

This course has already ended.

Eighth round tasks as a ZIP file.

This round focuses on the bit-level manipulations, which is often necessary for programming, for example, low-level device control, error detection and correction algorithms, data compression, encryption algorithms, and optimization

Binary system¶

In binary (base-2) numeral system, all numbers are presented with two symbols (**bits**), 0 or 1. Binary arithmetics have been traditionally significant in computer systems based on digital electronic circuitry, and therefore binary operations are common in low-level implementations. In computer, all numbers or datatypes are built from combinations of bits. Binary operations are also useful in packing information efficiently in small space, and for example, various low-level communication protocols rely on binary operations to efficiently transmit information over a communication link.

Standard C does not support representing numbers in binary format (although there are extensions to support it in many compilers). Therefore, hexadecimal (base-16, i.e., base-24) numbers are a often used together with binary numbers, because **each hexadecimal digit can be represented with four bits**, making them fairly handy format for binary operations. Hexadecimal system has 16 symbols: in addition to numbers 0 - 9, letters A to F are used to indicate decimal values 10 - 15.

The table below illustrates the close connection between decimal representation binary representation and hexadecimal representation.



All individual hexadecimal value is represented in 4 bits. A char data type is limited to 8-bit values, but larger numerical values is formed from a combination of hexadecimal values and corresponding binary values. For example, 16-bit (unsignedvshort) hexadecimal 0xD2A0 would be in binary format 1101 0010 1010 0000. That number conversion to decimal value from the hex value has already been more difficult (decimal representation should be 53920).

Binary representation is read in the same order as the decimal representation, for example: **the least significant bit to the right and the most significant bit on the left**. When the bit combination is converted to an integer, each bit of the "value" is two times higher than that of the right side of the bit value. The table above illustrates this concept in best possible way.

Task 8.1: Hex conversion¶

Points 5 / 5

My submissions 1

Deadline Friday, 30 July 2021, 19:59

To be submitted alone

This course has been archived (Saturday, 31 December 2022, 20:00).

Bin-to-Hex

Binary to hex converter

Convert the below 16 bit binary number to hexadecimal number.

Kirjoita alla esitetty binäärimuodossa oleva 16-bittinen lukuarvo heksadesimaalimuodossa.

Binary number (16-bits):

0001100100100100

Solution

Submit