

Template Week 2 – Logic

Student number: 573190

Assignment 2.1: Parking lot

Which gates do you need?

You will need the AND gate. Because the system must check if all the parking spots are empty or occupied. When all the parking spots are occupied, the sign should display full. If there is one spot available, the sign should not display full.

Complete this table

| Parking lot 1 | Parking lot 2 | Parking lot 3 | Result (full) |
|---------------|---------------|---------------|---------------|
| 0 | 0 | 0 | False |
| 0 | 0 | 1 | False |
| 0 | 1 | 0 | False |
| 1 | 1 | 1 | True |
| 1 | 1 | 0 | False |
| 0 | 1 | 1 | False |
| 1 | 0 | 1 | False |
| 1 | 0 | 0 | False |

Assignment 2.2: Android/iPhone

Which gates do you need?

You will need a XOR gate, because the employee can only have one of the devices, and not two.

Complete this table

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

Assignment 2.3: Four NAND gates

Complete this table

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

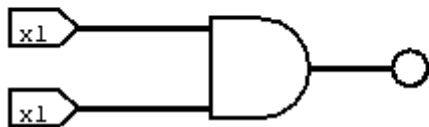
How can the design be simplified?

Instead of adding only NAND gates, you can replace some NAND gates with XOR gates.

Assignment 2.4: Getting to know Logisim evolution

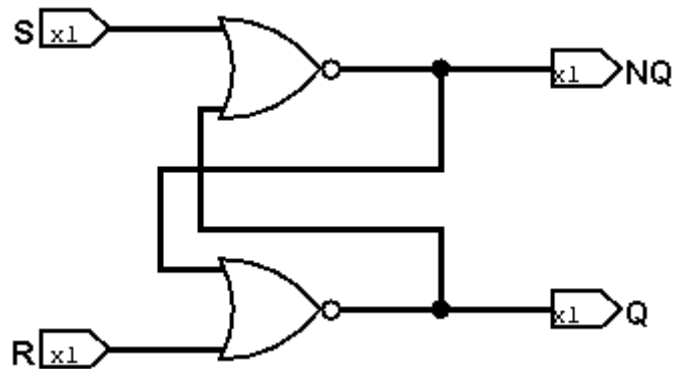
Screenshot of the design with your name and student number in it:

Kian Kamphuis 573190



Assignment 2.5: SR Latch

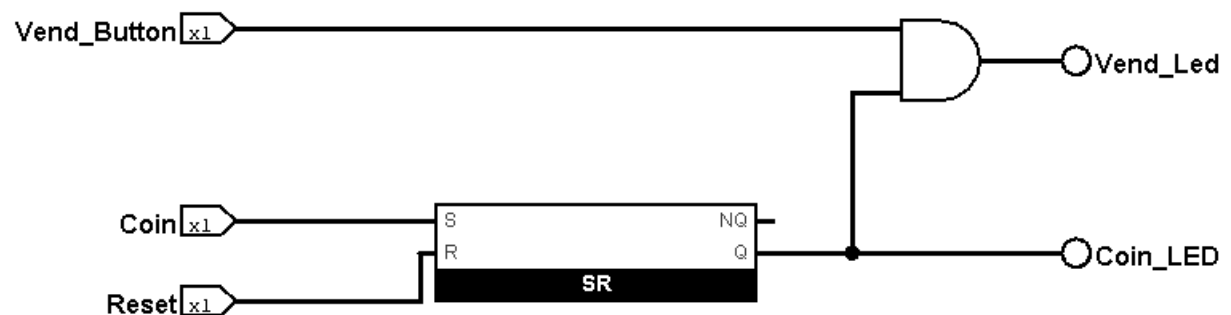
Screenshot SR Latch in Logisim with your name and student number:



