

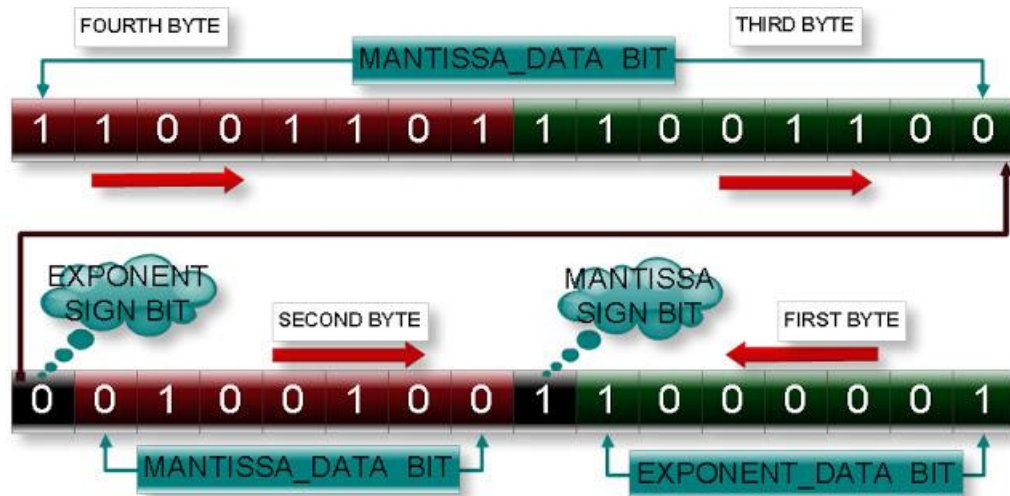
Integers and floats are two different kinds of numerical data. An integer is a number without a decimal point whereas a float is a floating point number, i.e. it is a number with a decimal point. Floating point numbers are stored in this format: $M \times b^e$, where m is the mantissa (an integer number), b is base and e is exponent. C supports two floating types: float and double. The float and double are represented using 32-bit single precision and 64-bit double precision. For single precision floating point we have: 1 sign bit, 8 exponent bits, 23 mantissa bits. For double precision floating points we have: 1 sign bit, 11 exponent bits, 52 mantissa bits.

- **Rule 1:** To find the mantissa and exponent, we convert data into scientific form.
- **Rule 2:** Before the storing of exponent, 127 is added to the exponent.
- **Rule 3:** Exponent is stored in memory in first byte from right to left side.
- **Rule 4:** If exponent is negative number it will be stored in 2's complement form.
- **Rule 5:** Mantissa is stored in the memory in second byte from right to left side.

- **Step1:** Convert 10.3 to binary form. Binary form of 10.3 is
1010.010011001100110011001100110011..
- **Step2:** Convert the above binary number to scientific form. Scientific form of
1010.010011001100110011001100110011.. = $1.010010011001100110011001100110011.. \times 10^3$
(First digit i.e. 1, base of the power i.e. 10, power symbol i.e. ^ and multiplication symbol i.e. * are not stored in the memory)
- **Step3:** Find exponent, mantissa and signed bit. Mantissa data bit in binary is 01001001100110011001101 (only first 23 bit from left side), mantissa sign bit is 1 (since it is a negative number), exponent in decimal is 3
- **Step 4:** Add 127 in the exponent and convert in the binary number form. (Size of exponent data is 7 and maximum possible number in 7 bit is 111111 in binary or 127 in decimal, hence 127 is added). Exponent is $127+3=130$, binary value of 130 in eight bit is 1000001 0.

exponent data bit is 1000001 (take first 7 bit from left side), exponent sign bit : 0 (take rightmost bit)

- **Step 5:** Now store the mantissa data bit, mantissa sign bit, exponent data bit and exponent sign bit at appropriate location as shown in figure.



Note: Mantissa data bits are stored from left to right while exponent data bits are stored from right to left.