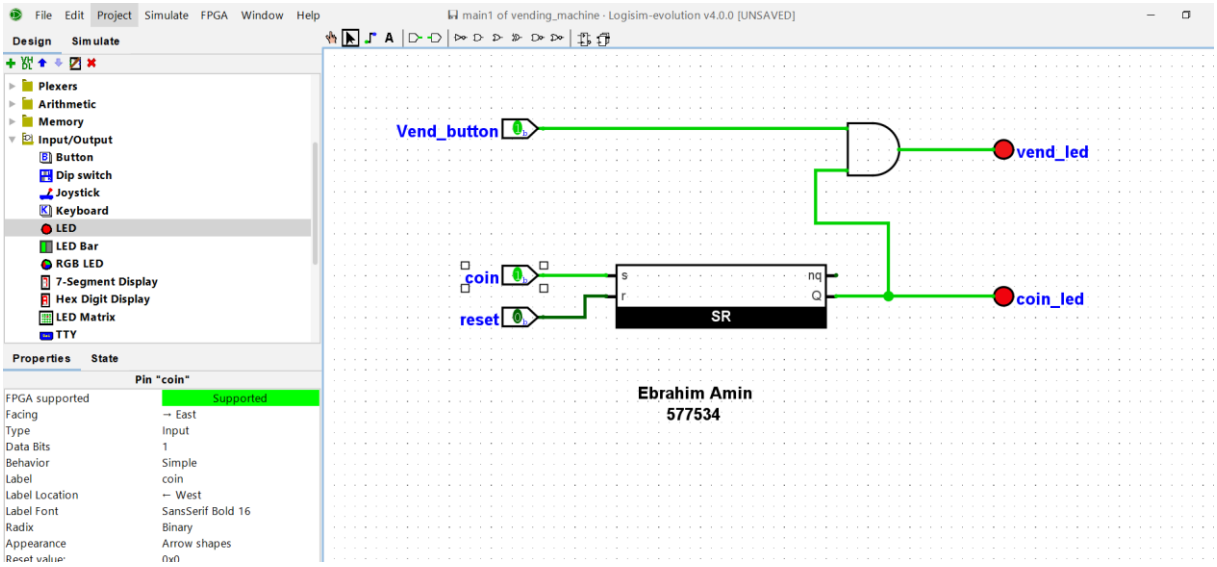
Assignment 2.5: SR Latch

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-bitwise & AND operator.

```
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

```
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

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

4-bitwise | OR operator

```
public class Main {
    public static void main(String[] args) {
        final int READ = 4;
        final int WRITE = 2;
        final int EXECUTE = 1;

        int userPermissions = 0;

        // Add READ and EXECUTE permissions
        userPermissions = READ | EXECUTE;

        System.out.println("User permissions: " + userPermissions);
    }
}
```

5- bitwise ^ XOR operator

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

        final int READ = 4;
        final int WRITE = 2;
        final int EXECUTE = 1;
```

```
        int userPermissions = 6;  // currently READ + WRITE (110)

        // Remove WRITE so only READ remains
        userPermissions = userPermissions ^ WRITE;

        System.out.println("User permissions: " + userPermissions);
    }
}
```

6 bitwise ~ NOT operator.

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

        int number = 5;

        // apply two's complement
        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.

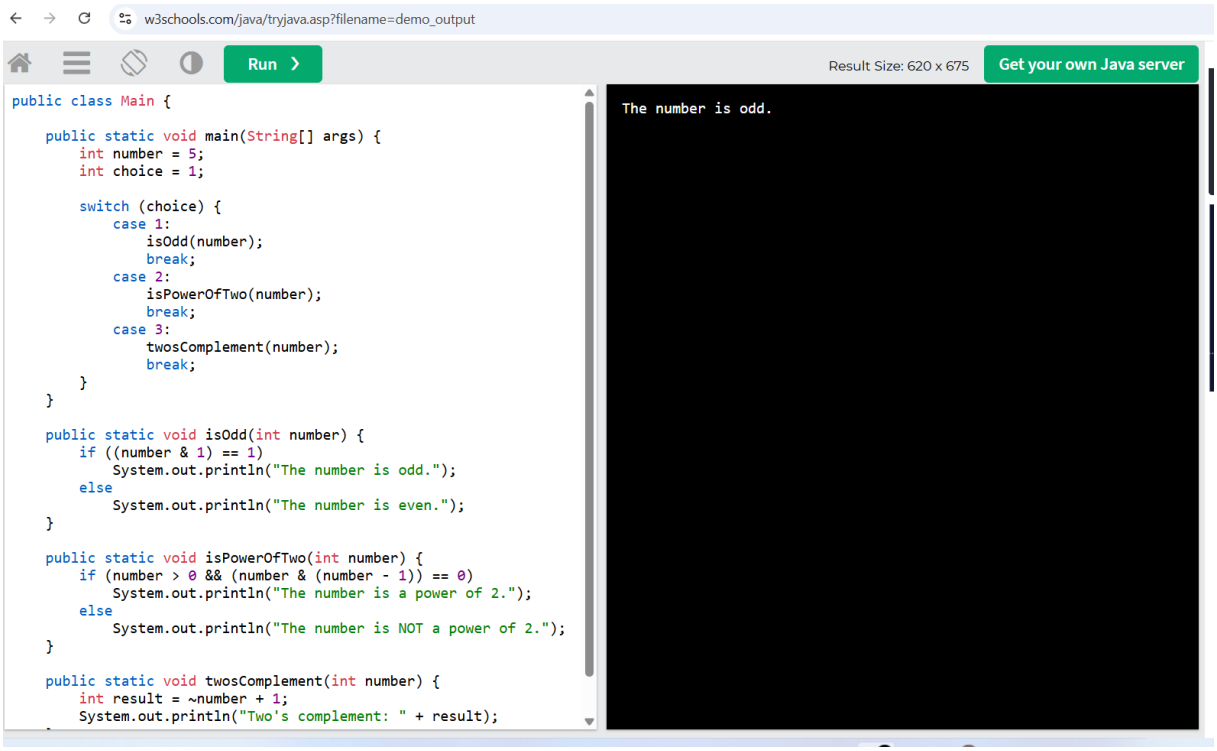
Organize your source code in a readable manner with the use of control flow and methods.

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.

```
public class Main {

    public static void main(String[] args) {
        int number = 5;
        int choice = 1;

        switch (choice) {
            case 1:
                isOdd(number);
                break;
            case 2:
                isPowerOfTwo(number);
                break;
            case 3:
                twosComplement(number);
                break;
        }
    }

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

    public static void isPowerOfTwo(int number) {
        if (number > 0 && (number & (number - 1)) == 0)
```

```
        System.out.println("The number is a power of 2.");
    else
        System.out.println("The number is NOT a power of 2.");
  }

  public static void twosComplement(int number) {
    int result = ~number + 1;
    System.out.println("Two's complement: " + result);
  }
}
```



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