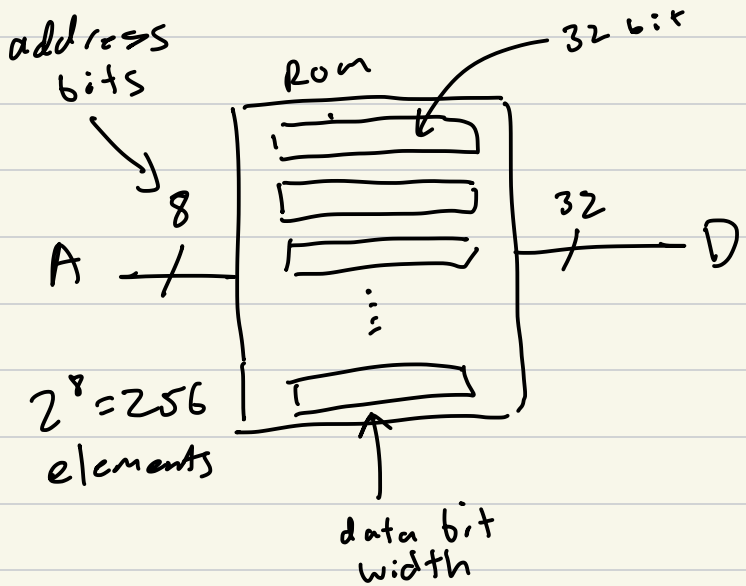
CS 315-02 ROM Decoder Encoder

Today:

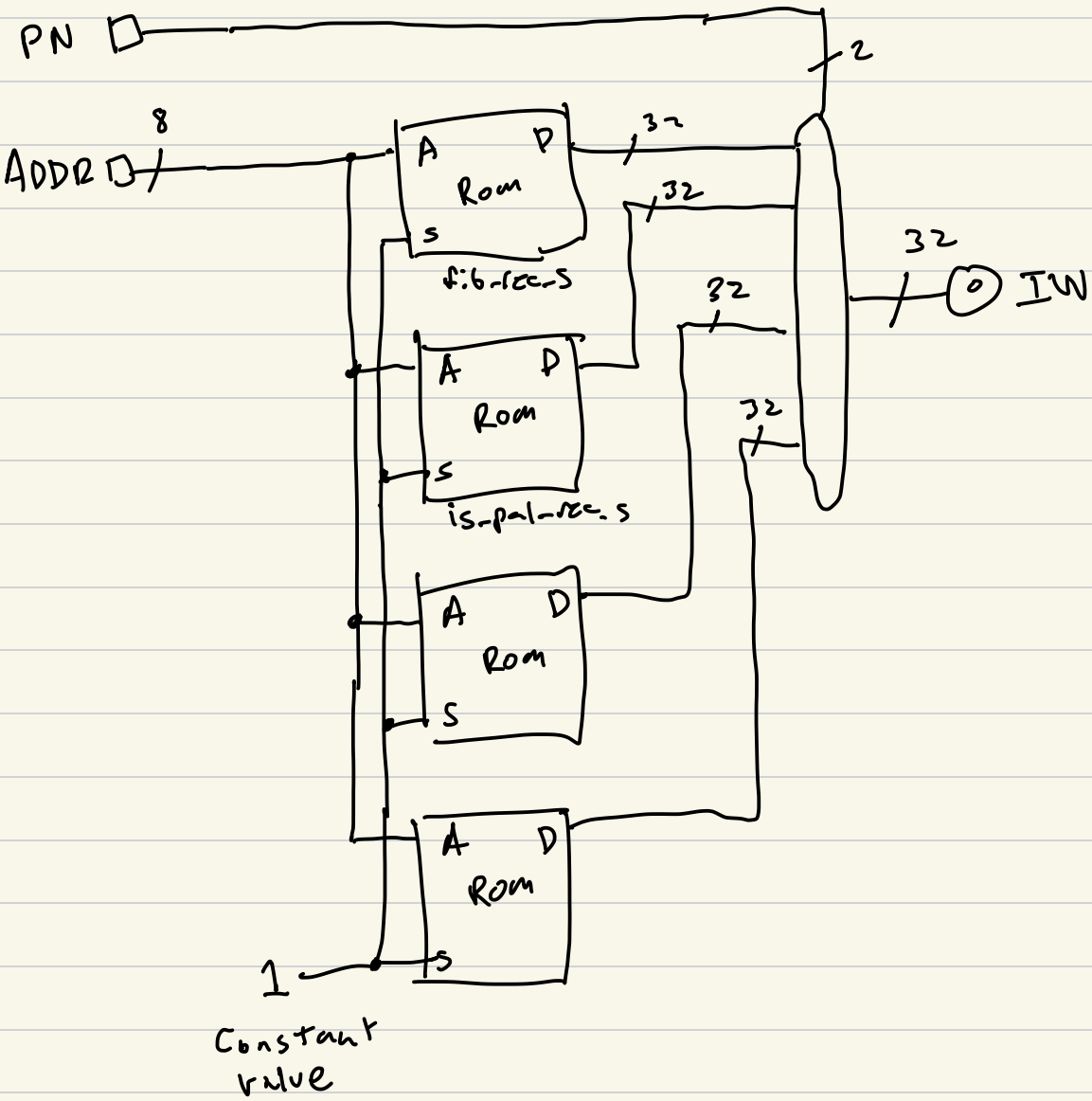
- ROM - Instruction Memory
- Decoder
- Priority Encoder
- Instruction decoding

