

Multiplexers:

Multiplexers, commonly known as MUX, are digital circuits that select one data input from multiple inputs and transfers it to the output. It is also called data selector because it selects the input data based on the selection lines.

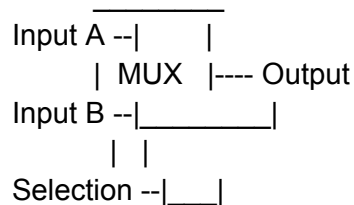
A 2:1 MUX has two data inputs and one output. It selects one of the two data inputs based on the value of the selection line. If the selection line is 0, then input A is selected, and if the selection line is 1, then input B is selected.

The truth table for a 2:1 MUX is as follows:

Selection (S)	Input A	Input B	Output
0	A	X	A
1	X	B	B

The symbol and circuit diagram for a 2:1 MUX is shown below:

Diagram:



Multiplexers can be cascaded to increase the number of inputs. For example, a 4:1 MUX can be constructed using two 2:1 MUXes.

Decoders:

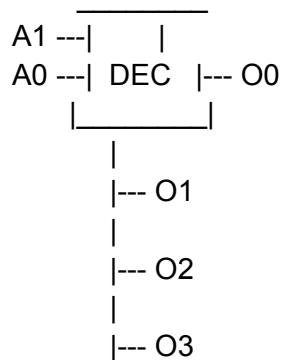
Decoders are digital circuits that decode a binary code into a set of mutually exclusive outputs. It is the reverse of the encoder. It has n inputs and 2^n outputs.

A 2-to-4 decoder takes two inputs and produces four outputs. The outputs are selected based on the input code. The truth table for a 2-to-4 decoder is as follows:

Input (A1, A0)	Output 0	Output 1	Output 2	Output 3
00	1	0	0	0
01	0	1	0	0
10	0	0	1	0
11	0	0	0	1

The symbol and circuit diagram for a 2-to-4 decoder is shown below:

Diagram:



Encoders:

Encoders are digital circuits that encode a set of inputs into a binary code. It is the reverse of the decoder. It has 2^n inputs and n outputs.

A priority encoder is a type of encoder that assigns priority to the inputs. It encodes the highest priority input that is active. For example, a 4-to-2 priority encoder takes four inputs and produces a two-bit binary code. The truth table for a 4-to-2 priority encoder is as follows:

Input (I3, I2, I1, I0)	Output (Y1, Y0)
0001 00	
0010 01	
0100 10	
1000 11	

The symbol and circuit diagram for a 4-to-2 priority encoder is shown below:

Diagram:

