Template Week 2 – Logic

Student number:

Assignment 2.1: Parking lot

Which gates do you need?

3 AND gates

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
0	1	1	0
1	1	0	0
1	0	1	0
1	1	1	1

Assignment 2.2: Android or iPhone

Which gates do you need?

1 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

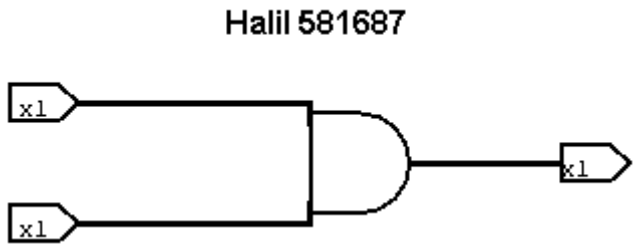
A	B	Q
0	0	0
1	0	1
0	1	1
1	1	0

How can the design be simplified?

Met een XOR gate aangezien het dezelfde werking heeft en maar 1 gate is.

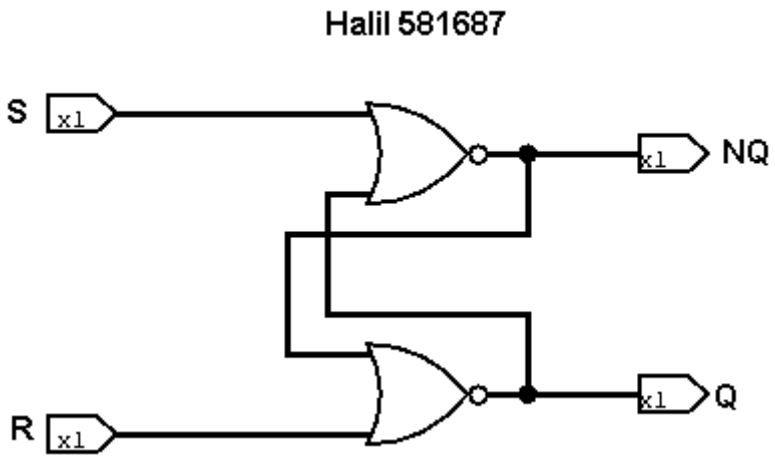
Assignment 2.4: Getting to know Logisim evolution

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



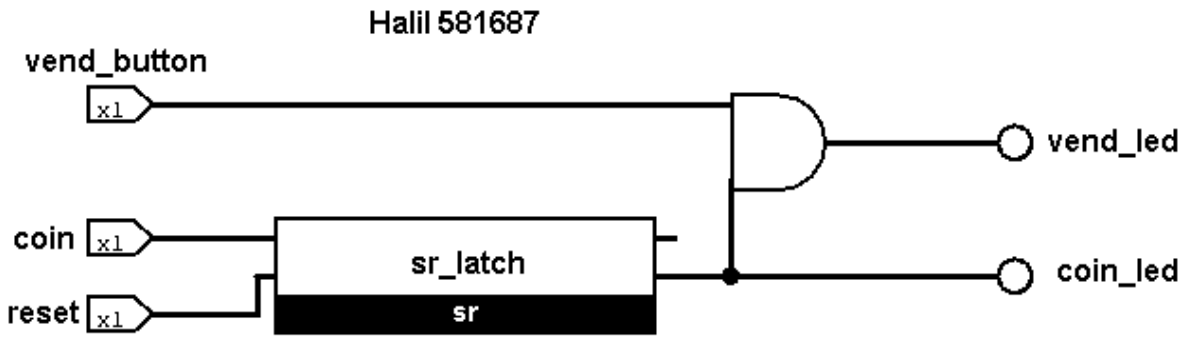
Assignment 2.5: SR Latch

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.

```
public class Main {

   public static void main(String[] args) {

      evenOdd();
      powerOfTwo();
      checkPermissions();
      assignPermissions();
      updatePermissions();
      twosComplement();
      convertBases();
   }

   public static void evenOdd() {
      int number = 5;

      if ((number & 1) == 1)
         System.out.println(number + " is odd");
      else
         System.out.println(number + " is even");
   }

   public static void powerOfTwo() {
      int number = 4;

      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 checkPermissions() {

    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 permission");
    else
        System.out.println("User has NO read permission");
}

public static void assignPermissions() {

    final int READ = 4;
    final int WRITE = 2;
    final int EXECUTE = 1;

    int userPermissions = 0;

    userPermissions |= READ;
    userPermissions |= EXECUTE;

    System.out.println("User permissions: " + userPermissions);
}

public static void updatePermissions() {

    final int READ = 4;
    final int WRITE = 2;
    final int EXECUTE = 1;

    int userPermissions = 6;

    userPermissions ^= WRITE;

    System.out.println("User permissions: " + userPermissions);
}

public static void twosComplement() {

    int number = 5;
    number = ~number + 1;

    System.out.println("Number: " + number);
}
```

```
    public static void convertBases() {

        int number = 10;

        System.out.println("Decimal: " + number);
        System.out.println("Binary: " + Integer.toBinaryString(number));
        System.out.println("Octal: " + Integer.toOctalString(number));
        System.out.println("Hexadecimal: " + Integer.toHexString(number));
    }
}
```

Assignment 2.8: Java Application Bit Calculations

Create a java program that accepts user input and presents a menu with options.
Is number odd?
Is number a power of 2?
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.

```
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int number = input.nextInt();

        while (true) {

            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?");
            System.out.println("4. Exit");
            System.out.print("Choose: ");

            int choice = input.nextInt();

            if (choice == 1) {
                isOdd(number);
            } else if (choice == 2) {
                isPowerOfTwo(number);
            } else if (choice == 3) {
                twosComplement(number);
            } else if (choice == 4) {
                System.out.println("Exiting...");
                break;
```

```
            } else {
                System.out.println("Invalid choice.");
            }
        }

        input.close();
    }

    public static void isOdd(int number) {
        if ((number & 1) == 1)
            System.out.println(number + " is odd");
        else
            System.out.println(number + " is even");
    }

    public static void isPowerOfTwo(int number) {
        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 twosComplement(int number) {
        int result = ~number + 1;
        System.out.println("Two's complement: " + result);
    }
}
```

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