

# Week 2 – Logic

Student number: 578438

## 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?

OR 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

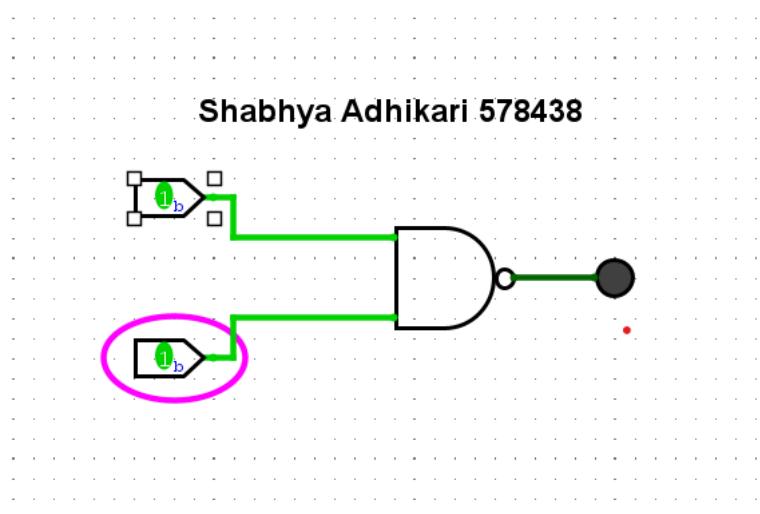
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

Just use 1 XOR gate, Instead of using 4 NAND gates .

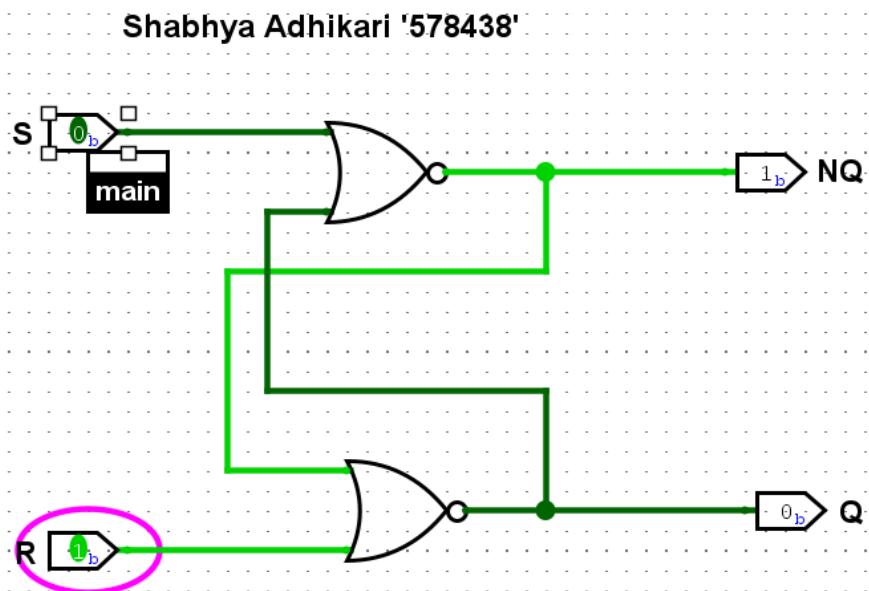
### Assignment 2.4: Getting to know Logisim evolution

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



### Assignment 2.5: SR Latch

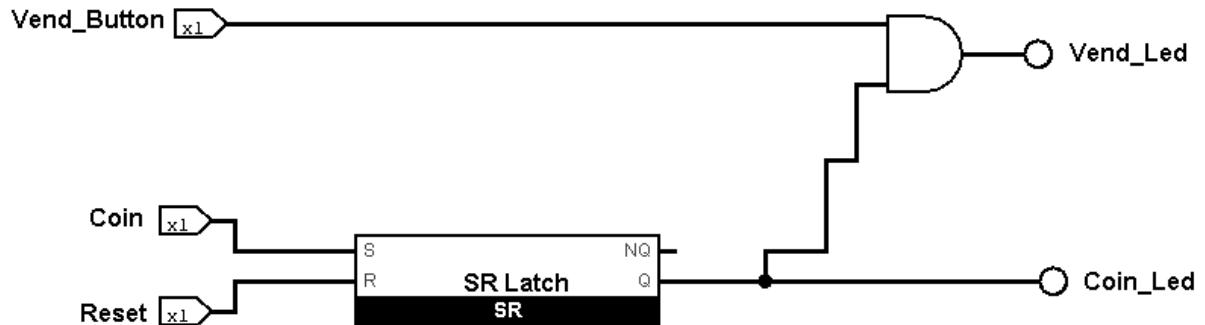
Screenshot SR Latch in Logisim with your name and student number:



