Template Week 2 – Logic

Student number: 588734

Assignment 2.1: Parking lot

Which gates do you need?

2 And gates

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
1	0	0	0
1	1	0	0
1	1	1	1

Assignment 2.2: Android or iPhone

Which gates do you need?

XOR Gateway

Complete this table

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

Assignment 2.3: Four NAND gates

Complete this table

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

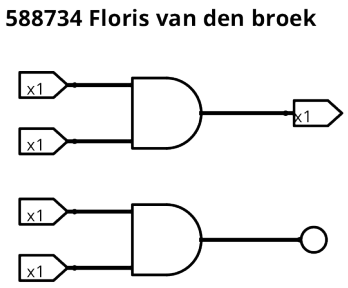
How can the design be simplified?

XOR

Assignment 2.4: Getting to know Logisim evolution

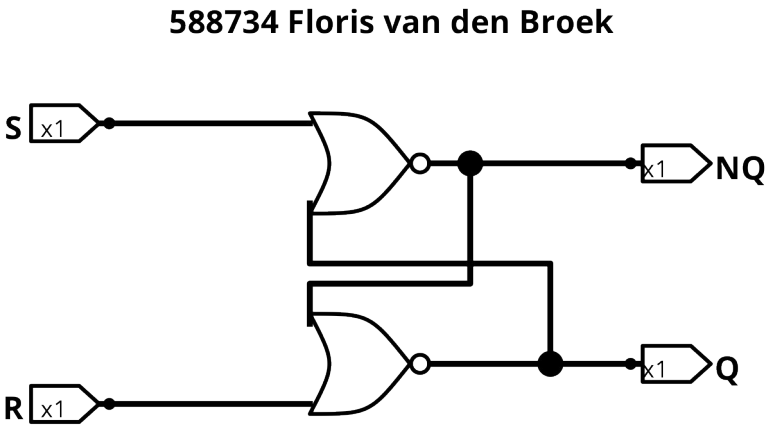
The value of the output pin is 0, because its and and gate

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



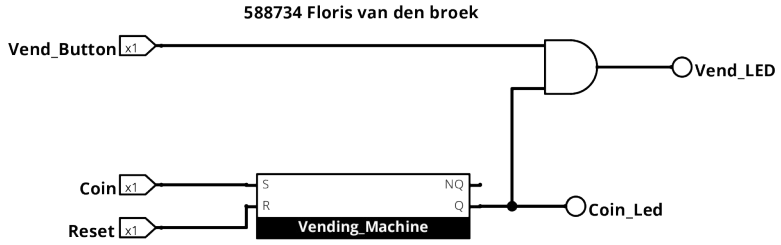
Assignment 2.5: SR Latch

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 oneven.");
        } else {
            System.out.println(number + " is even.");
        }
    }
}
```

