Template Week 2 – Logic

Student number: 589055

Assignment 2.1: Parking lot

Which gates do you need?

You need an AND gate to check if all the parking spaces are full

Complete this table

Parking lot 1	Parking lot 2	Parking lot 3	Result (full)
0	0	0	Not full
0	0	1	Not full
0	1	0	Not full
0	1	1	Not full
1	0	0	Not full
1	0	1	Not full
1	1	0	Not full
1	1	1	Full

Assignment 2.2: Android or iPhone

Which gates do you need?

You need an XOR gate to check which phone is chosen

Complete this table

Android phone	iPhone	Result (Phone in possession)
0	0	none
1	0	Andriod phone
0	1	iPhone
1	1	none

Assignment 2.3: Four NAND gates

Complete this table

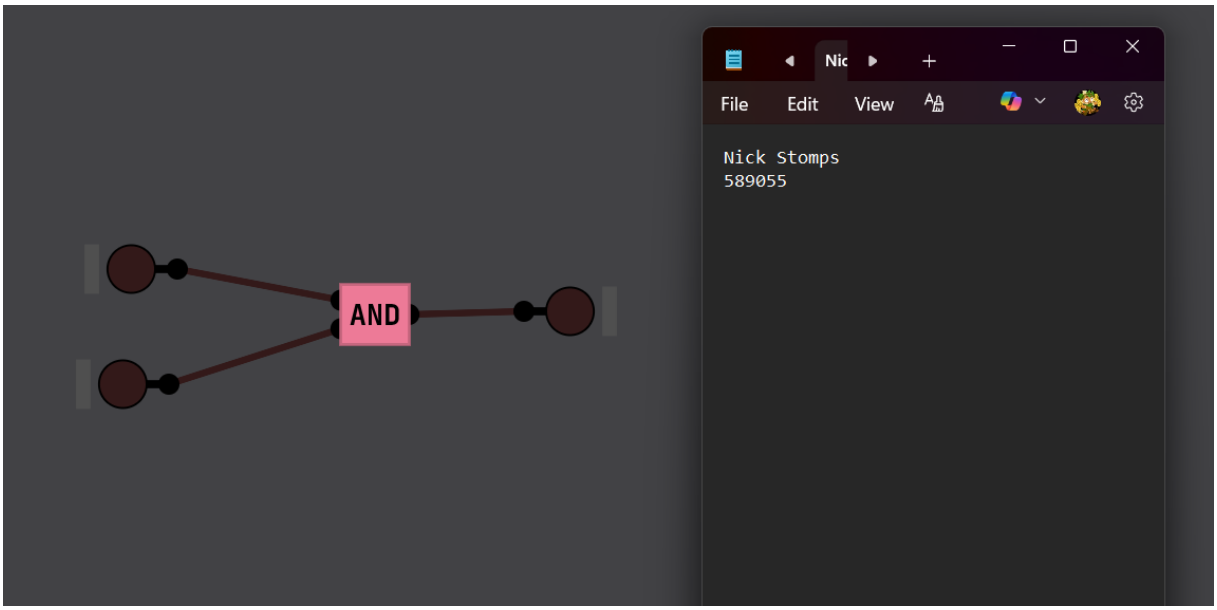
A	B	Q
0	0	0
1	0	1
0	1	1
1	1	0

How can the design be simplified?

Dit kan niet verspimpeld worden, dit is het optimale wat kanc

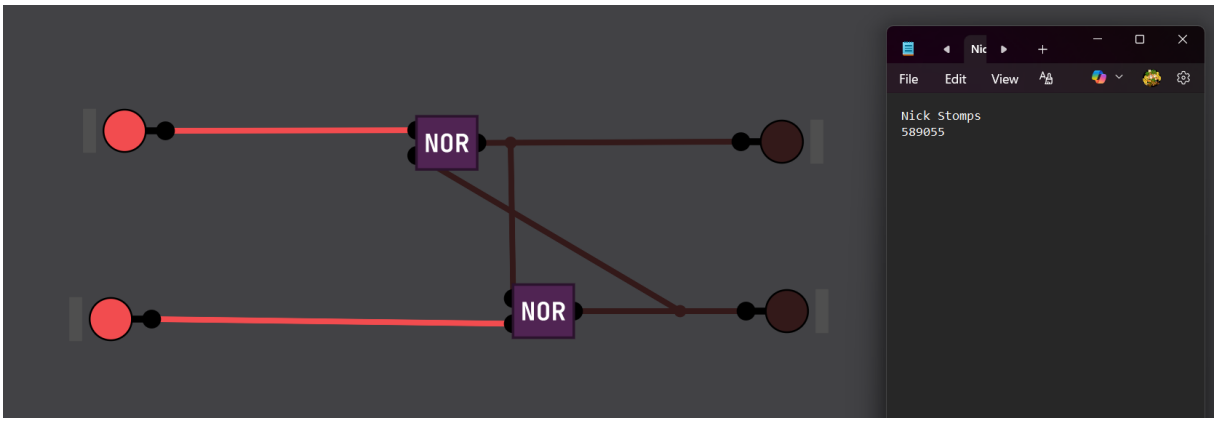
Assignment 2.4: Getting to know Logisim evolution

