Template Week 2 – Logic

Student number:588963

Assignment 2.1: Parking lot

Which gates do you need? 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
0	1	1	0
1	0	0	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-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

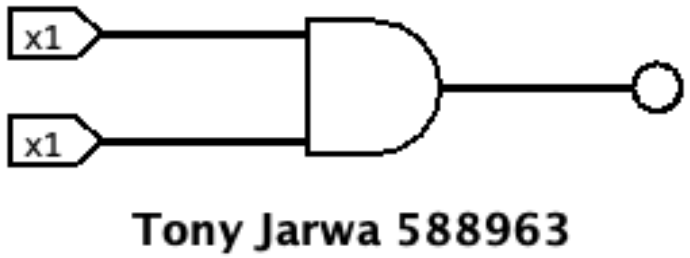
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

How can the design be simplified?

The design be simplified by using a single XOR-gate, because it's truth table is the same.

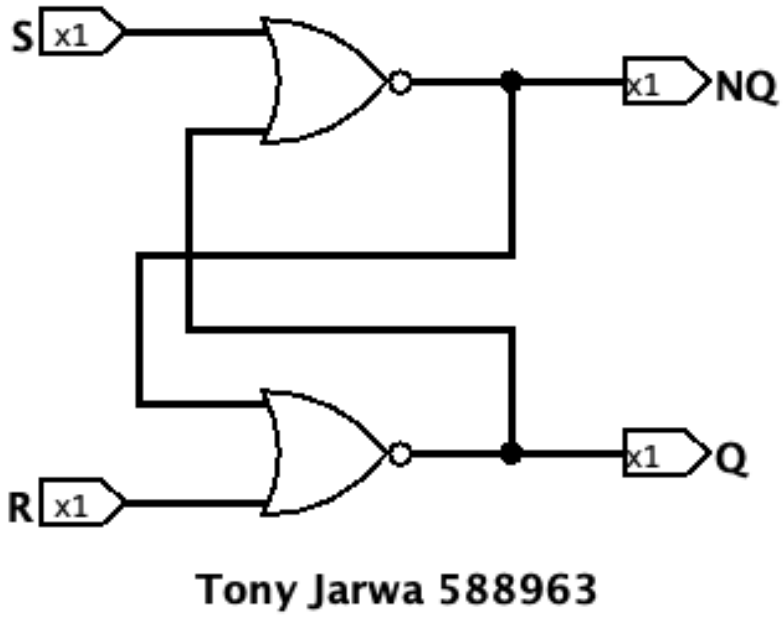
Assignment 2.4: Getting to know Logisim evolution

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



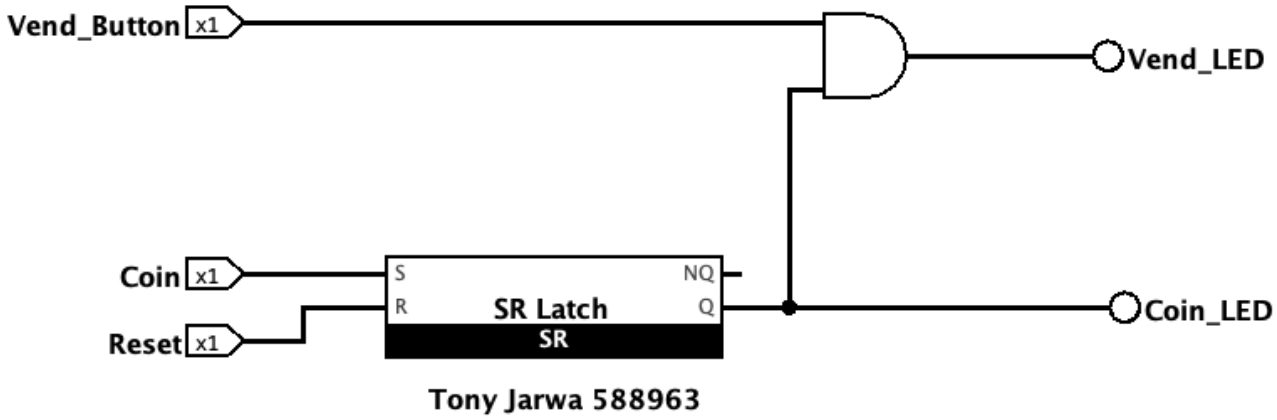
Assignment 2.5: SR Latch

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.

1# even or odd

```
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");
}
}
```

#2 power of 2

```
public class Main {
public static void main(String[] args) {
int number = 4;
if((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 check permission

```
public class Main {
public static void main(String[] args) {
final int READ = 4;
final int WRITE = 2;
final int EXECUTE = 2;
int userPermissions = 7;
if((userPermissions & READ) != 0) System.out.println("User has read permissions");
else System.out.println("User can't read. No permissions.");
}
}
```

#4 assign permission

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

#5 update permission

```
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);

}

}

#6 two's complement

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.