```
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");
    }
}
```

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.

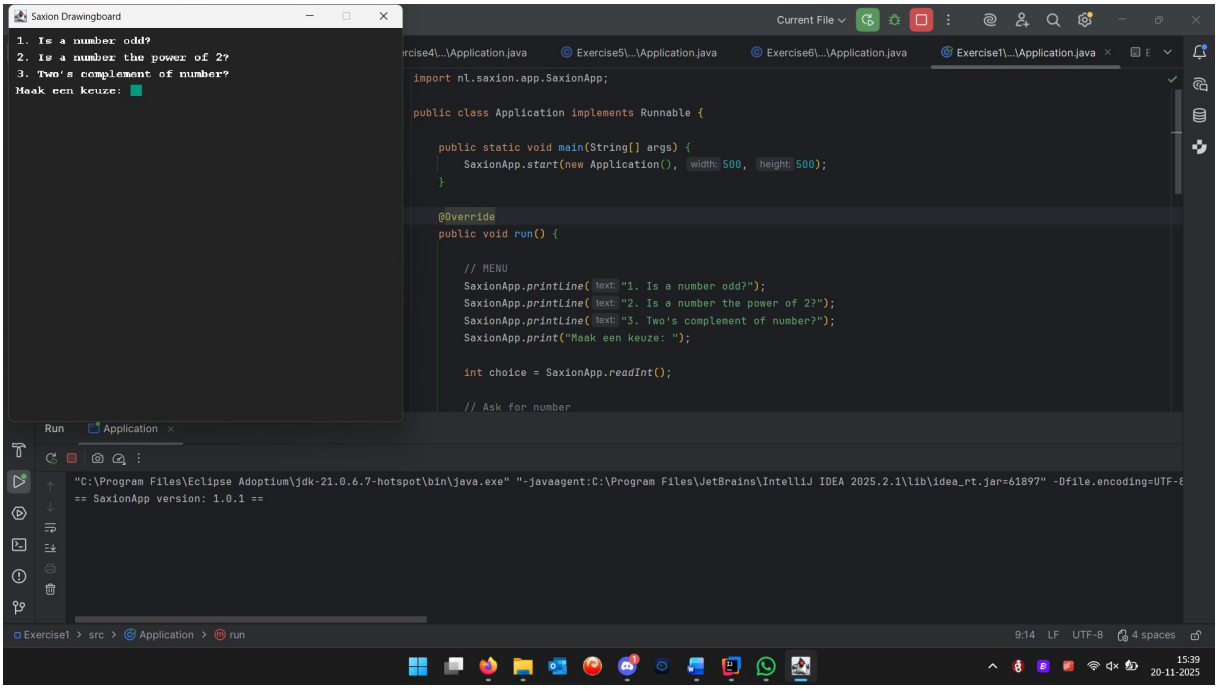
Organize your source code in a readable manner with the use of control flow and methods.

