Template Week 2 – Logic

Student number: 546746

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

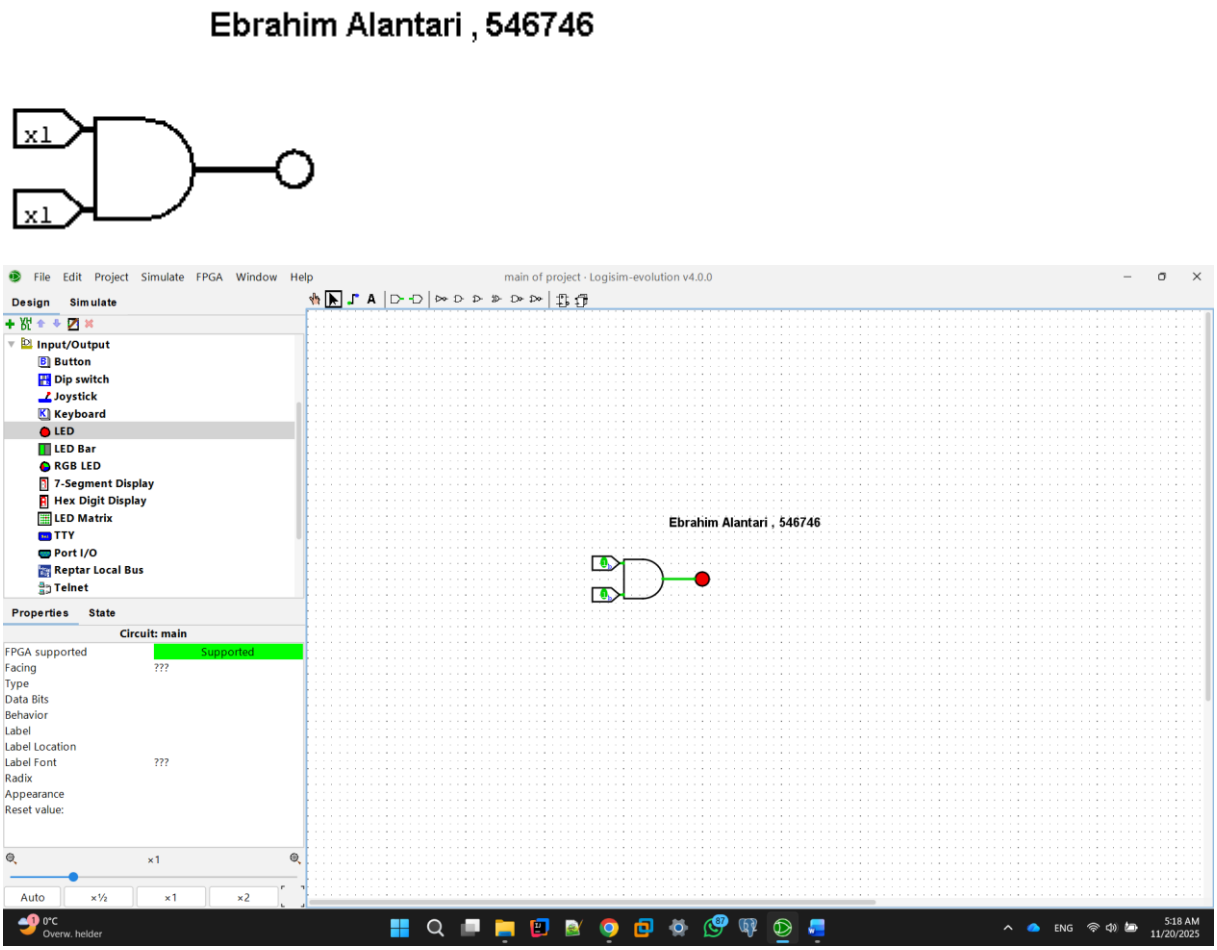
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

The circuit is equivalent to **A XOR B**,
so it can be replaced with **one XOR gate instead of four NAND gates**.

