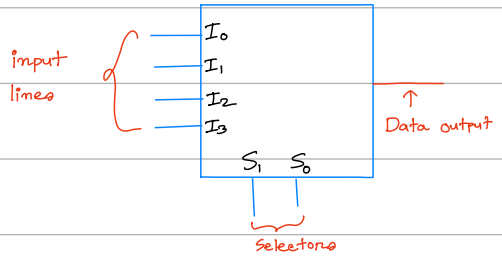
Multiplexer



4:1 mux – 2 selectors

↑

2^n : 1 mux – n selectors

↑

number of input lines

Large Mux:

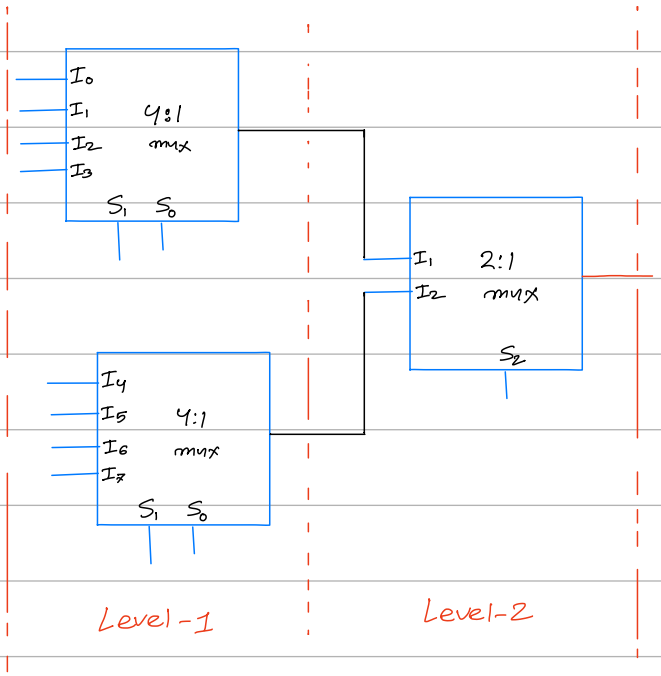
Build 8:1 mux using two 4:1 and one 2:1 mux.