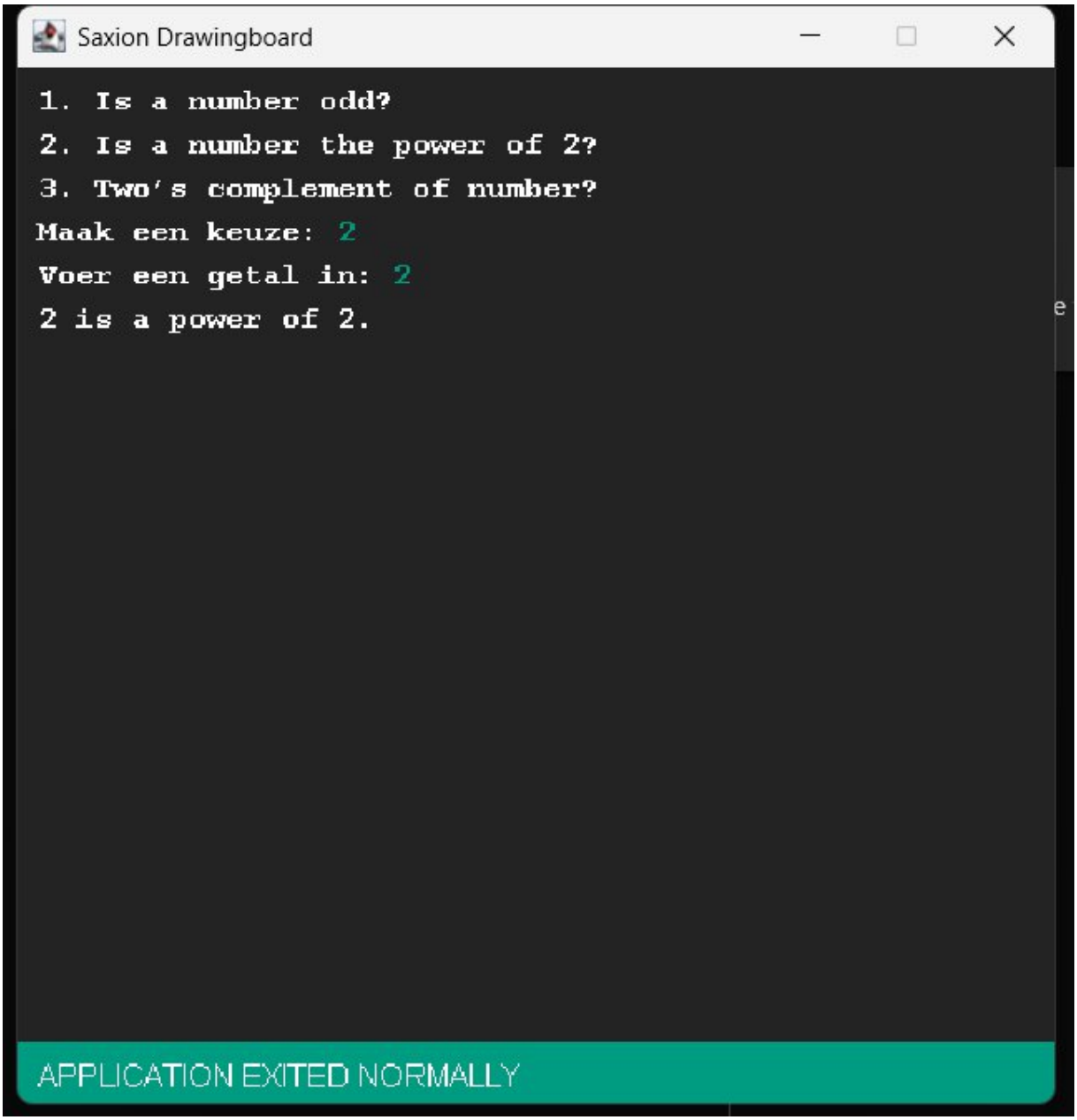
Keep this application because you need to expand it in week 6 for calculating network segments.

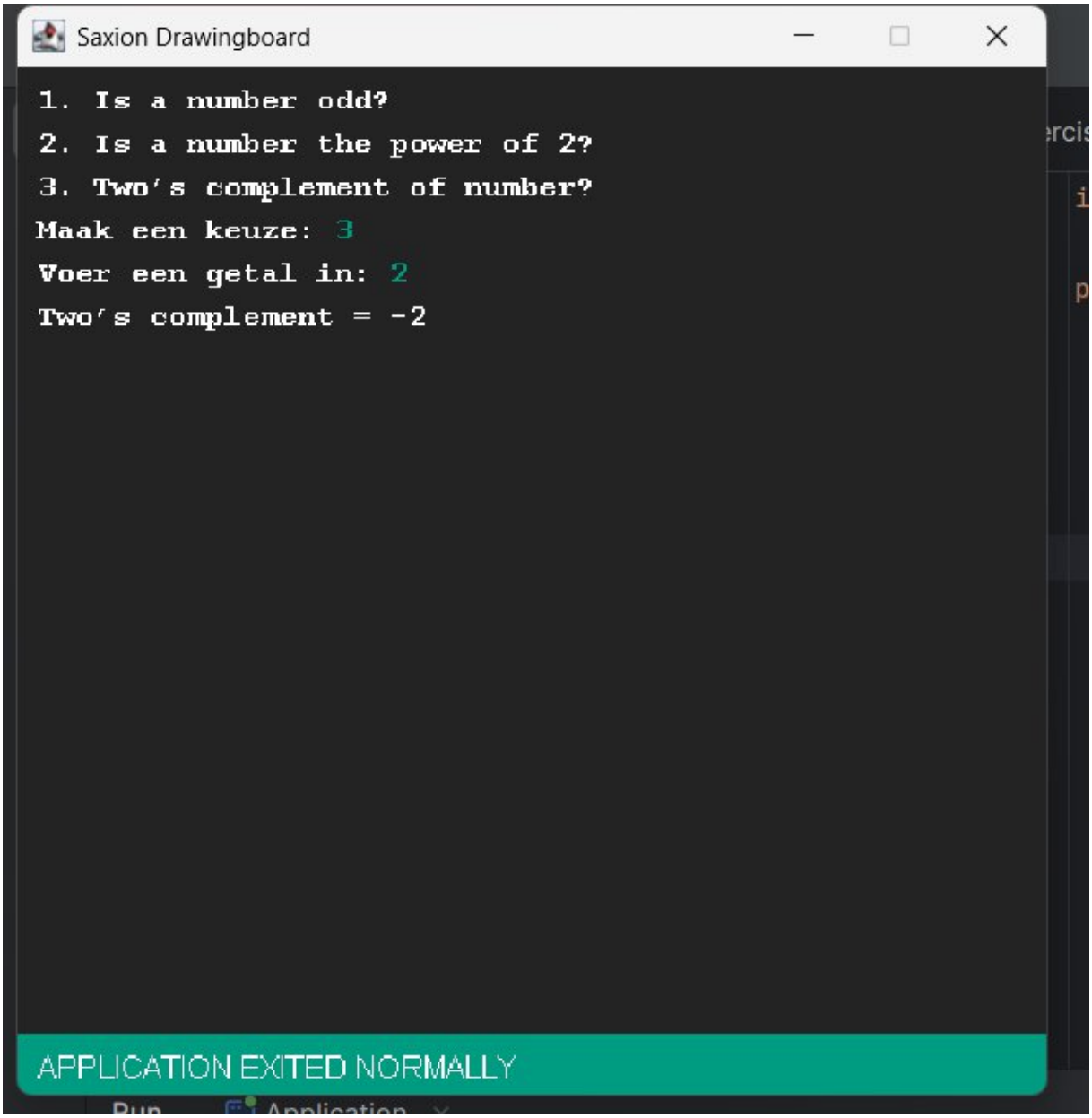
Paste source code here, with a screenshot of a working application.

