

Template Week 2 – Logic

Student number: 585296

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	False
0	0	1	False
0	1	0	false
1	1	1	True
1	0	0	false
1	1	0	False
1	0	1	False
0	1	1	false

Assignment 2.2: Android or iPhone

Which gates do you need?

Complete this table

Android phone	iPhone	Result (Phone in possession)
0	0	Geen phone
1	1	Geen phone
1	0	android
0	1	iphone

Assignment 2.3: Four NAND gates

Complete this table

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

A en b 1 1 1 0

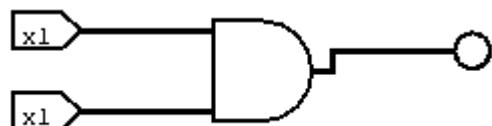
1 1 0 1

1010

How can the design be simplified?

Assignment 2.4: Getting to know Logisim evolution

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

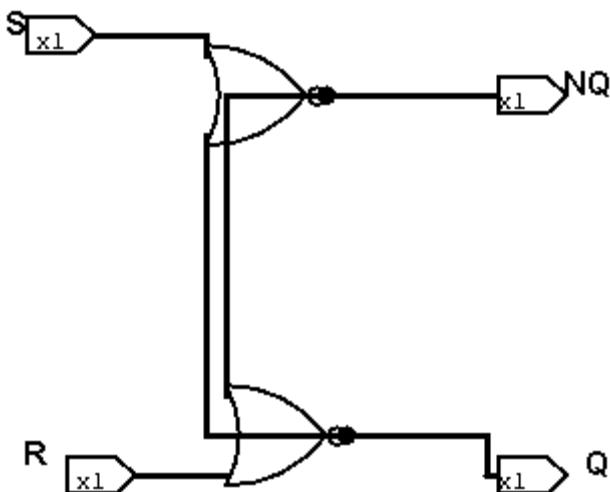


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Assignment 2.5: SR Latch

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

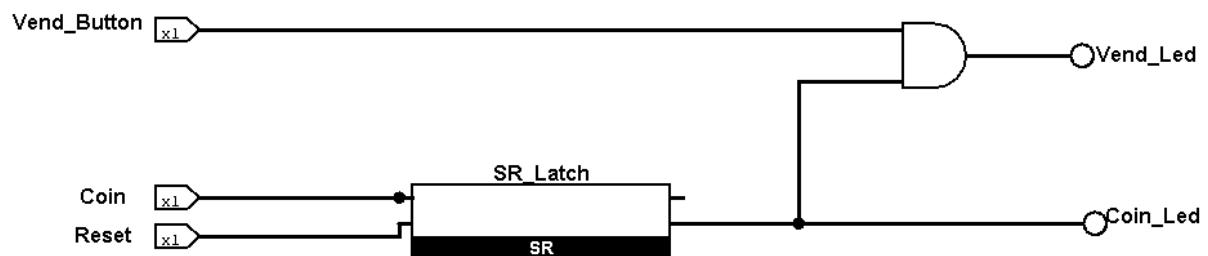


585296

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Assignment 2.6: Vending Machine

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



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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 odd");  
        else System.out.println("number is even");  
    }  
}
```

```
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");  
        }  
    }  
}
```

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

```

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

}

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

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

    }
}

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);

    }
}

```

```
public class Main {  
    public static void main(String[] args) {  
        int number = 5;  
        number = ~number + 1;  
        System.out.println("Number: " + number);  
  
    }  
}
```

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

int choice = scanner.nextInt();

switch (choice) {
    case 1:
        checkOdd(number);
        break;

    case 2:
        checkPowerOfTwo(number);
        break;

    case 3:
        printTwosComplement(number);
        break;

    default:
        System.out.println("Invalid choice.");
}

}

public static void checkOdd(int number) {
    // Odd if last bit = 1
    if ((number & 1) == 1) {
        System.out.println(number + " is odd.");
    } else {
        System.out.println(number + " is even.");
    }
}
```

```

public static void checkPowerOfTwo(int number) {
    // A number is a power of 2 if it has exactly ONE bit set.
    // n > 0 AND n & (n - 1) == 0
    if (number > 0 && (number & (number - 1)) == 0) {
        System.out.println(number + " is a power of 2.");
    } else {
        System.out.println(number + " is NOT a power of 2.");
    }
}

```

```

public static void printTwosComplement(int number) {
    // Two's complement: invert all bits then add 1
    int twoComp = ~number + 1;
    System.out.println("Two's complement of " + number + " is: " + twoComp);
}

```

The screenshot shows the IntelliJ IDEA interface. The code editor displays the Main.java file with the implemented methods. The project structure on the left shows a 'SalaryAdmin' project with 'src' and 'out' directories. The run terminal at the bottom shows the output of running the 'Main' class, where the user enters the number 5, and the program correctly identifies it as odd.

```

public class Main {
    public static void checkPowerOfTwo(int number) {
        // A number is a power of 2 if it has exactly ONE bit set.
        // n > 0 AND n & (n - 1) == 0
        if (number > 0 && (number & (number - 1)) == 0) {
            System.out.println(number + " is a power of 2.");
        } else {
            System.out.println(number + " is NOT a power of 2.");
        }
    }

    public static void printTwosComplement(int number) {
        // Two's complement: invert all bits then add 1
        int twoComp = ~number + 1;
        System.out.println("Two's complement of " + number + " is: " + twoComp);
    }
}

Enter a number: 5
Choose an option:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
1
5 is odd.

Process finished with exit code 0

```

```
C:\Users\wesse\jdk\ms-21.0.8\bin\java.exe "-javaagent:C:\Users\wesse\AppData\Local\Programs\IntelliJ IDEA Ultimate\lib\idea_rt.jar=57744" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.encoding=UTF-8 -classpath "C:\programmatelen\openjdk-24.0.2_windows-x64_bin\jdk-24.0.2;C:\Saxion\Introductie programmeren\SalaryAdmin\out\production\SalaryAdmin;C:\Saxion\Introductie programmeren\SalaryAdmin\resources\SaxionApp.jar" Main
Enter a number: 5
Choose an option:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
2
5 is NOT a power of 2.

Process finished with exit code 0
```

```
C:\Users\wesse\jdk\ms-21.0.8\bin\java.exe "-javaagent:C:\Users\wesse\AppData\Local\Programs\IntelliJ IDEA Ultimate\lib\idea_rt.jar=57744" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.encoding=UTF-8 -classpath "C:\programmatelen\openjdk-24.0.2_windows-x64_bin\jdk-24.0.2;C:\Saxion\Introductie programmeren\SalaryAdmin\out\production\SalaryAdmin;C:\Saxion\Introductie programmeren\SalaryAdmin\resources\SaxionApp.jar" Main
Enter a number: 3
Choose an option:
1. Is number odd?
2. Is number a power of 2?
3. Two's complement of number
3
Two's complement of 3 is: -5

Process finished with exit code 0
```

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