Assignment 2.6: Vending Machine

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

Kian Kamphuis 573190



Bonus point assignment – week 2

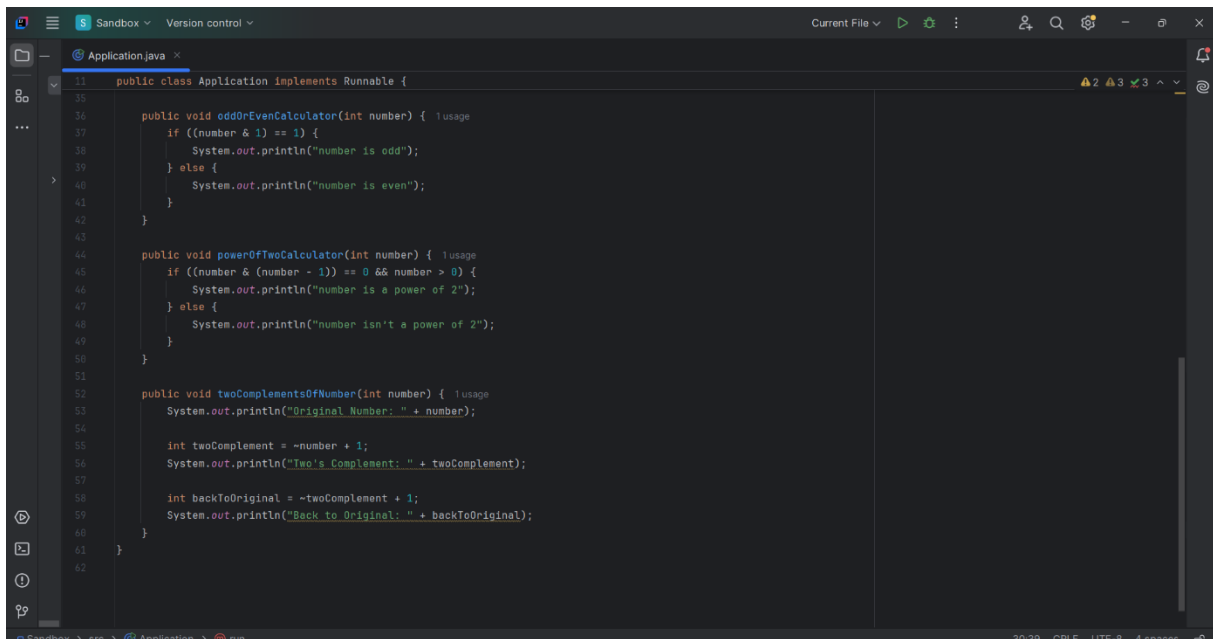
Create a java program that accepts user input and presents a menu with options.

1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?

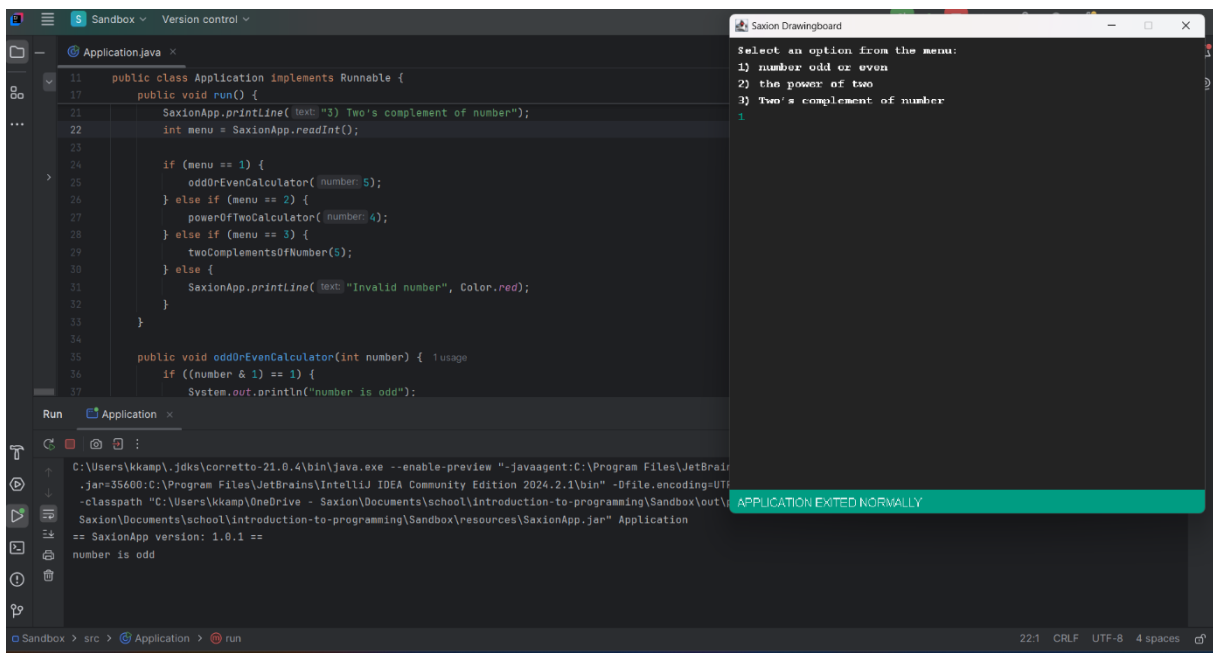
Implement the methods by using the bitwise operators you have just learned.