```
import nl.saxion.app.SaxionApp;

public class Application implements Runnable {

    public static void main(String[] args) {
        SaxionApp.start(new Application(), 500, 500);
    }

    @Override
    public void run() {

        // MENU
        SaxionApp.printLine("1. Is a number odd?");
        SaxionApp.printLine("2. Is a number the power of 2?");
        SaxionApp.printLine("3. Two's complement of number?");
        SaxionApp.print("Maak een keuze: ");

        int choice = SaxionApp.readInt();

        // Ask for number
        SaxionApp.print("Voer een getal in: ");
        int number = SaxionApp.readInt();

        // LOGIC USING ONLY BITWISE OPERATORS
        if (choice == 1) {
            // Odd = last bit is 1 → n & 1 == 1
            if ( (number & 1) == 1 ) {
                SaxionApp.printLine(number + " is odd.");
            } else {
                SaxionApp.printLine(number + " is even.");
            }
        }

        else if (choice == 2) {
            // Power of 2 = only 1 bit set → n & (n - 1) == 0
            boolean isPower = number > 0 && ( (number & (number - 1)) == 0 );
            if (isPower) {
                SaxionApp.printLine(number + " is a power of 2.");
            } else {
                SaxionApp.printLine(number + " is NOT a power of 2.");
            }
        }
```

```
    else if (choice == 3) {
        // Two's complement = ~n + 1
        int twosComp = ~number + 1;
        SaxionApp.printLine("Two's complement = " + twosComp);
    }

    else {
        SaxionApp.printLine("Ongeldige keuze.");
    }
  }
}
```




Saxion Drawingboard
1. Is a number odd?
2. Is a number the power of 2?
3. Two's complement of number?
Maak een keuze: 2
Voer een getal in: 2
2 is a power of 2.
APPLICATION EXITED NORMALLY



Ready? Then save this file and export it as a pdf file with the name: **week2.pdf**