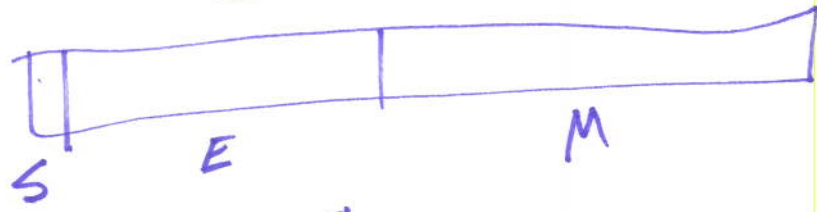


Quiz solution

(1)

Floating point



IEEE 754

S = 1 bit (0 = +, 1 = -)

E = 8 bits

$$2^{E-127}$$

If E = 0 (0000 0000)

exponent = 2^{-127}

6.02×10^{23}

Range 2^{-127} to 2^{128}
E

Range of long signed integers

$$-2^{31} \text{ to } 2^{31} - 1$$

$$-2^{n-1} \text{ to } 2^{n-1} - 1$$

n = bits available for the number

Quiz question:

Range of unsigned long integers?

0 to $2^{32} - 1$

0 to $2^n - 1$

Embedded Systems

Lecture 8

(2)

Mantissa = 23 bits

Range 0 to $2^{23} - 1$

$20.0_{10} \rightarrow$ Sign = 0

\uparrow
1010000

Exponent =

$$= 127 + 4$$

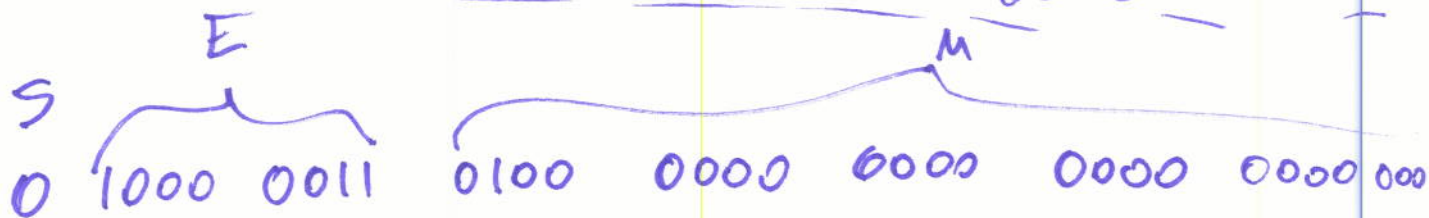
$$= 128 + 3 = \begin{array}{r} 1000\ 0000 \\ + \quad\quad 11 \\ \hline 1000\ 0011 \end{array}$$

Mantissa = 01000000

23 bits

0000 0000

0000 0000



Quiz? Exam?

3

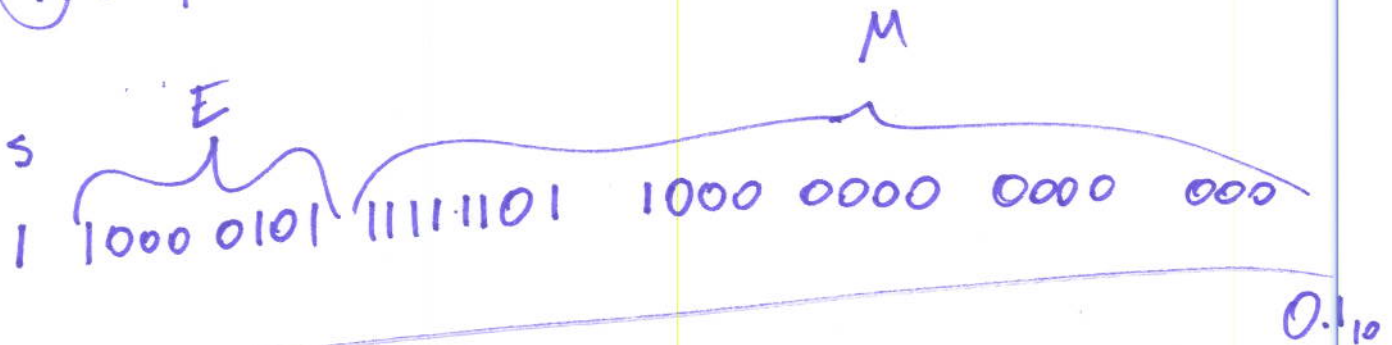
$$\textcircled{S} -127.375_{10} = +.25 \frac{1}{4} + .125 \frac{1}{8}$$



