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| **Course No: CS F342**  **Date: Week #06** | **TUTORIAL 6** | **Course Title: Computer Architecture** |

1. Write the normalized scientific form for the following decimal numbers
   1. 100.10
   2. 0.00123
   3. 1234.45

Answer:

1. 100.10

1.0010 X102

1. 0.00123

1.23X10-3

1. 1234.45

1.23445X103

1. Write normalized scientific form for the following binary numbers
   1. 1.0001
   2. 1001011.01
   3. 0000.00001

Answer:

1. 1.0001

1.0001X20

1. 1001011.01

1.00101101X26

1. 0000.00001

1.0X2-5

1. Write the binary representation of the decimal number, in IEEE 754 single precision format.

15213.0 base 10

Answer:

1521310 = 11 1011 0110 11012= 1.11011011011012×213

Significand

M = 1.1101101101101

fraction= 11011011011010000000000

Exponent

Actual Exponent = 13

Bias = 127

Biased Exponent = (Actual Exponent + Bias) = 140 = 10001100

In IEEE 754 number is 0 10001100 11011011011010000000000

1. Given the hexadecimal string 0x40500000 denoting a single precision floating point number, what floating point number does it represent in decimal?

Answer:

Writing this in binary:

0100 0000 0101 0000 0000 0000 0000 0000

Separating the bits into fields according to IEEE 754 single precision FP no.

0 10000000 10100000000000000000000

Sign = S = 0

Biased Exponent = 10000000

Actual exponent = (Biased Exponent – Bias) 128 − 127 = 1

Fraction = 10100000000000000000000

So, this number is:

(-1) S \* 1. fraction \* 2Actual exponent

1.1012 × 21 = 11.012 = 3.2510

1. Express the following decimal numbers in IEEE 754 single precision format.
2. 8.78

Answer:

1000.11000111101011100001

1. 00011000111101011100001 \* 23

Sign = +ve = 0

Fraction = 00011000111101011100001

Biased Exponent = Exponent + Bias = 130 = 1000 0010‬

0 10000010 00011000111101011100001

1. -0.321

0.01010010001011010001

1. 010010001011010001 \* 2-2

Sign = -ve = 1

Fraction = 010010001011010001

Biased Exponent = Exponent + Bias = 125 = 0111 1101‬

1 01111101 01001000101101000011101