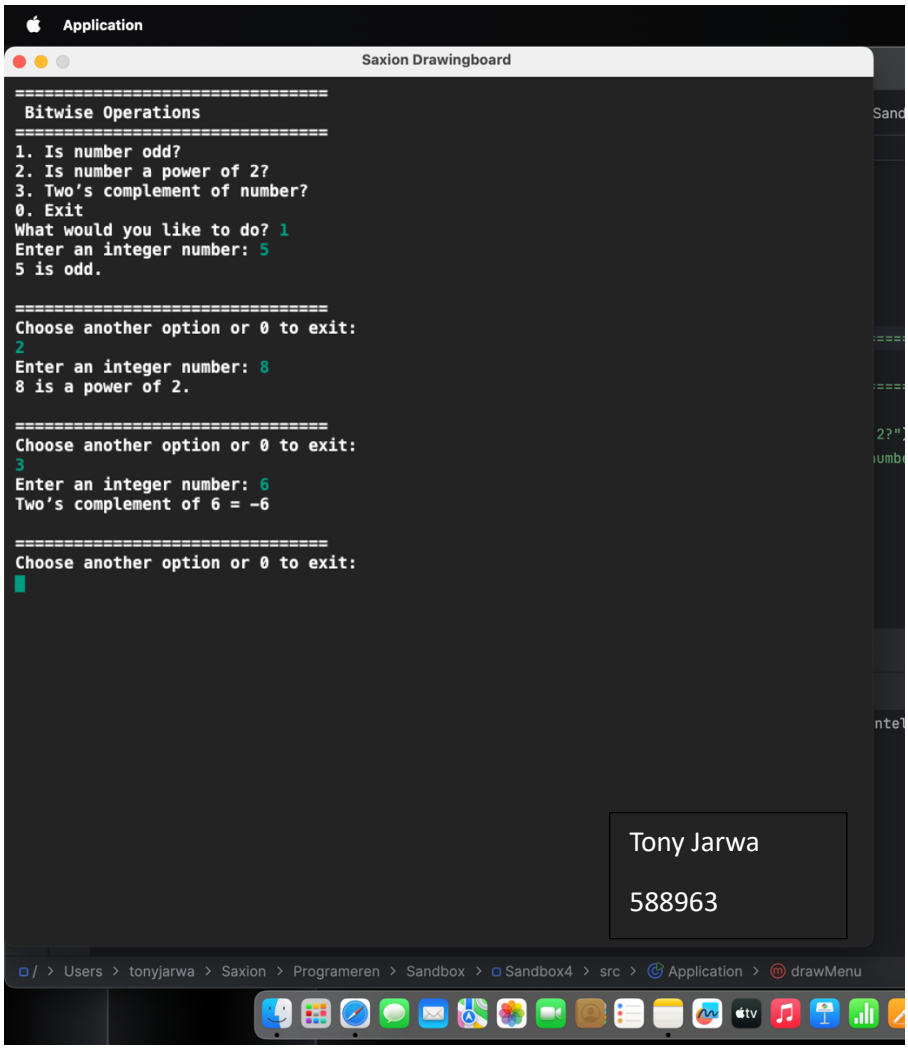
Keep this application because you need to expand it in week 6 for calculating network segments.

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

```
public void run() {

    drawMenu();

    int input = -1;
    while (input != 0) {
        input = SaxionApp.readInt();

        if (input == 1) {
            SaxionApp.print("Enter an integer number: ");
            int number = SaxionApp.readInt();
```

```
            if (isOdd(number)) {
                SaxionApp.printLine(number + " is odd.");
            } else {
                SaxionApp.printLine(number + " is even.");
            }

        } else if (input == 2) {
            SaxionApp.print("Enter an integer number: ");
            int number = SaxionApp.readInt();

            if (isPowerOfTwo(number)) {
                SaxionApp.printLine(number + " is a power of 2.");
            } else {
                SaxionApp.printLine(number + " is NOT a power of 2.");
            }

        } else if (input == 3) {
            SaxionApp.print("Enter an integer number: ");
            int number = SaxionApp.readInt();

            int result = twosComplement(number);
            SaxionApp.printLine("Two's complement of " + number + " = " +
result);

        } else if (input == 0) {
            SaxionApp.printLine("Exiting...");
        } else {
            SaxionApp.printLine("Invalid choice. Try again.");
        }

        if (input != 0) {
            SaxionApp.printLine();
            SaxionApp.printLine("================================");
            SaxionApp.printLine("Choose another option or 0 to exit:");
        }
    }
}


boolean isOdd(int number) {
    return (number & 1) == 1;
}


boolean isPowerOfTwo(int number) {
    return number > 0 && (number & (number - 1)) == 0;
}


int twosComplement(int number) {
    return ~number + 1;
}

public void drawMenu() {
    SaxionApp.printLine("================================");
    SaxionApp.printLine(" Bitwise Operations");
    SaxionApp.printLine("================================");
    SaxionApp.printLine("1. Is number odd?");
    SaxionApp.printLine("2. Is number a power of 2?");
    SaxionApp.printLine("3. Two's complement of number?");
```

```
    SaxionApp.printLine("0. Exit");
    SaxionApp.print("What would you like to do? ");
}
```



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