Week 2 – Logic

Student number: 581429

Assignment 2.1: Parking lot

Which gates do you need?

3-input 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
1	0	0	0
1	1	0	0
1	0	1	0
0	1	1	0
1	1	1	1

Assignment 2.2: Android or iPhone

Which gates do you need?

XOR gate

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

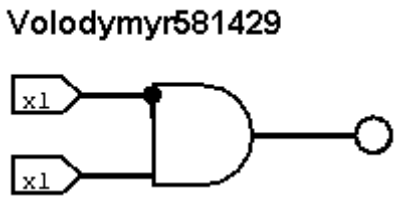
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

It is the same as XOR gate

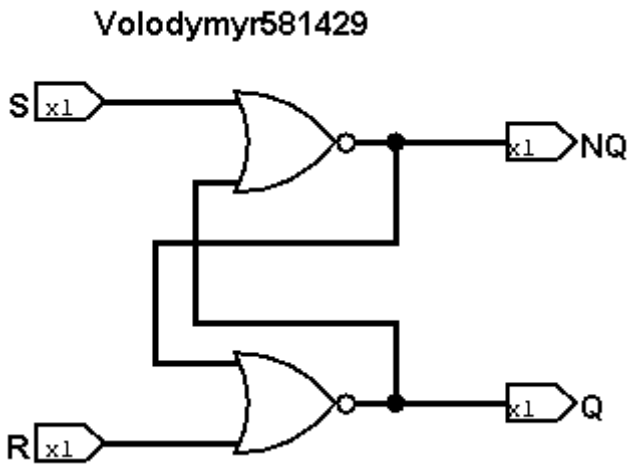
Assignment 2.4: Getting to know Logisim evolution

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



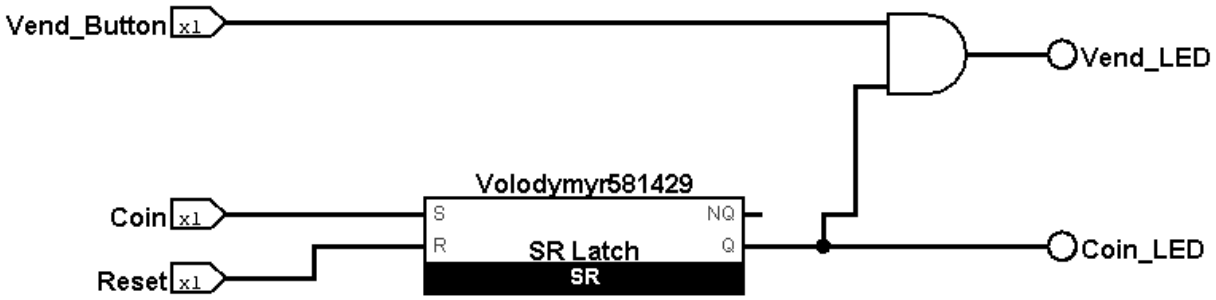
Assignment 2.5: SR Latch

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:



Assignment 2.7: Bitwise operators

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

```
int number1 = 5;
   if ((number1 & 1) == 1) {
      System.out.println("number is odd");
   } else {
      System.out.println("number is even");
   }

   int number2 = 4;
   if (number2 > 0 && (number2 & (number2 - 1)) == 0) {
      System.out.println("number is a power of 2");
   } else {
      System.out.println("number isn’t a power of 2");
   }

   final int READ = 4;
   final int WRITE = 2;
   final int EXECUTE = 1;
   int userPermissions = 7;
   if ((userPermissions & READ) != 0) {
      System.out.println("User has read permissions");
   } else {
      System.out.println("User can't read. No permissions.");
   }

   int userPermissions2 = READ | EXECUTE;
   System.out.println("User permissions: "+ userPermissions2);

   int userPermissions3 = 6;
```

```
    userPermissions3 = userPermissions3 ^ WRITE;
    System.out.println("User permissions: "+ userPermissions3);

    int number3 = 5;
    number3 = ~number3 + 1;
    System.out.println("Number: "+number3);

    int number4 = 10;
    System.out.println("Decimal integer: "+number4);

    String binary = Integer.toBinaryString(number4);
    String octal = Integer.toOctalString(number4);
    String hexadecimal = Integer.toHexString(number4);

    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.

```
    while(true) {
        SaxionApp.clear();
        SaxionApp.printLine("Number converter 2000");
        SaxionApp.printLine("1. Is number odd?");
        SaxionApp.printLine("2. Is number a power of 2?");
        SaxionApp.printLine("3. Two's complement of number?");
        char choice = SaxionApp.readChar();
        SaxionApp.clear();
        SaxionApp.printLine("Enter a number: ");
        switch (choice) {
```

```
            case '1' -> isNumberOdd();
            case '2' -> isNumberAPowerOfTwo();
            case '3' -> TwosComplement();
        }
    }
}

public void isNumberOdd() {
    int number = SaxionApp.readInt();
    if ((number & 1) == 1) {
        SaxionApp.printLine("Number " + number + " is odd.");
    } else {
        SaxionApp.printLine("Number " + number + " is even.");
    }
    SaxionApp.pause();
}

public void isNumberAPowerOfTwo() {
    int number = SaxionApp.readInt();
    if (number > 0 && (number & (number - 1)) == 0) {
        SaxionApp.printLine("Number " + number + " is a power of 2.");
    } else {
        SaxionApp.printLine("Number " + number + " isn't a power of 2.");
    }
    SaxionApp.pause();
}

public void TwosComplement() {
    int number = SaxionApp.readInt();
    SaxionApp.printLine("Two's complement of number " + number + " is: " + (~number + 1));
    SaxionApp.pause();
}
```

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