8:1 = 2^{3} : 1

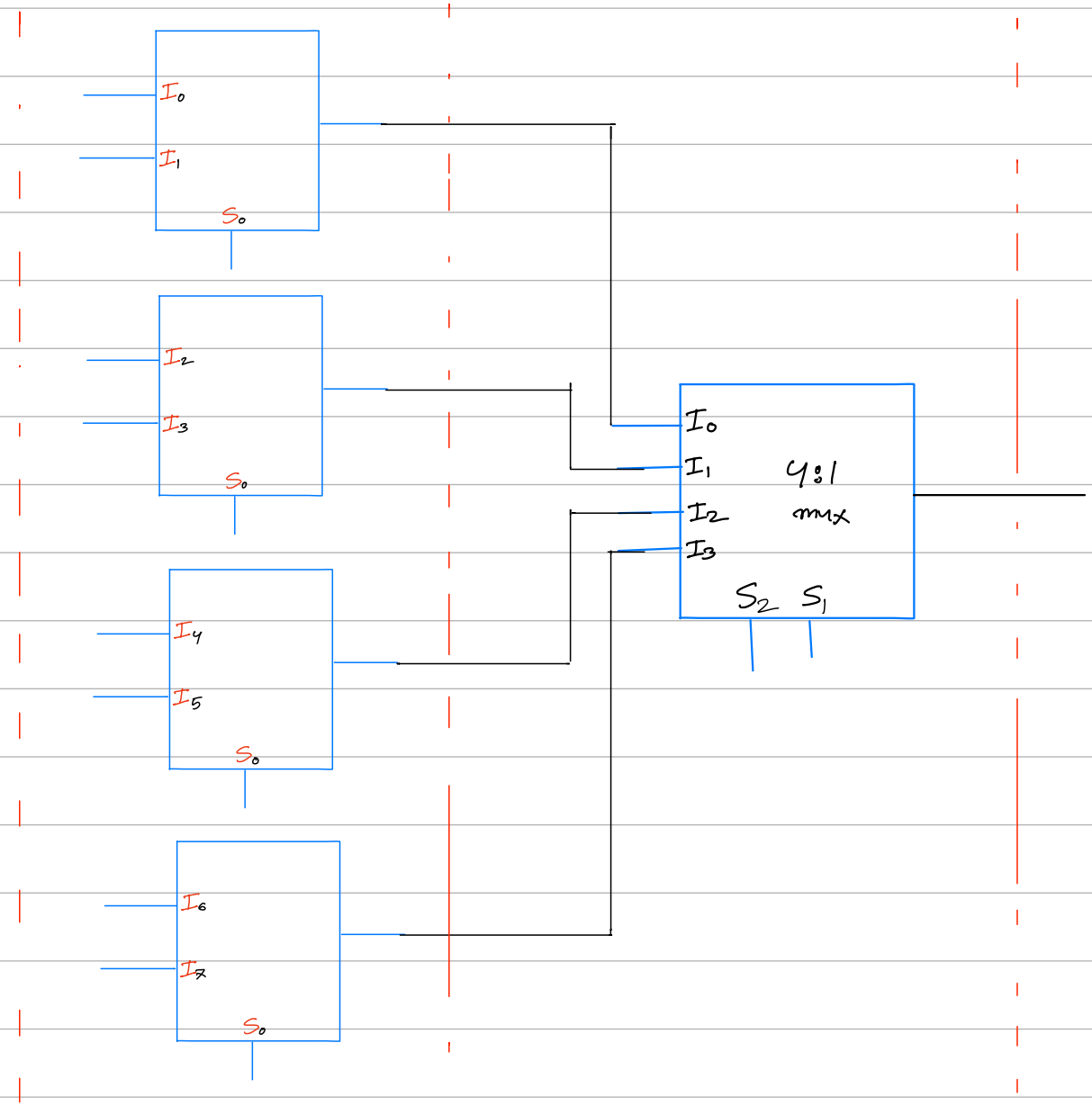
S_0, 3 selector bits = S_2 (MSB) S_1 S_0 (LSB)

Muxes that are in the same level their selector(s) will be shorted.

Start assigning the selector bits from the right side. (MSB)

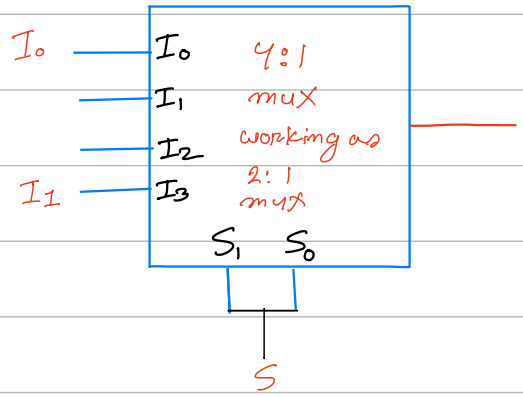


Build 8:1 mux using Four 2:1 and one 4:1 mux.



