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

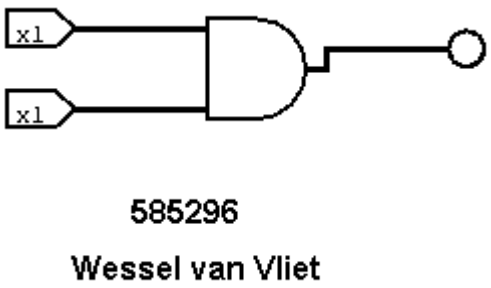
1 1 0 1

1010

How can the design be simplified?

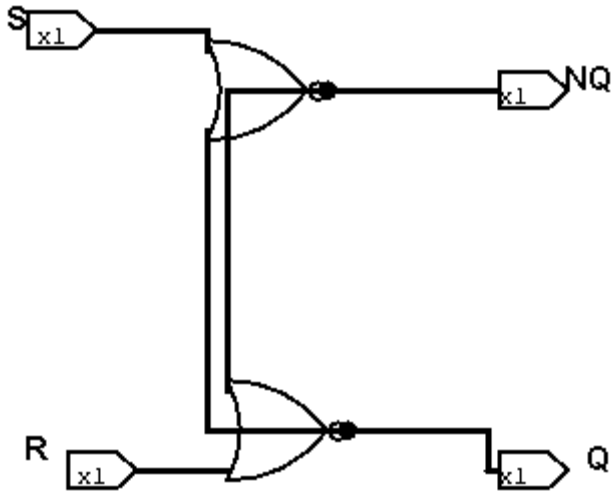
Assignment 2.4: Getting to know Logisim evolution

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



Assignment 2.5: SR Latch

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



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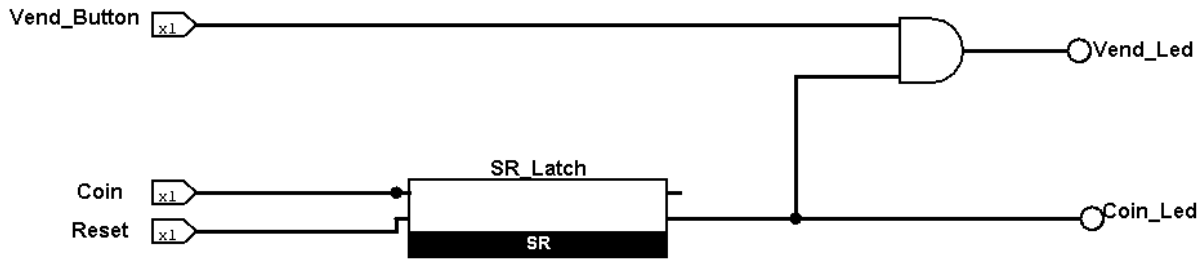
Assignment 2.6: Vending Machine

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.

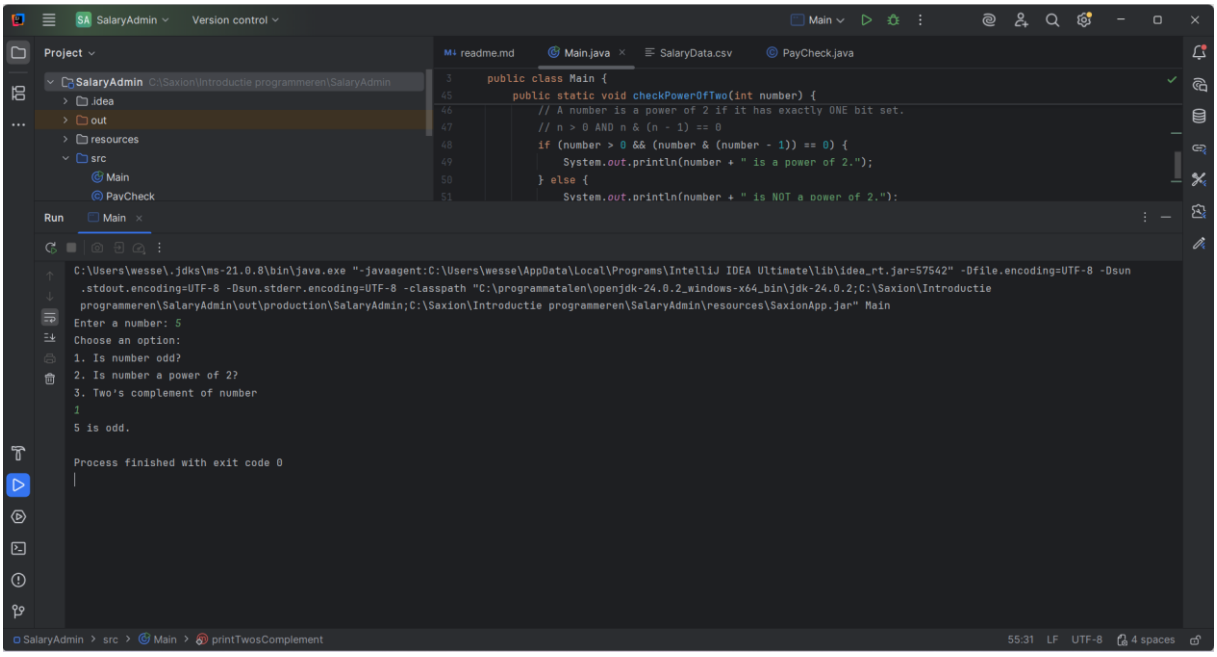
Keep this application because you need to expand it in week 6 for calculating network segments.

