

COMPUTER ARCHITECTURE

2020 - 2021

TD n°1

Exercise 1:

1. Give the decimal value of the following integers, the base in which these integers are coded being specified.
 - (a) 1011011 and 101010 in binary form (base 2)
 - (b) A1BE and C4F3 in hexadecimal (base 16)
 - (c) 77210 and 31337 in octal (base 8)
2. How many positive integers can be encoded in binary on one byte?
How many bits are needed to represent 65,563 different integers in binary?
3. Let us take a computer whose memory words are composed of 32 bits. This computer has 4 MB of memory.
Since an integer is encoded on a word, how many words can this computer memorize simultaneously?
What is the largest integer (decimal) value that this computer can store, this value being represented by its pure binary coding? Give an order of magnitude of the number of digits in decimal code.
4. Indicate the value encoded by the 16-bit word 1101 1001 0111 0101 depending on whether it represents an unsigned integer, or a signed integer.
5. Code the information - 78₁₀ in the following formats:
 - (a) 8-bit signed value
 - (b) Complement to 2 on 8 bits
 - (c) IEEE 754 single precision

Exercise 2:

We are trying to determine the cases of overflow in a signed addition. Overflow occurs when the result obtained (limited to the authorized size) is not correct.

Perform the following operations in 8-bit binary, in using the complement to 2 representation:

- $100 + 100$,
- $(-1) + (-2)$,
- $(-1) + 16$,
- $(-100) + (-100)$.

In which cases is there an overflow?