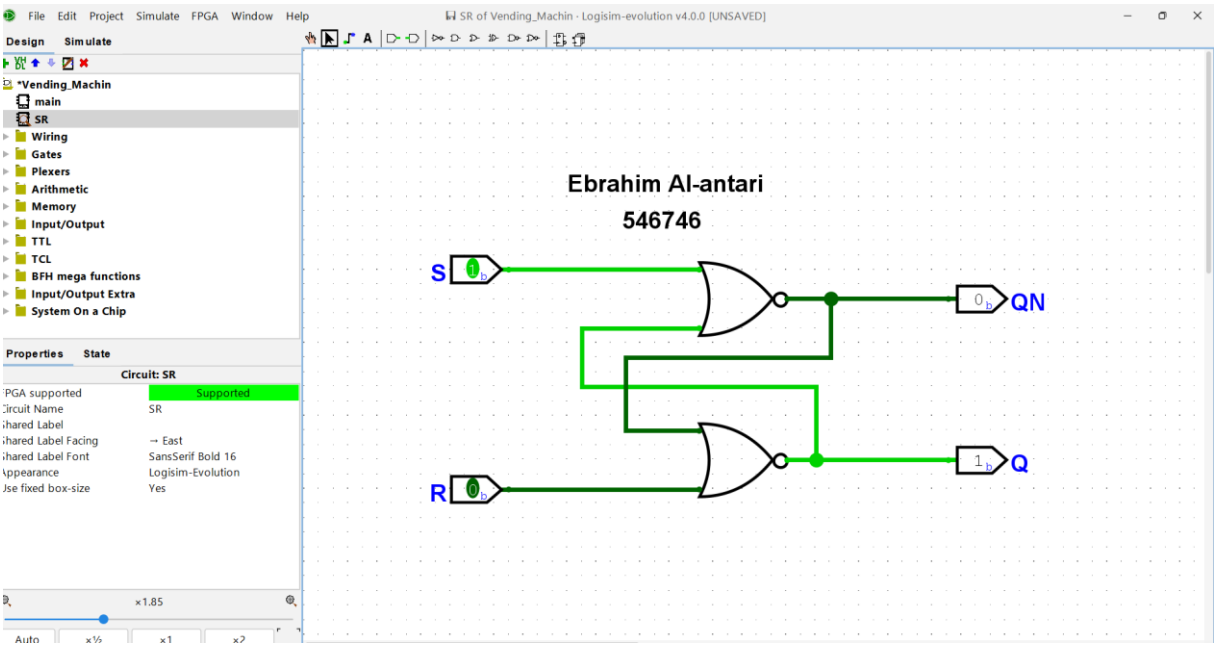
Assignment 2.4: Getting to know Logisim evolution

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



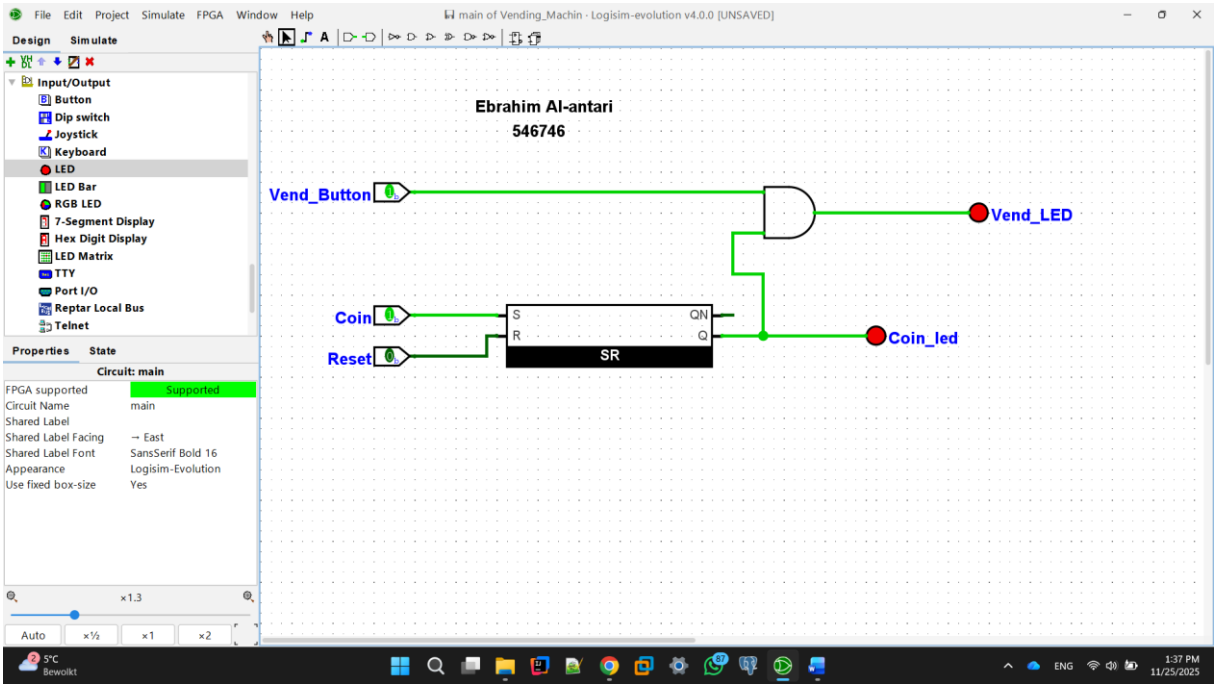
Assignment 2.5: SR Latch

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.

```
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 > 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");
  }
```

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; // 7 = rwx

      if ((userPermissions & READ) != 0)
         System.out.println("User has read permissions");
      else
```

4.

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

        int userPermissions = 0;

        // Assign read, write, execute permissions
        userPermissions = userPermissions | READ;
        userPermissions = userPermissions | WRITE;
        userPermissions = userPermissions | EXECUTE;

        System.out.println("User permissions: " + userPermissions); // prints 7
    }
}
```

5.

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

        int userPermissions = 6; // READ + WRITE

        // Remove WRITE using XOR
        userPermissions = userPermissions ^ WRITE;

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

6.