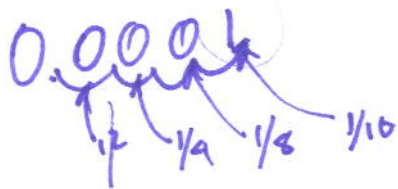
$$E = -127 + 6 = -133$$

$$= 10000101$$

$$\textcircled{1} .11111011$$

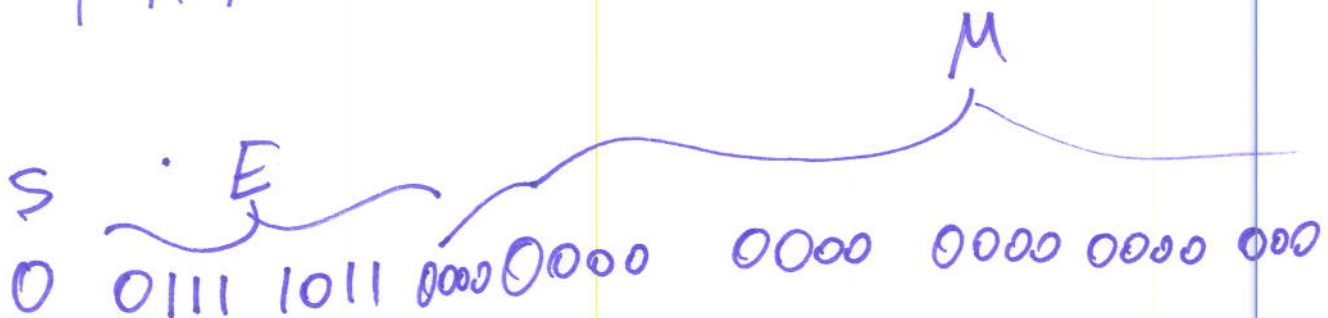


$$0.0625_{10} = \frac{1}{16}$$



$$S = 0$$

$$E = 127 - 4$$



In class:

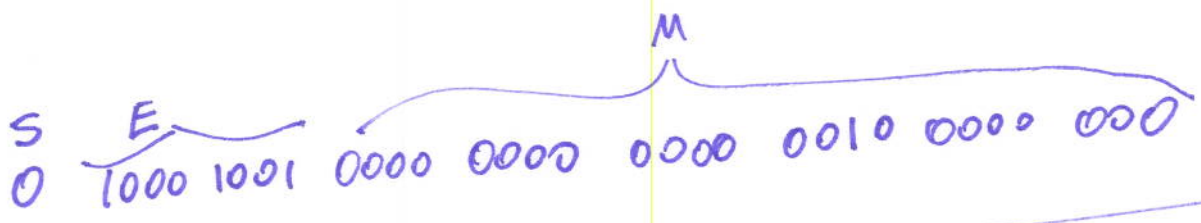
1024.03125

Convert to Floating Point number

4



$$\begin{aligned}
 S &= 0 \\
 E &= 127 + 10 \\
 &= 137 = 128 + 9 \\
 &\quad 1000\ 1001
 \end{aligned}$$

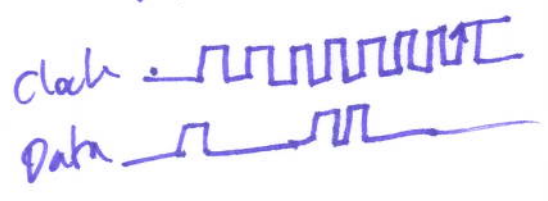


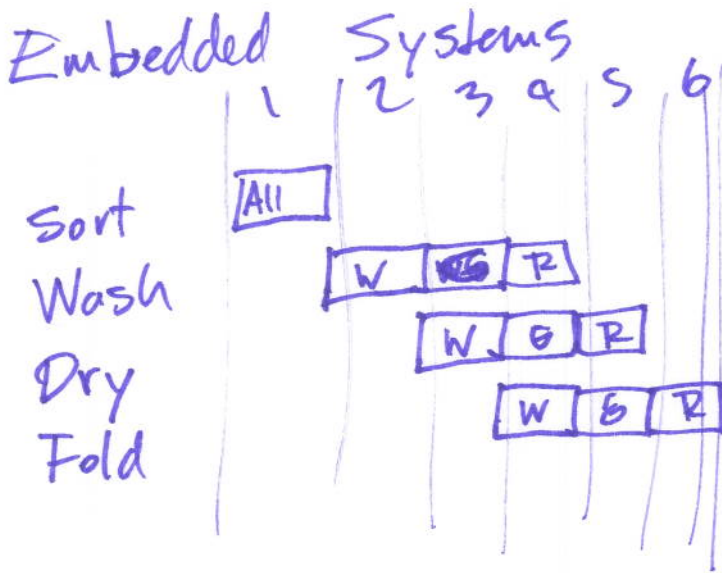
External bus clock → 100 MHz

SDRAM → 50 MHz

Serial clock → Set this

AD clock → Set this





6 time units

Red
Green
White

5



10 time units