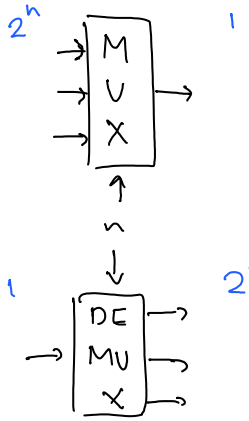
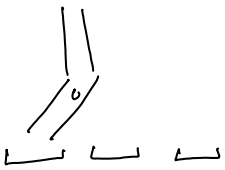
Lecture 5

Friday, September 11, 2015 10:02

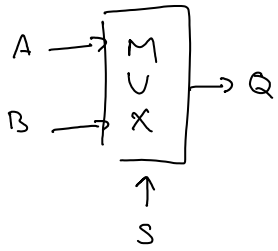
Multiplier/Demultiplier (MYX/DEMUX)





A MUX is like a this contraption, that determines which bucket the marble will fall into. A DEMUX, is the opposite

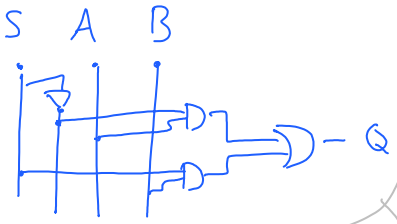
2-to-1 MUX



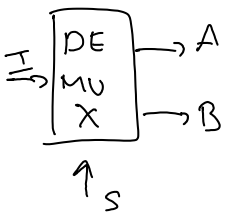
S	A	B	Q	
0	0	0	0	
0	0	1	0	
0	1	0	1	←
0	1	1	1	←
1	0	0	0	
1	0	1	1	←
1	1	0	0	
1	1	1	1	←

DNF

$$Q = \bar{S}A\bar{B} + \bar{S}AB + S\bar{A}B + SAB$$
$$= \bar{S}(A\bar{B} + AB) + S(\bar{A}B + AB)$$
$$= \bar{S}(A(\bar{B} + B)) + S(B(\bar{A} + A))$$
$$= \bar{S}A + SB$$



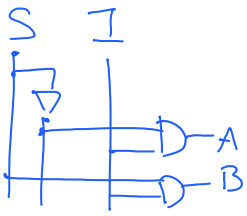
1-to-2 DEMUX



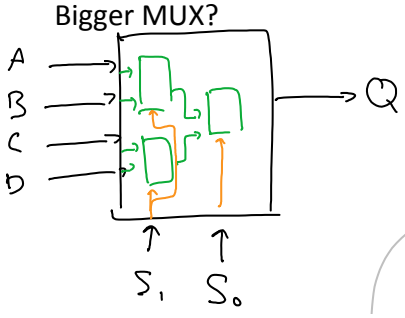
S = 0 ⇒ A = I, B = Ø
S = I ⇒ B = I, A = Ø

$A = \bar{S}I$
$B = SI$

S	I	A	B
0	0	0	0
0	1	1	0
1	0	0	0
1	1	0	1



Bigger MUX?

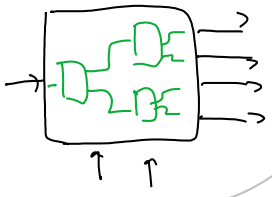


S_0	S_1	Q
0	0	A
0	1	B
1	0	C
1	1	D

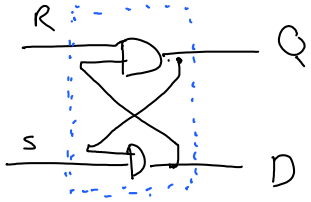
Memory

1-bit

Bigger DEMUX



Timing properties
Feedback circuit



R	S		
1	1	If Q = 1, then $\bar{Q}$ = 0 If Q = 0, then $\bar{Q}$ = 1	HOLD
0	1	If Q = 1, then $\bar{Q}$ = 0 If Q = 0, then $\bar{Q}$ = 1, then Q = 1	SET
1	0	$\bar{Q}$ = 0	RESET
0	0	If Q = 1, then $\bar{Q}$ = 1	ILLEGAL