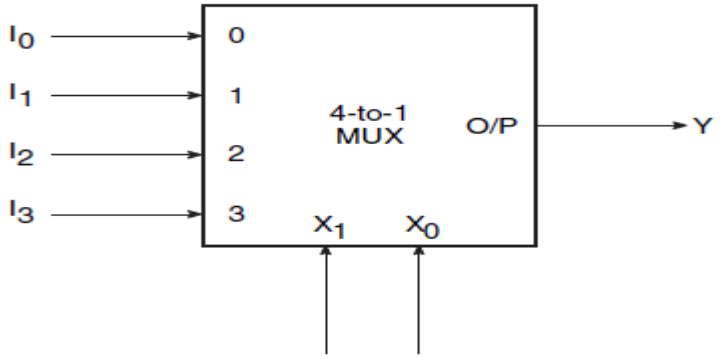
Multiplexer

- A multiplexer or MUX, also called a data selector, is a combinational circuit with **more than one** input line, **one** output line



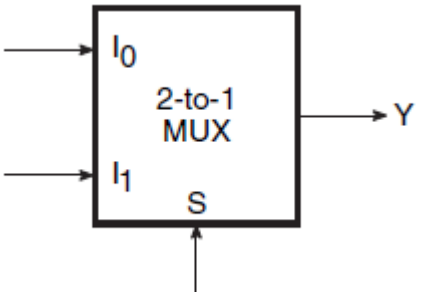
X_1	X_0	Y
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3

- A multiplexer selects binary information present on any one of the input lines, depending upon the logic status of the selection inputs, and routes it to the output line

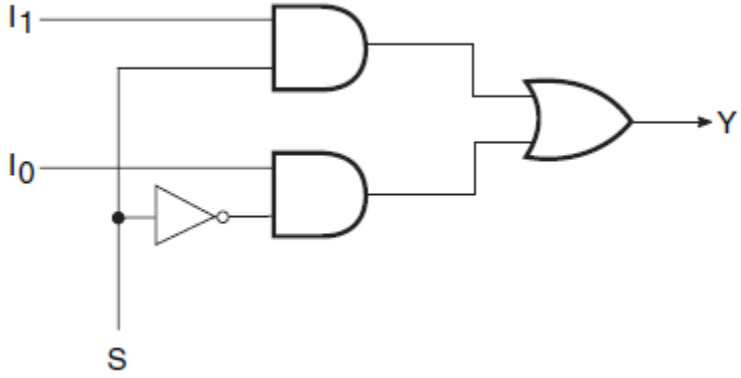
- If there are n selection lines, then the number of maximum possible input lines is 2^n and the multiplexer is referred to as a 2^n to-1 multiplexer or $2^n \times 1$ multiplexer.

Briefly describe the type of combinational logic circuit found inside a multiplexer by considering the 2-to-1 multiplexer

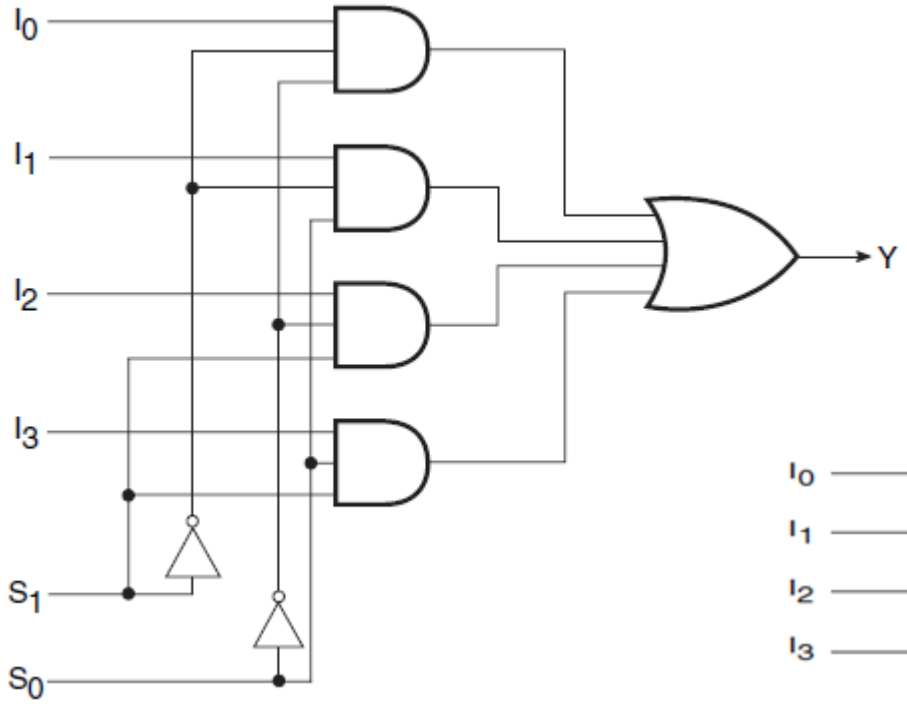
- The circuit functions as follows:
- For S = 0, the Boolean expression for the output becomes Y = I_0.
- • For S = 1, the Boolean expression for the output becomes Y = I_1.

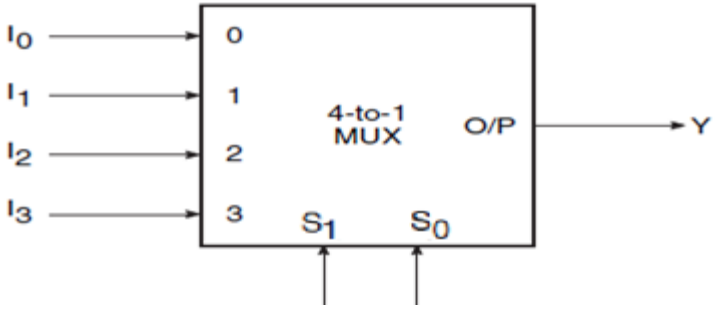


S	Y
0	I_0
1	I_1



Logic diagram of a 4-to-1 multiplexer.





$$Y = I_0.\overline{S_1}.\overline{S_0} + I_1.\overline{S_1}.S_0 + I_2.S_1.\overline{S_0} + I_3.S_1.S_0$$

S_1	S_0	Y
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3