Template Week 2 – Logic

Student number: 528668

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	0	1	0
1	1	0	0
1	1	1	1

Assignment 2.2: Android or iPhone

Which gates do you need?

OR Gate

Complete this table

Android phone	iPhone	Result (Phone in possession)
0	0	0
1	0	1
0	1	1
1	1	1

Assignment 2.3: Four NAND gates

Complete this table

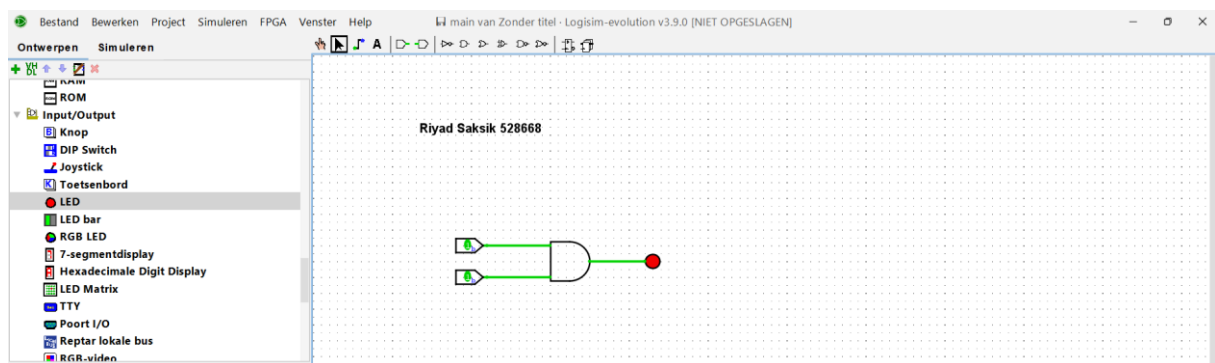| A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

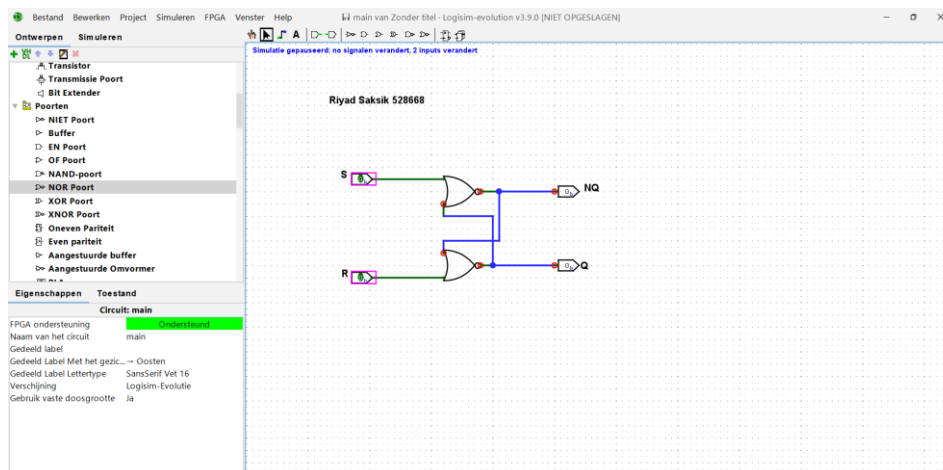How can the design be simplified?

Bij gebruik van een 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.

