

Template Week 2 – Logic

Student number: 589948

Assignment 2.1: Parking lot

Which gates do you need?

AND

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

Assignment 2.2: Android or iPhone

Which gates do you need?

XOR

Complete this table

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

Assignment 2.3: Four NAND gates

Complete this table

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

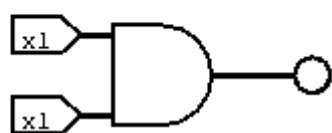
How can the design be simplified?

De truth table komt overeen met een enkele NAND-poort, dus het ontwerp kan worden vereenvoudigd tot één NAND-gate A en B direct op één NAND aansluiten.

Assignment 2.4: Getting to know Logisim evolution

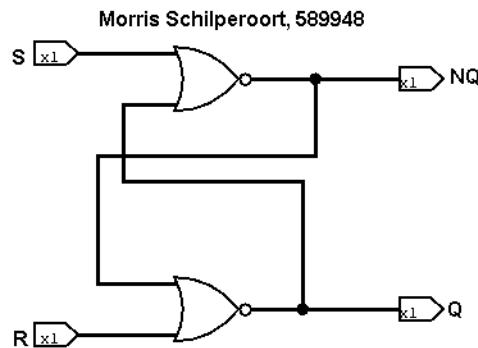
Screenshot of the design with your name and student number in it:

Morris Schilperoort, 589948



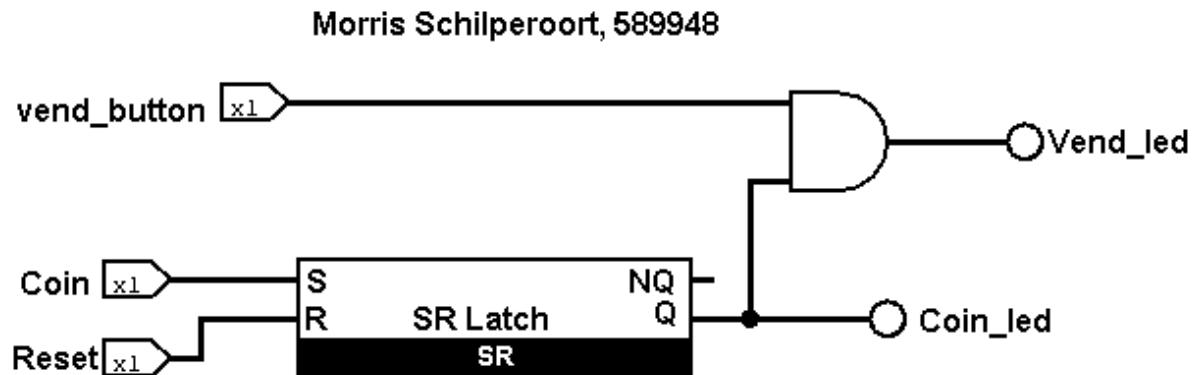
Assignment 2.5: SR Latch

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:

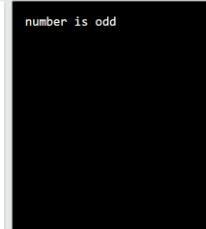


Assignment 2.7: Bitwise operators

Complete the java source code for bitwise operators. Put the source code here.

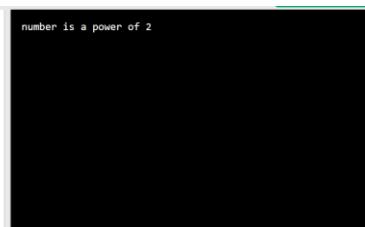
#1:

```
public class Main {
    public static void main(String[] args) {
        int number = 5;
        if ((number & 1) == 0) {
            System.out.println("number is even");
        } else {
            System.out.println("number is odd");
        }
    }
}
```



#2:

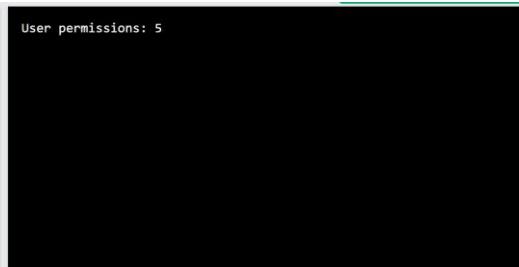
```
public class Main {
    public static void main(String[] args) {
        int number = 4;
        if (number > 0 && (number & (number - 1)) == 0)
            System.out.println("number is a power of 2");
        else
            System.out.println("number isn't a power of 2");
    }
}
```



#3:

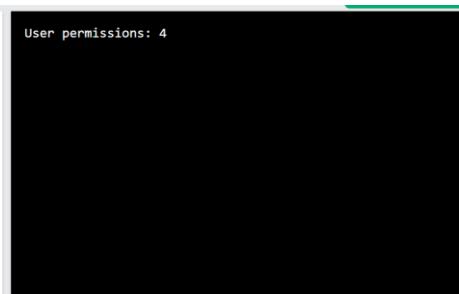
#4:

```
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; // rW-
        // WRITE verwijderen met XOR
        userPermissions = userPermissions ^ WRITE;
        System.out.println("User permissions: " + userPermissions);
    }
}
```



#6:

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

        // two's complement: negatief maken
        number = ~number + 1;

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

Result Size: 617 x 559

Number: -5

#7:

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 java.util.Scanner;
public class Main {
    public static boolean isOdd(int n) {
        return (n & 1) == 1;
    }

    public static boolean isPowerOfTwo(int n) {
        return n > 0 && (n & (n - 1)) == 0;
    }

    public static int twosComplement(int n) {
        return -n + 1;
    }

    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int number = input.nextInt();

        System.out.println("\nchoose an option:");
        System.out.println("1. Is number odd?");
        System.out.println("2. Is number a power of 2?");
        System.out.println("3. Two's complement of number?");
        System.out.print("Enter choice (1-3): ");
    }
}
```

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Language version: JDK 21.0.0 Interactive Mode

Input arguments

Output Generated files

Enter a number: 5

Choose an option:

1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number?
Enter choice (1-3): |

The screenshot shows a Java code editor and an execution interface. The code is a Java program that prints out whether a number is odd, a power of 2, or its two's complement. It includes three helper methods: isOdd, isPowerOfTwo, and twosComplement. The execution interface shows the code running in an IDE with JDK 21.0.0 and Interactive Mode checked. The output window shows the program's interaction with the user, asking for a number and then displaying the results for choice 3.

```

29 System.out.println("2. Is number a power of 2? ");
30 System.out.println("3. Two's complement of number?");
31 System.out.print("Enter choice (1-3): ");
32
33 int choice = input.nextInt();
34 System.out.println();
35
36 *
37 switch (choice) {
38
39     case 1:
40         if (isOdd(number))
41             System.out.println(number + " is odd.");
42         else
43             System.out.println(number + " is even.");
44         break;
45
46     case 2:
47         if (isPowerOfTwo(number))
48             System.out.println(number + " IS a power of 2.");
49         else
50             System.out.println(number + " is NOT a power of 2.");
51         break;
52
53     case 3:
54         int result = twosComplement(number);
55         System.out.println("Two's complement of " + number + " = " + result);
56         break;
57
58     default:
59         System.out.println("Invalid choice.");
60
61     }
62     input.close();
63 }

```

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