New topic: Multiplexers, Decoders, and Programmable Logic Devices

Multiplexers and Decoders are examples of medium-scale integrated circuits (MSI circuits), which contain 12–100 gates in one package (one “chip”).

LSI (large-scale integrated) circuits: ~100 – several thousand
VLSI: from several thousands up

A multiplexer (MUX) is also called a data selector,

\[ Z = A' I_0 + A I_1 \]
4-to-1 MUX:  
\[ z = A'B'I_0 + A'BI_1 + AB'I_2 + AB I_3 \]  

8-to-1 MUX:  
\[ z' = A'B'C'I_0 + A'B'C I_1 + A'BC'I_2 + \cdots + ABC I_7 \]  

2\(^{n}\)-to-1 MUX:  
\[ z = \sum_{k=0}^{2^n-1} m_k I_k \]  

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**Figure 9-2:** Multiplexers

**Figure 9-3: Logic Diagram for 8-to-1 MUX**
Figure 9-4: Quad Multiplexer Used to Select Data

Figure 9-5: Quad Multiplexer with Bus Inputs and Output