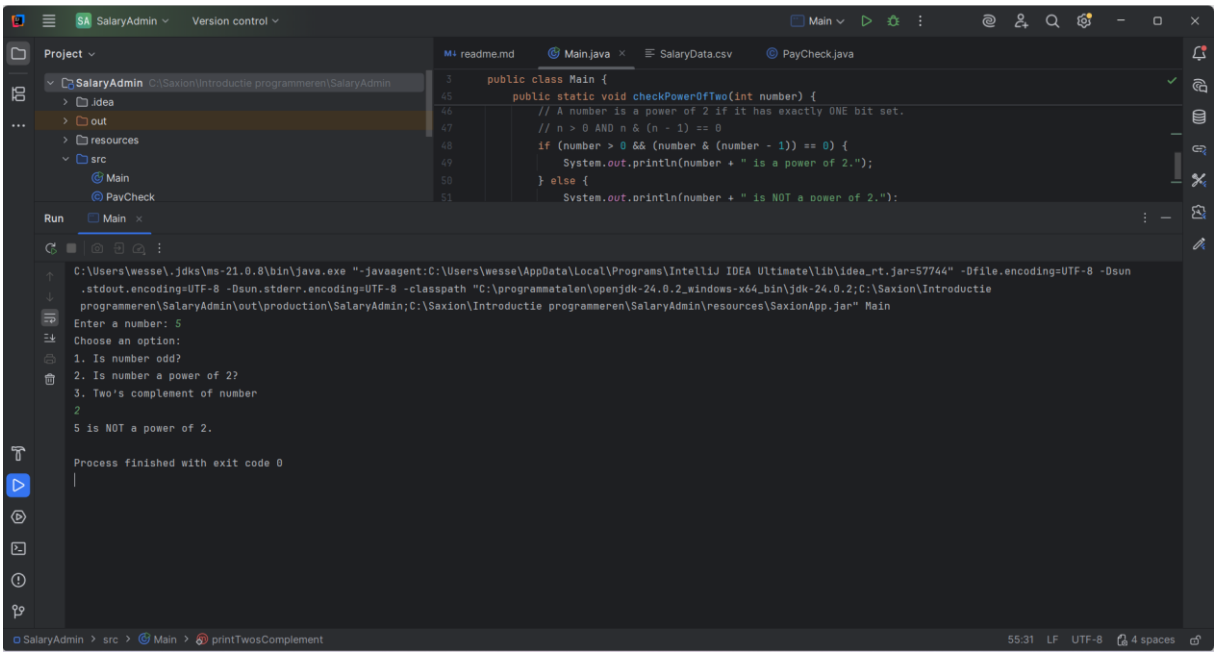
Paste source code here, with a screenshot of a working application.

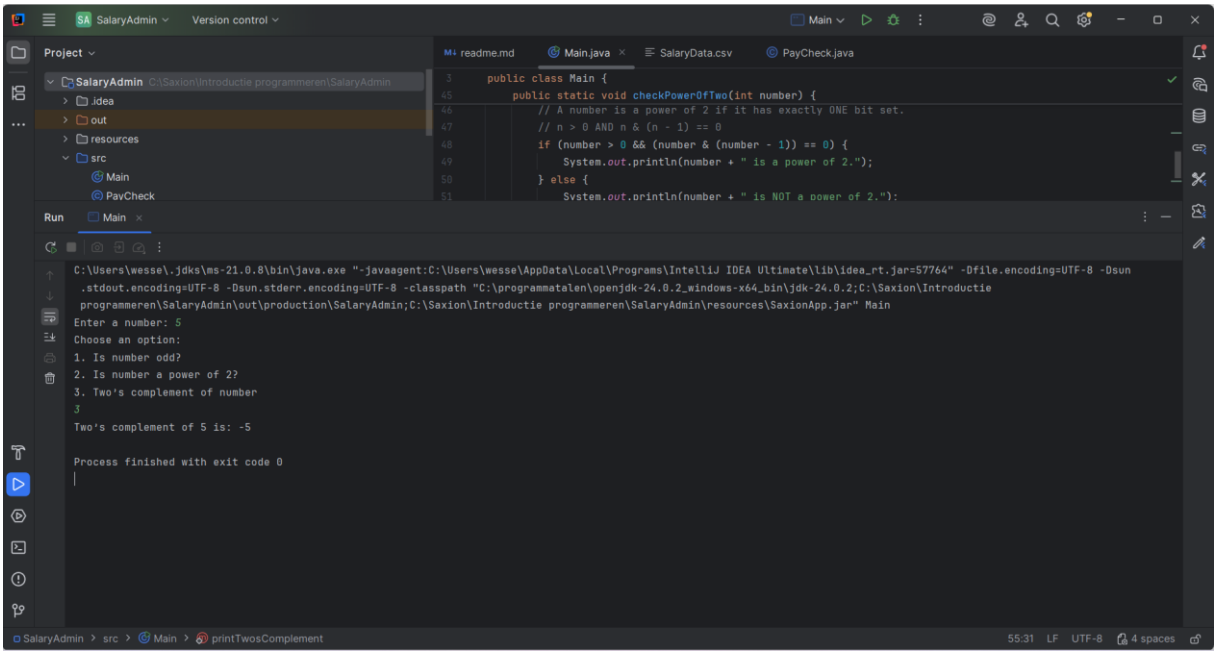
```
import java.util.Scanner;

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);
    }
}
```







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