Assignment 2.8: Java Application Bit Calculations

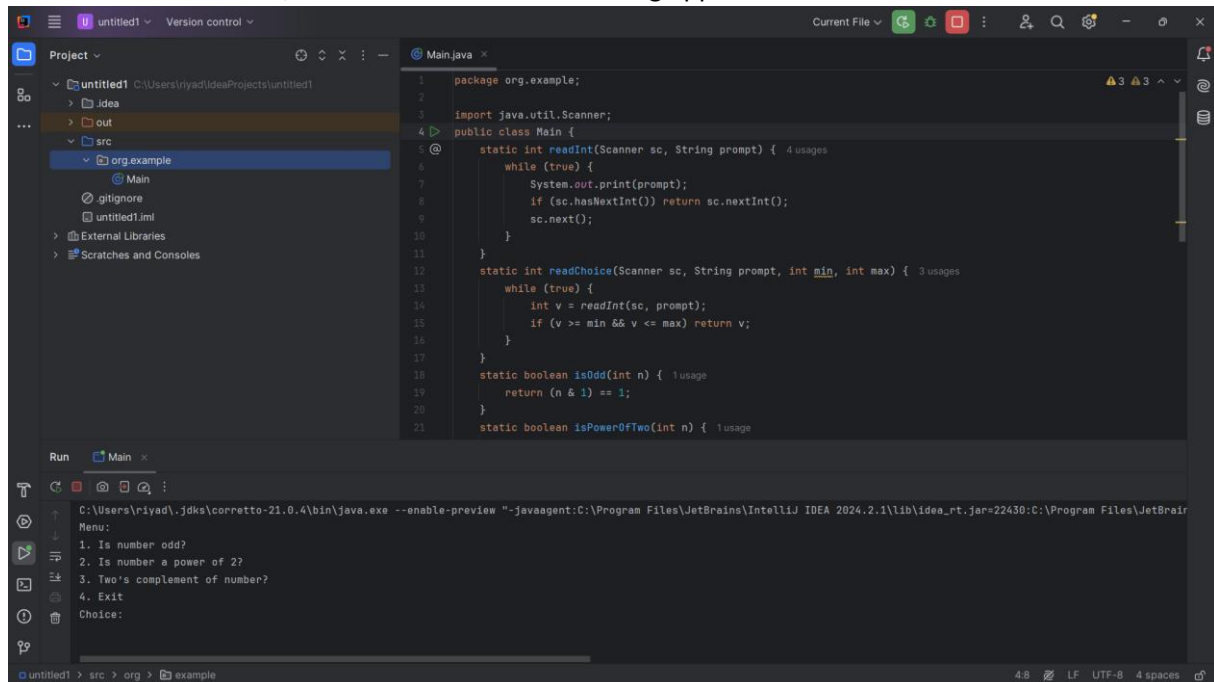Create a java program that accepts user input and presents a menu with options.

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.

package org.example;

import java.util.Scanner;
public class Main {
    static int readInt(Scanner sc, String prompt) {
        while (true) {
            System.*out*.print(prompt);
            if (sc.hasNextInt()) return sc.nextInt();
            sc.next();
        }
    }
    static int readChoice(Scanner sc, String prompt, int min, int max) {
        while (true) {
            int v = *readInt*(sc, prompt);
            if (v >= min && v <= max) return v;
        }
    }
    static boolean isOdd(int n) {
        return (n & 1) == 1;
    }
    static boolean isPowerOfTwo(int n) {
        return n > 0 && (n & (n - 1)) == 0;
    }
    static long maskForBits(int bits) {
        if (bits == 32) return 0xFFFFFFFFL;
        return (1L << bits) - 1;
    }
    static String toBinaryPadded(long v, int bits) {
        String s = Long.*toBinaryString*(v);

```java
      if (s.length() > bits) s = s.substring(s.length() - bits);
      while (s.length() < bits) s = "0" + s;
      return s;
   }
   static long twosComplement(long value, int bits) {
      long mask = maskForBits(bits);
      return (~value + 1) & mask;
   }
   static void runOdd(Scanner sc) {
      int n = readInt(sc, "Enter number: ");
      System.out.println(isOdd(n) ? "number is odd" : "number is even");
   }
   static void runPowerOfTwo(Scanner sc) {
      int n = readInt(sc, "Enter number: ");
      System.out.println(isPowerOfTwo(n) ? "number is a power of 2" : "number isn't a power of 2");
   }
   static void runTwosComplement(Scanner sc) {
      int n = readInt(sc, "Enter number: ");
      int bits = readChoice(sc, "Bit-width (8/16/32): ", 1, 32);
      while (bits != 8 && bits != 16 && bits != 32) {
         bits = readChoice(sc, "Bit-width (8/16/32): ", 1, 32);
      }
      long mask = maskForBits(bits);
      long value = ((long) n) & mask;
      long tc = twosComplement(value, bits);
      System.out.println("number: " + toBinaryPadded(value, bits));
      System.out.println("two's complement: " + toBinaryPadded(tc, bits));
   }
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      while (true) {
         System.out.println("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");
         int choice = readChoice(sc, "Choice: ", 1, 4);
         if (choice == 4) break;
         if (choice == 1) runOdd(sc);
         if (choice == 2) runPowerOfTwo(sc);
         if (choice == 3) runTwosComplement(sc);
         System.out.println();
      }
   }
}
```

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