Ruben Ortega 137 Assignment 2

1.3 -5.375 as a 16bit Fp with 1 bit sign, 4 bit biased exponent, 11 bit Fraction & 7 bit bias offset

- 5/2=2 R1
2/2=1 R0
1 ← → 1
101

.375 · 2 = 0.75
.75 · 2 = 1.50
.50 · 2 = 1
011

101.011

Step 1 convert to binary

biased exponent = exponent + bias

Step 2 convert to Scientfic Notation

101.011×10^2

$1.01011 \times 10^2 = 101.011$

$9 = 2 + 7$

9/2 = 4 R1
4/2 = 2 R0
2/2 = 1 R0
1 ← → 1

Step 3 Calculate Biased exponent in binary

biased exponent = 1001

Step 4 build IEEE754 Number

sign bit | biased exponent | 1.01011 Fraction/mantissa

1.4 Real Number equivelent to FP 0x3400, 1 bit sign 4 bit biased exponent, 11 bit Fraction & bias offset = 7

3 4 0 0 Step 1 convert to binary

0011 0100 0000 0000

0 0 11 0 100 0000 0000
↑ Fraction

sign bit biased exponent = 0110 = 6 Step 2 Calculate Biased Exponent
8421

exponent = biased_exponent - bias Step 3 Calculate Exponent
6 - 7

exponent = -1

1. mantissa or Fraction Step 4 convert to Scientific Notation
↓ 1.100 0000 0000 x 10^{-1}

0.11 converts From binary to Real Number
$2^{-1} + 2^{-2}$
0.5 + 0.25 = 0.75

1.5 Real number equivalent to FP 0x3400 with 1 bit sign, 4 bit biased exponent, 11 bit fraction, & bias offset = 8

3 4 0 0

0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0 Step 1 convert to binary

↑ ↑

sign bit | biased exponent | Fraction/mantissa

0 | 1100 | 0000 0000

biased exponent = 0110 = 6 (8 4 2 1)

exponent = biased_exponent − bias

−2 = 6 − 8

Step 2 calculate biased exponent

Step 3 calculate exponent

$1.00\ 0000\ 0000 \times 10^{-2}$ Step 4 convert to Scientific Notation

$= .011$

$2^{-1} + 2^{-2} + 2^{-3}$

$0.5 + 0.25 + 0.125 = \boxed{0.375}$

1.14 What is a Von Neumann architecture bottleneck?

A Communication bottleneck between a faster cpu & slower memory.