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



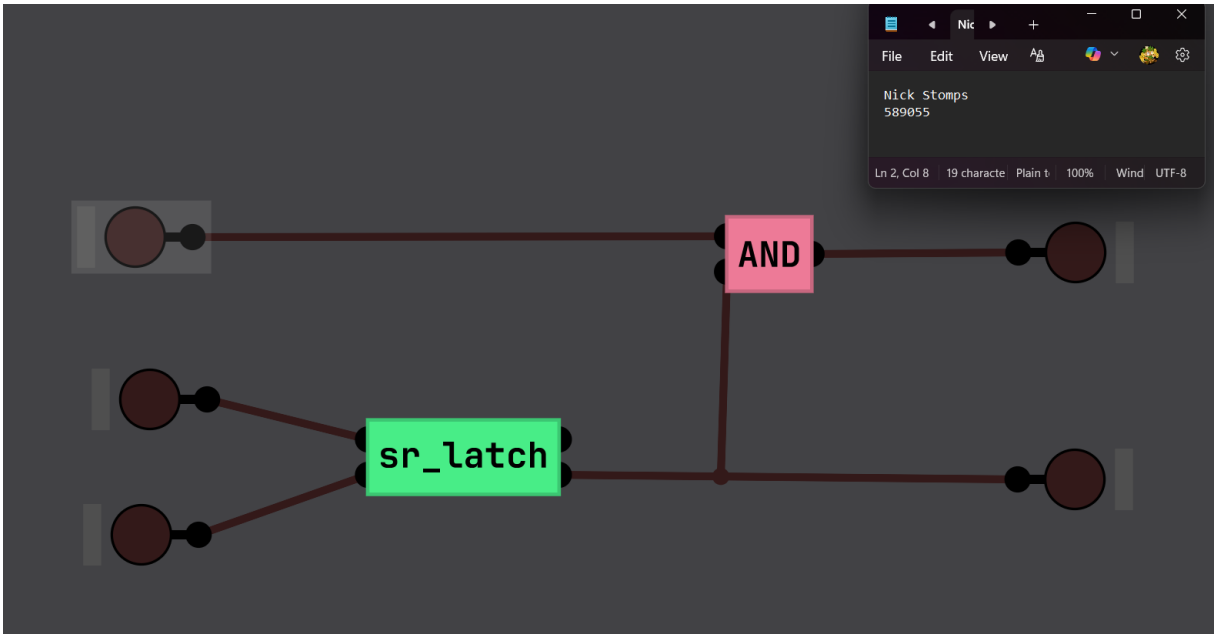
Assignment 2.5: SR Latch

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:

```
public class Main {
   public static void main(String[] args) {
      int number = 5;
      if((isEven(number))) System.out.println("number is even");
      else System.out.println("number is odd");
   }

   public static boolean isEven(int num) {
      int numero = num / 2;
      return numero * 2 == num;

      // het kan ook op deze manier met de bitwise AND operator:
      // return (num & 1) != 1;
   }
}
```

#2:

```
public class Main {
   public static void main(String[] args) {
      int number = 3;
      if((isPowerOf2(number))) System.out.println("number is a power of 2");
      else System.out.println("number isn't a power of 2");
   }
   public static boolean isPowerOf2(int num) {
      return (num & (num - 1)) == 0 && num > 0;
   }
}
```

#3: 644

#4:

```
public class Main {
   public static void main(String[] args) {
      final int READ = 4;
      final int WRITE = 2;
      final int EXECUTE = 1;
      int userPermissions = 0;
      // Grant read and execute permissions
      userPermissions |= READ;
      userPermissions |= EXECUTE;
      System.out.println("User permissions: "+userPermissions);
   }
}
```

#5:

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

#6:

```
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();

      showMenu();
      System.out.print("Choose your option (1-3): ");
      int choice = scanner.nextInt();

      switch (choice) {
         case 1:
            checkOdd(number);
            break;
         case 2:
            checkPowerOfTwo(number);
            break;
         case 3:
            showTwosComplement(number);
            break;
         default:
            System.out.println("That is not a valid option");
      }

      scanner.close();
   }

   // Menu display
   public static void showMenu() {
      System.out.println("\n=== MENU ===");
      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");
    }

    // Option 1: Odd check
    public static void checkOdd(int number) {
        if ((number & 1) != 1) {
            System.out.println(number + " is odd");
        } else {
            System.out.println(number + " is even");
        }
    }

    // Option 2: Power of 2 check
    public static void checkPowerOfTwo(int number) {
        if ((number & (number - 1)) == 0 && number > 0) {
            System.out.println(number + " is a power of 2");
        } else {
            System.out.println(number + " is not a power of 2");
        }
    }

    // Option 3: Two's complement
    public static void showTwosComplement(int number) {
        int twosComplement = ~number + 1;
        System.out.println("Two's complement of " + number + " is " + twosComplement);
    }
}
```

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