ROM Read Only Memory

In contrast to RAM



Instruction Memory

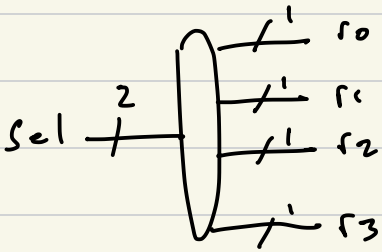


Decoder

2 to 4 Decoder

3 to 8

4 to 16



S_1	S_0	r_3	r_2	r_1	r_0
0	0	0	0	0	1
0	1	0	0	1	0
1	0	0	1	0	0
1	1	1	0	0	0

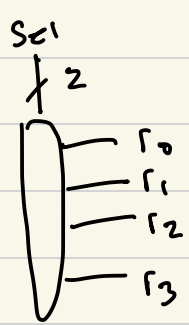
$r_0 = (\bar{S}_1 \cdot \bar{S}_0)$

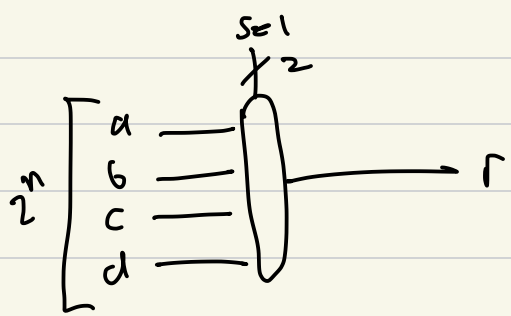
$r_1 = (\bar{S}_1 \cdot S_0)$

$r_2 = (S_1 \cdot \bar{S}_0)$

$r_3 = (S_1 \cdot S_0)$

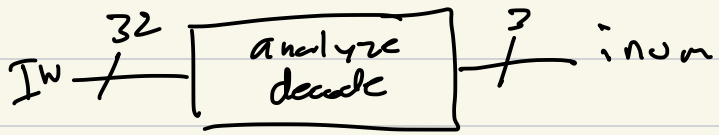
Decoder vs Multiplexor





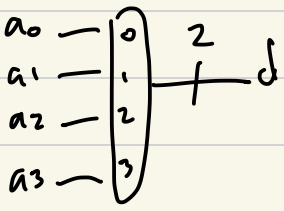
$2^2 = 4$

Instruction Decoder (analyze_decode)



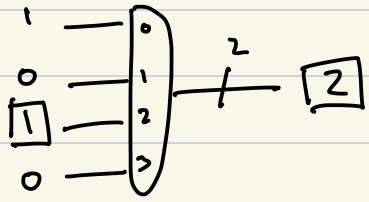
0	i-type	4	b-type	
1	r-type	5	jal	(call)
2	load	6	j	
3	s-type	7	jalr	(ret)

