

## CSE2021 Computer Organization

### Chapter 2

#### Activities

#### Activity 1

- Convert the hexadecimal number A59.FCE to binary
- Convert the decimal number 166.34 into binary

## Activity 1 Solution

- Convert the hexadecimal number A59.FCE to binary

$\text{A59.FCE} = \underbrace{1010}_{\text{A}} \underbrace{0101}_{\text{5}} \underbrace{1001}_{\text{9}} \cdot \underbrace{1111}_{\text{F}} \underbrace{1100}_{\text{C}} \underbrace{1110}_{\text{E}}$

- Convert the decimal number 166.34 into binary  $\rightarrow 10100110.0101\dots$

$$\begin{array}{r}
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 \frac{83}{2} \overline{)166} \leftarrow \frac{41}{2} \overline{)83} \leftarrow \frac{20}{2} \overline{)41} \leftarrow \frac{10}{2} \overline{)20} \leftarrow \frac{5}{2} \overline{)10} \leftarrow \frac{2}{2} \overline{)5} \leftarrow \frac{1}{2} \overline{)2} \leftarrow \frac{0}{2} \overline{)1} \\
 \underline{166} \qquad \underline{82} \qquad \underline{40} \qquad \underline{20} \qquad \underline{10} \qquad \underline{4} \qquad \underline{2} \qquad \underline{0} \\
 0 \qquad 1 \qquad 1 \qquad 0 \qquad 0 \qquad 1 \qquad 0 \qquad 1
 \end{array}
 \end{array}$$

$$.34 \times 2 = 0.68 \rightarrow .68 \times 2 = 1.36 \rightarrow .36 \times 2 = 0.72 \rightarrow .72 \times 2 = 1.44 \dots$$

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### Chapter 3

#### Activities

## Activity 1

- Represent  $(-0.75)_{10}$  in single and double precision of IEEE 754 binary representation

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Represent  $(-0.75)_{10}$  in single and double precision of IEEE 754 binary representation

- $-0.75 = (-1)^1 \times 1.1_2 \times 2^{-1}$
- $S = 1$
- Fraction =  $1000\dots00_2$
- Exponent =  $-1 + \text{Bias}$ 
  - Single:  $-1 + 127 = 126 = 01111110_2$
  - Double:  $-1 + 1023 = 1022 = 01111111110_2$
- Single:  $1011111101000\dots00$
- Double:  $1011111111101000\dots00$

## Activity 2

- What number is represented by the single-precision float

11000000101000...00

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- What number is represented by the single-precision float

11000000101000...00

- $S = 1$

- Fraction =  $01000...00_2$

- Exponent =  $10000001_2 = 129$

- $x = (-1)^1 \times (1 + .01_2) \times 2^{(129 - 127)}$   
 $= (-1) \times 1.25 \times 2^2$   
 $= -5.0$