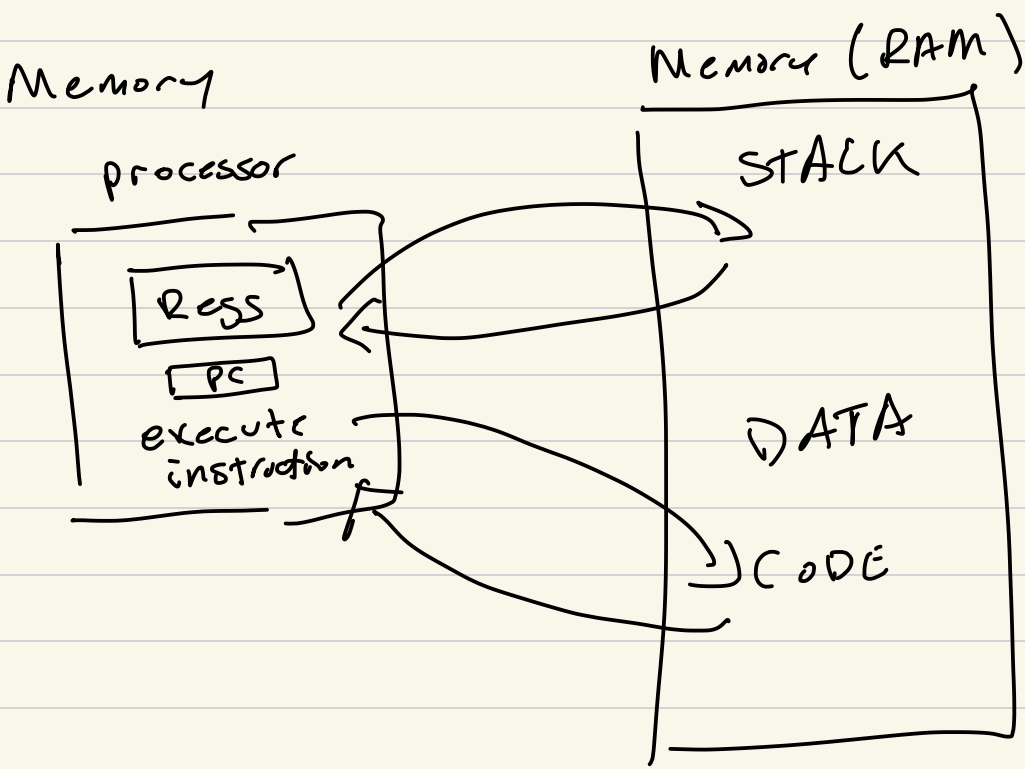
CS315-02 RISC-V Strings Twos Complement

Project02 - make up to 50% back
code quality - calling conventions

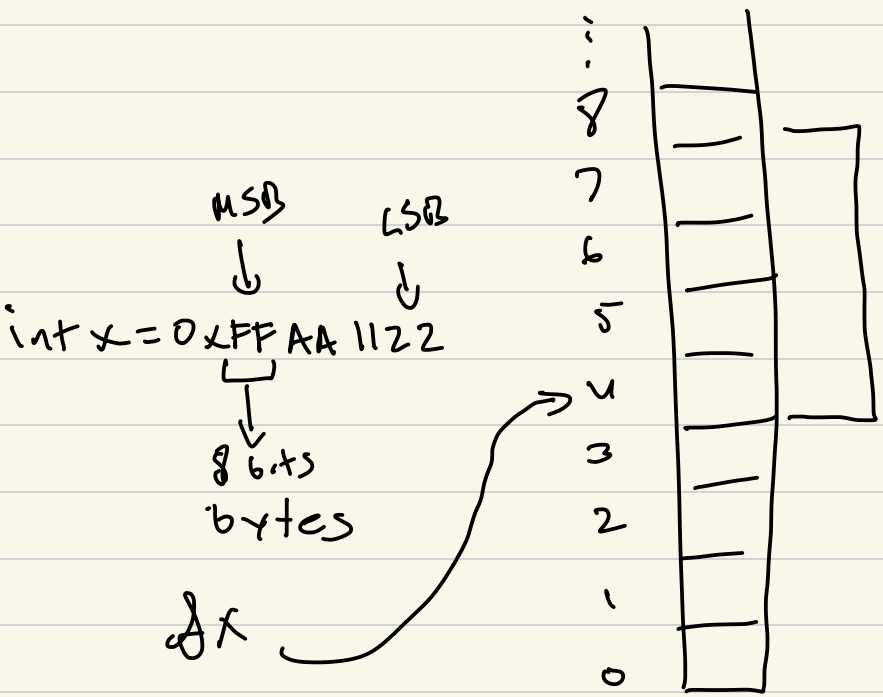
Project02 Exam Problems due Wed Sep18 11:59