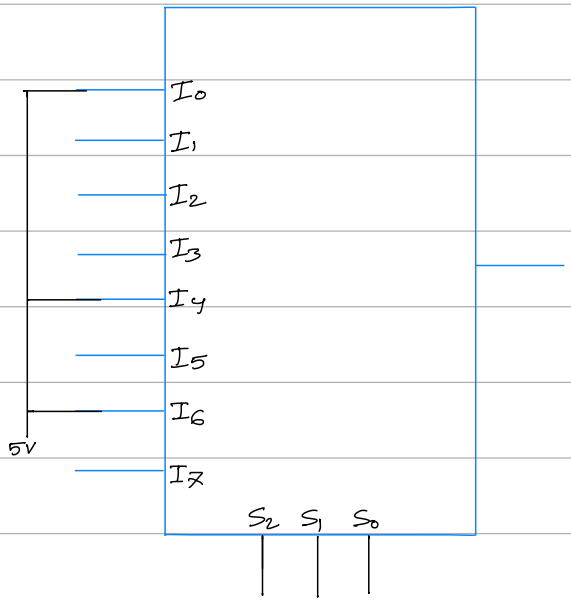
Implement a 2:1 mux using 4:1 mux.

$\Rightarrow 2:1 = 2^1:1$; 1 selector

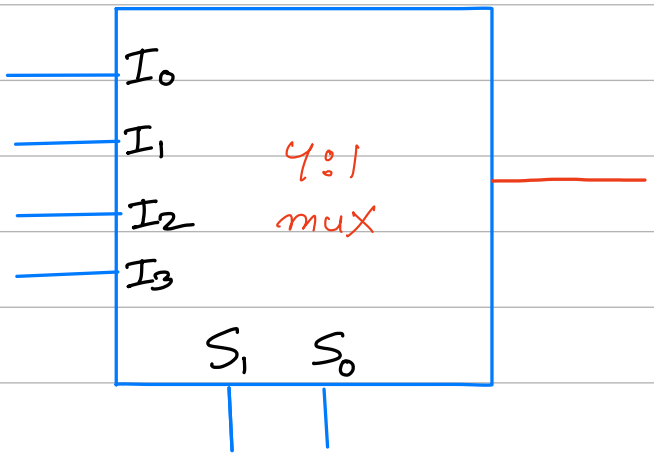


Function implementation using Mux

F = Σ(0, 4, 6) ; implement the given function using 8:1 mux.



$F(S_2,S_1,S_0) = \Sigma(0, 4, 6)$; implement the given function using a 4:1 mux.



unused

S_2, S_1, S_0

Start from right side

Build a table:

→ column wise: All the input values of the Mux you are currently using.

	I_0	I_1	I_2	I_3
A'	(0)	1	2	3
A	(4)	5	(6)	7
	$A+A' = 1$	0	A	0

Row-wise: All the combinations possible for the unused variable(s)

Circle rules:

(i) If in a column there is no circle

Output = 0

(ii) If in a column all the cells are circled

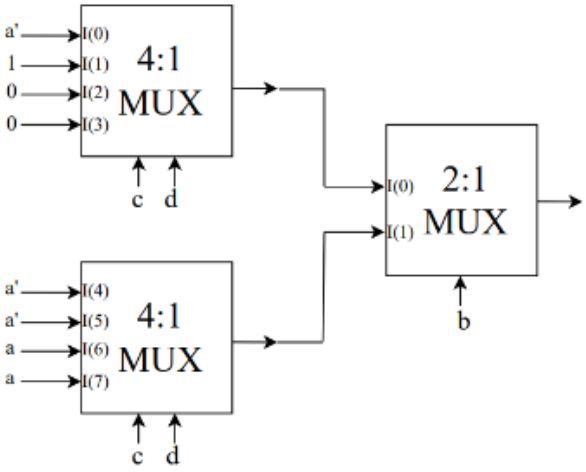
Output = 1

(iii) If some of the cells are circled then take the row variable combination of each cell and "+" them. [Simplify if possible]

(iv) In case of a single cell circled, just take the row variable combination of that cell.

F(a,b,c,d)=∑(0,1,4,5,9,14,15)

Implement the above boolean function using two 4:1 MUX(s) and one 2:1 MUX.



	I(0)	I(1)	I(2)	I(3)	I(4)	I(5)	I(6)	I(7)
a'	0	1	2	3	4	5	6	7
a	8	9	10	11	12	13	14	15
	a'	1	0	0	a'	a'	a	a