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

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



```
11 public class Application implements Runnable {
12
13     public void oddOrEvenCalculator(int number) { //usage
14         if ((number & 1) == 1) {
15             System.out.println("number is odd");
16         } else {
17             System.out.println("number is even");
18         }
19     }
20
21     public void powerOfTwoCalculator(int number) { //usage
22         if ((number & (number - 1)) == 0 && number > 0) {
23             System.out.println("number is a power of 2");
24         } else {
25             System.out.println("number isn't a power of 2");
26         }
27     }
28
29     public void twoComplementsOfNumber(int number) { //usage
30         System.out.println("Original Number: " + number);
31
32         int twoComplement = ~number + 1;
33         System.out.println("Two's Complement: " + twoComplement);
34
35         int backToOriginal = ~twoComplement + 1;
36         System.out.println("Back to Original: " + backToOriginal);
37     }
38 }
39
40 }
```



```
11 public class Application implements Runnable {
12     public void run() {
13         SaxionApp.printlnLine("3) Two's complement of number");
14         int menu = SaxionApp.readInt();
15
16         if (menu == 1) {
17             oddOrEvenCalculator(number: 5);
18         } else if (menu == 2) {
19             powerOfTwoCalculator(number: 4);
20         } else if (menu == 3) {
21             twoComplementsOfNumber(5);
22         } else {
23             SaxionApp.printlnLine("Invalid number", Color.red);
24         }
25     }
26
27     public void oddOrEvenCalculator(int number) { //usage
28         if ((number & 1) == 1) {
29             System.out.println("number is odd");
30         }
31     }
32 }
```

Run Application

C:\Users\kkamp\jdk\corretto-21.0.4\bin\java.exe --enable-preview "-javaagent:C:\Program Files\JetBrains\jetbrains-idea-community-edition-2024.2.1\bin\idea-jbr.jar-35600:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2024.2.1\bin" -Dfile.encoding=UTF-8 -classpath "C:\Users\kkamp\OneDrive - Saxion\Documents\school\introduction-to-programming\Sandbox\out\production\SaxionApp\SaxionApp.jar" Application
== SaxionApp version: 1.0.1 ==
number is odd

Saxion Drawingboard

Select an option from the menu:
1) number odd or even
2) the power of two
3) Two's complement of number
1

APPLICATION EXITED NORMALLY

```
11 public class Application implements Runnable {
12     public void run() {
13         SaxionApp.println( text: "3 Two's complement of number");
14         int menu = SaxionApp.readInt();
15
16         if (menu == 1) {
17             oddOrEvenCalculator( number: 5);
18         } else if (menu == 2) {
19             powerOfTwoCalculator( number: 4);
20         } else if (menu == 3) {
21             twoComplementsOfNumber(5);
22         } else {
23             SaxionApp.println( text: "Invalid number", Color.red);
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26
27     public void oddOrEvenCalculator(int number) { //usage
28         if ((number & 1) == 1) {
29             System.out.println("number is odd");
30         }
31     }
32
33     public void powerOfTwoCalculator(int number) { //usage
34         if ((number & 1) == 0) {
35             System.out.println("number is a power of 2");
36         }
37     }
38
39     public void twoComplementsOfNumber(int number) { //usage
40         int complement = ~number + 1;
41         System.out.println("Two's complement of " + number + " is " + complement);
42     }
43 }
```

Run Application

C:\Users\kkamp\.jdk\corretto-21.0.4\bin\java.exe --enable-preview "-javaagent:C:\Program Files\JetBrains\jetbrains-idea-community-edition-2024.2.1\bin\idea_rt.jar=36103:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2024.2.1\bin" -Dfile.encoding=UTF-8 -classpath "C:\Users\kkamp\OneDrive - Saxion\Documents\school\introduction-to-programming\Sandbox\out\production\Sandbox\classes;C:\Users\kkamp\OneDrive - Saxion\Documents\school\introduction-to-programming\Sandbox\resources\SaxionApp.jar" Application

== SaxionApp version: 1.0.1 ==

number is a power of 2

APPLICATION EXITED NORMALLY

```
11 public class Application implements Runnable {
12     public void run() {
13         SaxionApp.println( text: "3 Two's complement of number");
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Run Application

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== SaxionApp version: 1.0.1 ==

Original Number: 5

Two's Complement: -5

Back to Original: 5

APPLICATION EXITED NORMALLY

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