Informatik - AS19

Exercise 2: Expressions & Integers

Handout: 23. Sep. 2019 06:00

Due: 30. Sep. 2019 18:00

Task 1: Expressions

Open Task

Task

Let `a`, `b`, `c`, and `d` be variables of type `int`.

- Which of the following character sequences are valid in the sense that they are accepted by a C++ Compiler? Explain your answer.

    1. `a = b = 5`
    2. `1 = a`
    3. `++a + b++`
    4. `a + b = c + d`
    5. `a = 2 b`

  Assume that all the variables have been defined and correctly initialized.

- For each of the expressions that you have identified as valid, decide whether the *entire expression* is an lvalue or an rvalue, and explain your decision.

- Determine the values of the expressions that you have identified valid and explain how these values are obtained.

Task 2: Representation of Integers

Open Task

Task

Numbers can be provided in various formats in C++. Literals prefixed with `0b` indicate binary encoding. Assume unsigned arithmetics with sufficient numbers of bits, i.e. no overflows. Convert the following binary numbers into decimal numbers (1-4) and decimal numbers to binary (5-8):

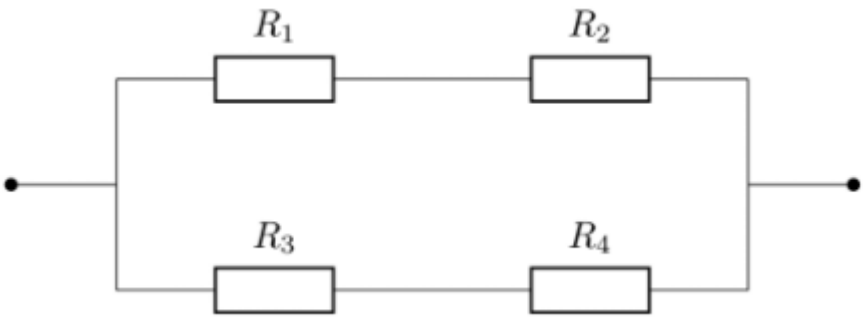
```
    binary          decimal
1.  0b1           = ?
2.  0b10          = ?
3.  0b000001      = ?
4.  0b101010      = ?

5.  ?             = 7
6.  ?             = 11
7.  ?             = 28
8.  ?             = 1024
```

Task 3: Equivalent Resistance

Open Task

Task

Write a program `resistance.cpp` that computes the equivalent resistance of the following wiring:



We assume that R_1, R_2, R_3, and R_4 have an integer valued resistance. After input of the four values, the program should output the result arithmetically rounded to the next integer.

Use of floating point arithmetic is not allowed (you must not use any `float` of `double` value).

Do also **not use any conditionals** such as `if`/`else`. The most elegant solution relies on integer operations only.

Remark: In order to facilitate the task, you may want to:

- conceptually divide the task into sub tasks. For example, start with computation of serial resistors R_{12} and R_{34},
- solve the task first naively using default rounding and then think about how to accomplish arithmetic rounding.

You can find formulas for computing the total resistance in this Wikipedia article.