

# 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

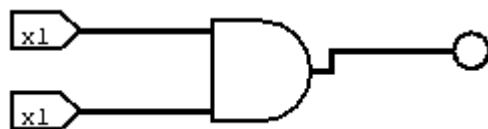
1 1 0 1

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:

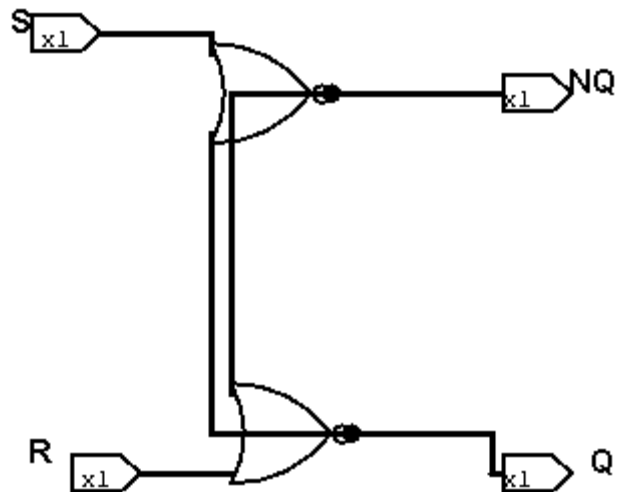


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### Assignment 2.5: SR Latch

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

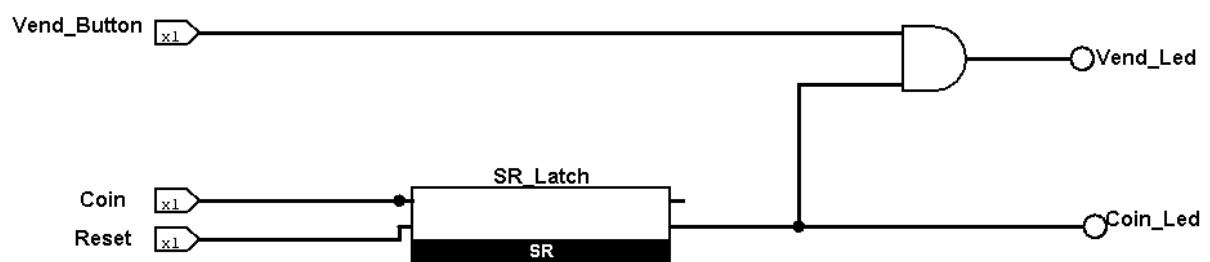


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### Assignment 2.6: Vending Machine

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 an IDE with a project named 'SalaryAdmin'. The code editor displays the 'Main.java' file, which contains the following code:

```

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.");
        }
    }
}

```

The Run window shows the execution of the program. The output is as follows:

```

C:\Users\wesle\jdk\ms-21.0.8\bin\java.exe "-javaagent:C:\Users\wesle\AppData\Local\Programs\IntelliJ IDEA Ultimate\lib\idea_rt.jar=57542" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.encoding=UTF-8 -classpath "C:\programdata\openjdk-24.0.2_windows-x64_bin\jdk-24.0.2;C:\Saxion\Introduce programmeren\SalaryAdmin\out\production\SalaryAdmin;C:\Saxion\Introduce 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
1
5 is odd.
Process finished with exit code 0

```



```
3 public class Main {
45     public static void checkPowerOfTwo(int number) {
46         // A number is a power of 2 if it has exactly ONE bit set.
47         // n > 0 AND n & (n - 1) == 0
48         if (number > 0 && (number & (number - 1)) == 0) {
49             System.out.println(number + " is a power of 2.");
50         } else {
51             System.out.println(number + " is NOT a power of 2.");
52         }
53     }
54 }

C:\Users\wesle\jdk\ms-21.0.8\bin\java.exe "-javaagent:C:\Users\wesle\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:\programdata\openjdk-24.0.2_windows-x64_bin\jdk-24.0.2\bin\java.exe;C:\Saxion\Introduce programmeren\SalaryAdmin\out\production\SalaryAdmin;C:\Saxion\Introduce 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
```

```
3 public class Main {
45     public static void checkPowerOfTwo(int number) {
46         // A number is a power of 2 if it has exactly ONE bit set.
47         // n > 0 AND n & (n - 1) == 0
48         if (number > 0 && (number & (number - 1)) == 0) {
49             System.out.println(number + " is a power of 2.");
50         } else {
51             System.out.println(number + " is NOT a power of 2.");
52         }
53     }
54 }

C:\Users\wesle\jdk\ms-21.0.8\bin\java.exe "-javaagent:C:\Users\wesle\AppData\Local\Programs\IntelliJ IDEA Ultimate\lib\idea_rt.jar=57764" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.encoding=UTF-8 -classpath "C:\programdata\openjdk-24.0.2_windows-x64_bin\jdk-24.0.2\bin\java.exe;C:\Saxion\Introduce programmeren\SalaryAdmin\out\production\SalaryAdmin;C:\Saxion\Introduce 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
3
Two's complement of 5 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](#)