

S2	S1	S0	Y
0	0	0	D0
0	0	1	D1
0	1	0	D2
0	1	1	D3
1	0	0	D4
1	0	1	D5
1	1	0	D6
1	1	1	D7

Highlighting indicates

Self-similarity (recursive pattern) in 2:1, 4:1, 8:1 MUXes

MUX equations contain all minterms of S anded with the corresponding D.

S2	S1	S0	Y
0	0	0	D0
0	0	1	D1
0	1	0	D2
0	1	1	D3
1	0	0	D4
1	0	1	D5
1	1	0	D6
1	1	1	D7

Highlighting indicates

A 4:1 MUX can be made with 3, 2:1 MUXes

An 8:1 MUX can be made with a 2:1 MUX and 2, 4:1 MUXes

Generally:

A 2:1 MUX on top of 2 N:1 MUXes makes a 2N:1 MUX

...the 2:1 MUX adds 1 more address bit.

Other combinations are possible

Ex.: A 4:1 MUX on top of 4 N:1 MUXes makes a 4N:1 MUX

...the top/outer 4:1 MUX adds 2 more address bits.

This can be used to make a 16:1 MUX out of 5, 4:1 MUXes. (2+2 address bits)

This can be used to make an 8:1 MUX out of a 4:1 MUX and 4, 2:1 MUXes. (2+1 address bits)