Note: Was in Mi. for AQ E. Talked to Ben about getting in late

Comp Arch H3 Share Skillne

10/12/15

(1) $91_{10} + C6_{16}$

$91_{10} \rightarrow$ 91%2 45%2 22%2 11%2 5%2 2%2 1%2

1 1 0 1 1 0 1 $\rightarrow$ 1011011

4 bits $\rightarrow$

$C6_{16} \rightarrow$ 1100 0110 $\rightarrow$ 1100 0110

C 6

```
  1 1 1 1
  0 0 1 0 1 1 0 1 1
+ 0 1 1 0 0 0 1 1 0
  1 0 0 1 0 0 0 0 1
```

9 bit, unsigned, integer

$256 + 32 + 1 = 289_{10}$

$2^0_{10} + 2^5_{10} + 2^8_{10} = 289_{10}$

(2) $11_8 - 11_{10}$

$11_8 \rightarrow$ 001 001

$11_{10} \rightarrow$ 11%2 5%2 2%2 1%2

1 1 0 1 $\rightarrow$ 1011

$-(11_{10}) = 01011 \rightarrow 10100 + 1 = 10101$

```
  01001
+ 10101
-------
  11110
```

5 bit, signed integer

convert to pos. $11110 \rightarrow 00001 + 1 = 00010$

$2^1_{10} = 2_{10}$

-2_{10}

(3) 12.3125_{10} + 0110_{I2Q2}

$12.3125_{10} \rightarrow$ 1100.0101

$0110_{I2Q2} \rightarrow$ 01.10

$$\begin{array}{r} 1100.0101 \\ +\ 0001.1000 \\ \hline 1101.1101 \end{array}$$

8 bit fixed point unsigned I4Q4

1101.1101 → $2^3_{10} + 2^2_{10} + 2^0_{10} + 2^{-1}_{10} + 2^{-2}_{10} + 2^{-4}_{10} = 13.8125_{10}$

(4) $5.75_{10} - 7.125_{10}$

$5.75_{10} \rightarrow$ 0101.110

$7.125_{10} \rightarrow$ 0111.001

$7.125 \rightarrow -7.125$ 1000 110 + 1 1000.111

$$\begin{array}{r} 0101.110 \\ +\ 1000.111 \\ \hline 1110.101 \end{array}$$

7 bit fix point signed 5 4 Q 3

1110.101 → pos 0001.011

$2^0_{10} + 2^{-2}_{10} + 2^{-3}_{10} = 1.375_{10}$

-1.375_{10}

CompArch HW Share Strike Continued

(5) $9_{10} \cdot 3_{10}$

$9_{10} \rightarrow 1001$ $3_{16} \rightarrow 0011$

```
  01001
X 00011
-------
   1001
+ 1001
-------
  11011
```

5bit unsigned integer

$2^0_{10} + 2^1_{10} + 2^3_{10} + 2^4_{16} =$ **27**

(6) $-5_{10} \cdot -6_{16}$

$-5_{10} \rightarrow 0101$ $-5_{10} \rightarrow 1011$ $6_{16} \rightarrow 0110$ $-6_{16} \rightarrow 1010$

```
  1111 1011
X 1111 1010
-----------
  1111 1010
 1111 1010
1111 1010
1111 1010
1111 1010
1111 1010
1111 1010
1111 1010
-----------
0001 1110
```

Signed 8bit integer

00011110

$2^1_{10} + 2^2_{10} + 2^3_{10} + 2^4_{10} = 30$

(7.) $95_{10} \cdot 2.625_{10}$

$9.5 \rightarrow 1001.100$ $2.625 \rightarrow 0010.101$

Fixed point unsigned

11 bit I7 Q4

$$\begin{array}{r} 1001.100 \\ \times\ 0010.101 \\ \hline 0010.1\,01 \\ 001.0101 \\ +\ 00101\,01.0000 \\ \hline 0011000.1111 \end{array}$$

11000.1111

$2^{-1}_{10} + 2^{-2}_{10} + 2^{-3}_{10} + 2^{-4}_{10} + 2^{3}_{10} + 2^{4}_{10} = 24.9375$

(8.) $-1.25_{10} \times 3.5_{10}$

$1.25_{10} \rightarrow 0001.01$ $-1.25_{10} \rightarrow 1110.11$

$3.5_{10} \rightarrow 0011.10$

8 bit signed fixed point

S5Q3

$$\begin{array}{r} 111111\,1110.11,0 \\ \times\ 0000000011.100 \\ \hline 0000000001.110 \\ 000000000.111 \\ 00000111.000 \\ \hline 1111111011.101 \end{array}$$

$1101\,1.101$ to pos $\rightarrow 00100.011$

$2^{2}_{10} + 2^{-2}_{10} + 2^{-3}_{10} = 4.375$

neg

-4.375