Multiplexers Lecture 4

Dronacharya Group of Institutions

Multiplexers

Multiplexers

- A multiplexer has
 - N control inputs
 - 2^N data inputs
 - 1 output
- A multiplexer routes (or connects) the selected data input to the output.
 - The value of the control inputs determines the data input that is selected.





Multiplexers



А	В	F
0	0	I ₀
0	1	I ₁
1	0	I ₂
1	1	I ₃

 $\mathbf{Z} = \mathbf{A'}.\mathbf{B'}.\mathbf{I}_0 + \mathbf{A'}.\mathbf{B}.\mathbf{I}_1 + \mathbf{A}.\mathbf{B'}.\mathbf{I}_2 + \mathbf{A}.\mathbf{B}.\mathbf{I}_3$







 $Z = A'.B'.C'.I_0 + A'.B'.C.I_1 + A'.B.C'.I_2 + A'.B.C.I_3 + A.B'.C'.I_0 + A.B'.C.I_1 + A'.B.C'.I_2 + A.B.C.I_3$





Exercise:

Design an 8-to-1 multiplexer using 4-to-1 and 2-to-1 multiplexers only.

An 8-to-1 multiplexer using 4-to-1 and 2-to-1 multiplexers only





Exercise:

Design a 16-to-1 multiplexer using 4-to-1 multiplexers only.

16-to-1 multiplexer using 4-to-1 multiplexers only



Multiplexer (Bus)





Exercise:

 As a second example, consider the implementation of the Boolean function

•
$$F(A, B, C, D) = (1, 3, 4, 11, 12, 13, 14, 15)$$

- This function is implemented with a multiplexer with three selection inputs. Note that the first variable A must be connected to selection input S₂ so that A , B, and C correspond to selection inputs S₂, S₁, and So, respectively.
- The values for the data line number is determined from the binary combination of ABC. For example, the table shows that when ABC = 101, F = D, so the input variable D is applied to data input 5.
- The binary constants o and 1 correspond to two fixed signal values. When integrated circuits are used, logic o corresponds to signal ground and logic 1 is equivalent to the power signal, depending on the technology (e.g., 3 V).

Implementing a four-input function with a multiplexer