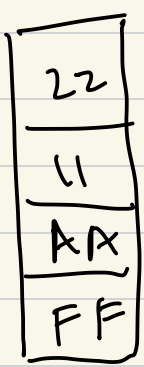
Project03 due Mon Sep 23 11:59 pm
IG Tue Sep 24



Memory → array of bytes

byte addressable

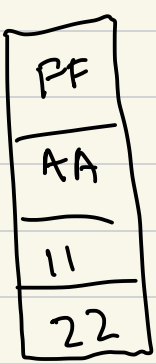




big endian

byte ordering

endianness

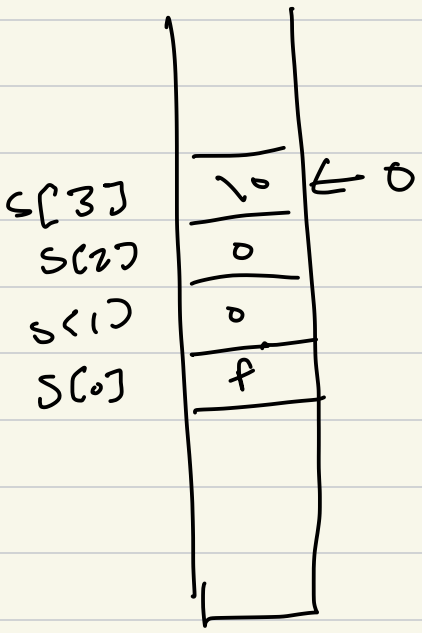


little endian

Strings

arrays of bytes

```
char *s = "foo";
```



ld load double

lw load word

lb load byte

Binary representation of integers

How to represent signed values

↳ two's complement

4 bits

Unsigned decimal	Binary	Hex	signed magnitude	Two's Complements
0	0000		0	0
1	0001		1	1
2	0010		2	2
3	0011		3	3
4	0100		4	4
5	0101		5	5
6	0110		6	6
7	0111		7	7
8	1000		-0	-8
9	1001		-1	-7
10	1010	A	-2	-6
11	1011	B	-3	-5
12	1100	C	-4	-4
13	1101	D	-5	-3
14	1110	E	-6	-2
15	1111	F	-7	-1

sign mag

$$\begin{array}{rll} (1)\,1\,11 & & \\ 0\,1\,0\,1 & (5) & \\ +\ 1\,0\,1\,1 & (-3) & \\ \hline \boxed{0000} & (0) & \end{array}$$

$$\begin{array}{rll} (1)\,{}^{1}\,{}^{1} & & \\ 0\,1\,0\,1 & (5) & \\ +\ 1\,1\,0\,1 & (-3) & \\ \hline \boxed{0010} & (2) & \end{array}$$

How to get a two's complement negative representation from a positive value?

3 → -3

0011 → 1100 + 1 = 1101 (-3)

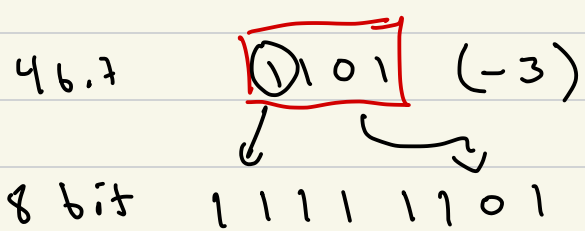
invert(x) + 1

-3 →

1101 → 0010 + 1 = 0011 (3)

invert(x) + 1

Other interesting facts about two's complement values



0000 0011 → 1111 1100 + 1 = 1111 1101

(-3)

4 bit 0011 (3)

0000 0011

32 bit 1

0000 0001

invert

1111 1110

+ 1

1111 1111