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

        // Convert to two's complement (negative)
        number = ~number + 1;

        System.out.println("Number: " + number);
    }
}
```

7.

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

      int number = 10;
      System.out.println("Decimal integer: " + number);

      String binary = Integer.toBinaryString(number);
      String octal = Integer.toOctalString(number);
      String hexadecimal = Integer.toHexString(number);

      System.out.println("Binary representation: " + binary);
      System.out.println("Octal representation: " + octal);
      System.out.println("Hexadecimal representation: " + hexadecimal);
   }
}
```

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?

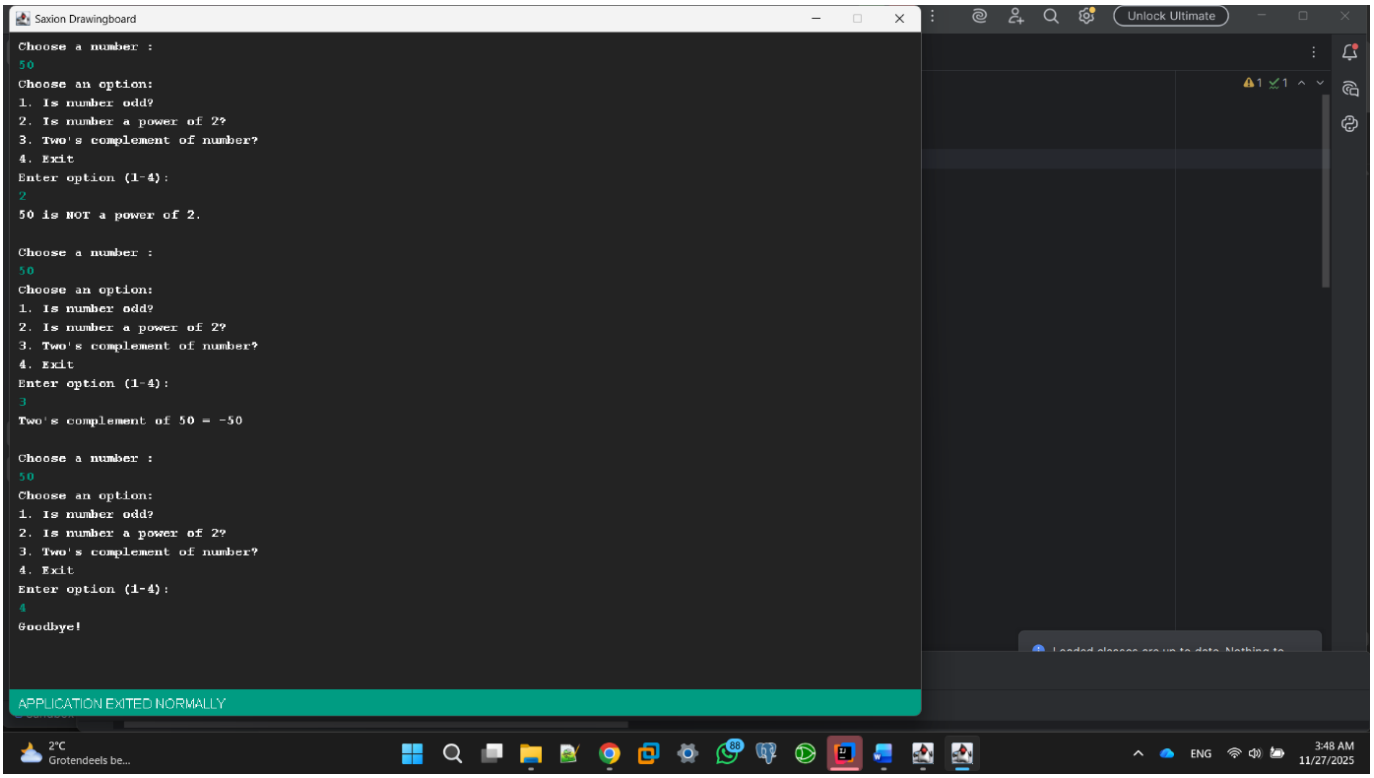
Implement the methods by using the bitwise operators you have just learned.

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 nl.saxion.app.SaxionApp;

public class testing implements Runnable {

   public static void main(String[] args) {

      SaxionApp.start(new testing(), 1024, 768);
   }

   public void run() {
      boolean statr = false;


      while (true){

         SaxionApp.printLine("Choose a number :");
         int number = SaxionApp.readInt();

         SaxionApp.printLine("Choose an option:");
         SaxionApp.printLine("1. Is number odd?");
         SaxionApp.printLine("2. Is number a power of 2?");
         SaxionApp.printLine("3. Two's complement of number?");
         SaxionApp.printLine("4. Exit");
         SaxionApp.printLine("Enter option (1-4): ");

         int option = SaxionApp.readInt();
         switch (option) {

            case 1:
               if (isOdd(number)) {
                  SaxionApp.printLine(number + " is odd.");
               } else {
                  SaxionApp.printLine(number + " is even.");
               }
               break;

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

            case 3:
               int result = twosComplement(number);
               SaxionApp.printLine("Two's complement of " + number + " = " + result);
               break;

            case 4:
               SaxionApp.printLine("Goodbye!");
               return;
```



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