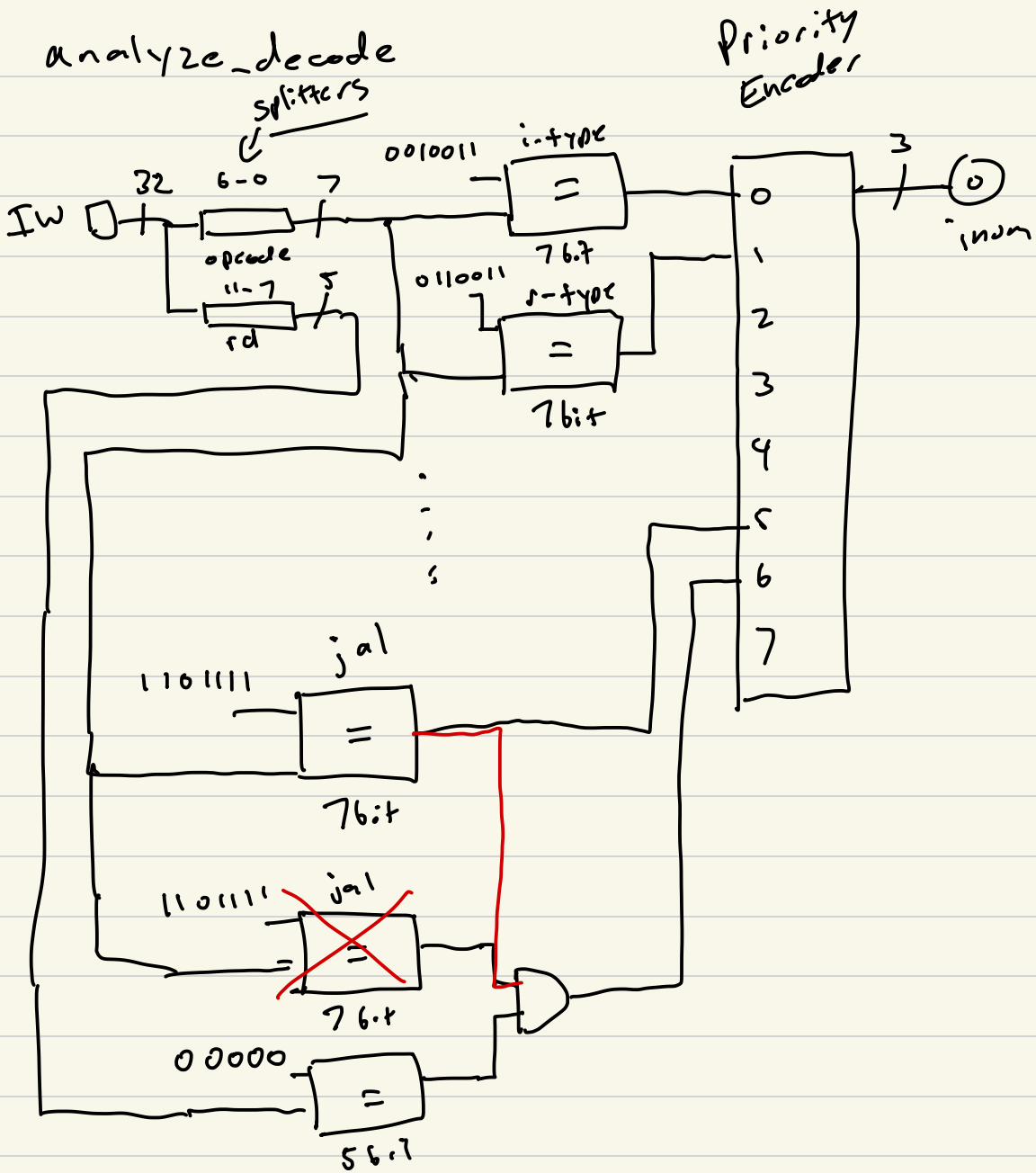
Encoder



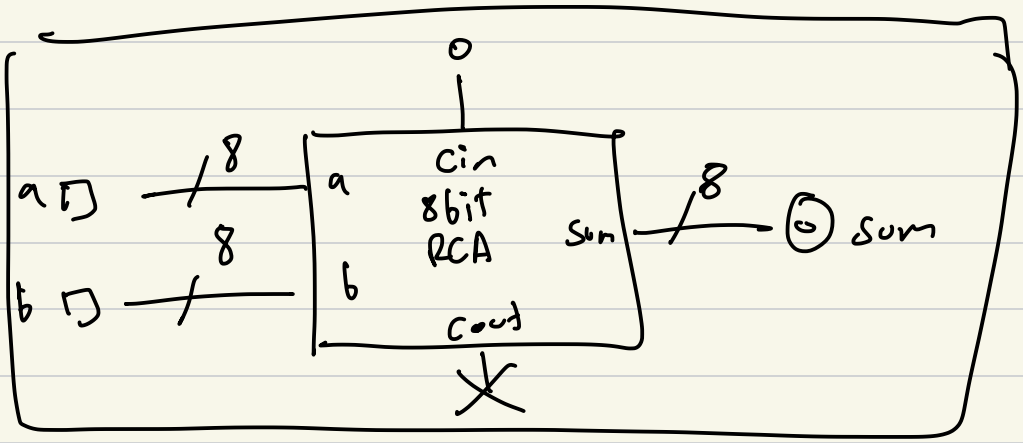
$a_3\ a_2\ a_1\ a_0$	$d_1\ d_0$
0 0 0 1	0 0
0 0 1 0	0 1
0 1 0 0	1 0
1 0 0 0	1 1

Priority Encoder




analyze_decode
splitters
Priority Encoder
IW
32
6-0
7
opcode
11-7
5
rd
0010011
i-type
7 b.t
0110011
s-type
7bit
3
0
inum
0
1
2
3
4
5
6
7
jal
1101111
7b:t
00000
5 b.7

Adder



Detecting End of Code