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

$$\underbrace{1010}\ \underbrace{0101}\ \underbrace{1001}\ \bullet\ \underbrace{1111}\ \underbrace{1100}\ \underbrace{1110}$$

- Convert the decimal number 166.34 into binary -> 10100110.0101…

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

$$.34 \times 2 = \mathbf{0}.68 \rightarrow .68 \times 2 = \mathbf{1}.36 \rightarrow .36 \times 2 = \mathbf{0}.72 \rightarrow .72 \times 2 = \mathbf{1}.44 \ldots\ldots$$

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Chapter 3

Activities

Activity 1

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

Activity 1

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 = $1000\ldots00_2$
- Exponent = –1 + Bias
  - Single: –1 + 127 = 126 = 01111110_2
  - Double: –1 + 1023 = 1022 = 01111111110_2
- Single: 10111111010000…00
- Double: 101111111110100 0…00

Activity 2

- What number is represented by the single-precision float

  1100000010100 0…00

Activity 2

What number is represented by the single-precision float

1100000010100 0…00

- S = 1
- Fraction = $01000\ldots00_2$
- Exponent = 10000001_2 = 129

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

  $= (-1) \times 1.25 \times 2^2$

  $= -5.0$

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Appendix C

Activities

Activity 1

Derive SOP and POS expressions for the following TT.

A	B	Carry
0	0	0
0	1	0
1	0	0
1	1	1

Activity 1

Derive SOP and POS expressions for the following TT.

A	B	Carry	Minterms	Maxterms
0	0	0	A'B'	A+B
0	1	0	A'B	A+B'
1	0	0	AB'	A'+B
1	1	1	AB	A'+B'

SOP: Carry=AB

POS: Carry=(A+B)(A+B')(A'+B)

Activity 2

Proofs of some Identities:

12b: $A + \overline{A}B = A + B$

13a: $AB + \overline{A}C + BC = AB + \overline{A}C$

Activity 2

Proofs of some Identities:

12b:

$$A + \overline{A}B = A + B$$

$$A + \overline{A}B = A + AB + \overline{A}B \quad (A + AB = A(B + 1) = A) \quad \text{(Using 11)}$$

$$= A + B$$

13a:

$$AB + \overline{A}C + BC = AB + \overline{A}C$$

$$= AB + \overline{A}C + (A + \overline{A})BC$$

$$= AB + \overline{A}C + ABC + \overline{A}BC$$

$$= AB(C + 1) + \overline{A}C(B + 1)$$

$$= AB + \overline{A}C$$

Activity 3

- Find an MSOP for

$$F = V\overline{W}XY + VWYZ + V\overline{X}YZ$$

Activity 3

- Find an MSOP for

$$
\begin{aligned}
F &= V\overline{W}XY + VWYZ + V\overline{X}YZ \\
&= VY(\overline{W}X + WZ + \overline{X}Z) \\
&= VY(\overline{W}X + Z(W + \overline{X})) \quad [W + \overline{X} = \overline{\overline{W}X}] \\
&= VY(\overline{W}X + Z\overline{\overline{W}X}) \quad [A + \overline{A}B = A + B] \\
&= VY(\overline{W}X + Z) \\
&= VY\overline{W}X + VYZ
\end{aligned}
$$