### Assignment 2.6: Vending Machine

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

Shabhyu Adhikari 578438



### **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 = 2;
    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 = 2;
    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;

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

}
```

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

```
#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;
    userPermissions = userPermissions ^ WRITE;
    System.out.println("User permissions: "+userPermissions);
}
}
```

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

```
public static void main(String[] args) { SaxionApp.start(new Application(), 800, 800); }

public void run() {

    drawMenu();
    int counter = 0;

    while (counter < 1) {
        int input = SaxionApp.readInt();

        if (input == 0) {      break;
        } else if (input == 1) {      isNumberOdd();      } else if (input == 2) {
isNumberPowerTwo();      } else if (input == 3) {
            convertIntoNegative();
        }
    }
    SaxionApp.clear();
}

public void isNumberOdd() {
    SaxionApp.printLine("Pick a number to check if its odd");    int input = SaxionApp.readInt();

    if ((input & 1) == 1) {
        SaxionApp.printLine("number is odd");
    } else {
        SaxionApp.printLine("number is even");
    }
}

public void isNumberPowerTwo() {
    SaxionApp.printLine("Pick a number to check if its power of 2");    int input = SaxionApp.readInt();
```

```

if (input > 0 && (input & (input - 1)) == 0) {
    SaxionApp.printLine("number is a power of 2");
} else {
    SaxionApp.printLine("number isn't a power of 2");
}

public void convertIntoNegative(){
    SaxionApp.printLine("Pick a number to convert into negative");    int input = SaxionApp.readInt();

    input = ~input + 1;
    SaxionApp.printLine("Negative number: " + input);
}

public void drawMenu() {
    SaxionApp.printLine("MENU");
    SaxionApp.printLine("1. Check if a number is odd");
    SaxionApp.printLine("2. Check if a number is a power of 2");
    SaxionApp.printLine("3. Turn a number into negative");
    SaxionApp.printLine("0. Close application"); }}
```

The screenshot shows an IDE interface with two main windows and a terminal at the bottom.

- Left Window (Project View):** Shows a file tree for a project named "Sandbox". The tree includes "Sandbox", ".idea", "\_MACOSX", "out", "Sandbox", "resources", "Sandbox1", "src", "Application", and "Sandbox1.iml".
- Middle Window (Code Editor):** The title is "Application.java". The code is as follows:
 

```

3 public class Application implements Runnable {
    SAXION DRAWINGBOARD
    MENU
    1. Check if a number is odd
    2. Check if a number is a power of 2
    3. Turn a number into negative
    0. Close application
    1
    Pick a number to check if its odd
    7
    number is odd
    
```
- Bottom Terminal Window:** Displays the command line output:
 

```

C:\Users\PREDATOR\.jdks\openjdk-24.0.2+12-54\bin\ja
== SaxionApp version: 1.0.1 ==

```

```
}

 Saxion Drawingboard
MENU
1. Check if a number is odd
2. Check if a number is a power of 2
3. Turn a number into negative
0. Close application
2
Pick a number to check if its power of 2
8
number is a power of 2

dInt();
```

Saxion Drawingboard

**MENU**

1. Check if a number is odd
2. Check if a number is a power of 2
3. Turn a number into negative
0. Close application

3

Pick a number to convert into negative

69

Negative number: -69

```
public class Main implements Runnable {  
    public void run() {  
        System.out.println("usage  
ext: \"MENU\"");  
        System.out.println("ext: \"1. Check if a number  
ext: \"2. Check if a number  
ext: \"3. Turn a number int  
ext: \"0. Close application  
    }  
}  
:Brains\\IntelliJ IDEA 201
```

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