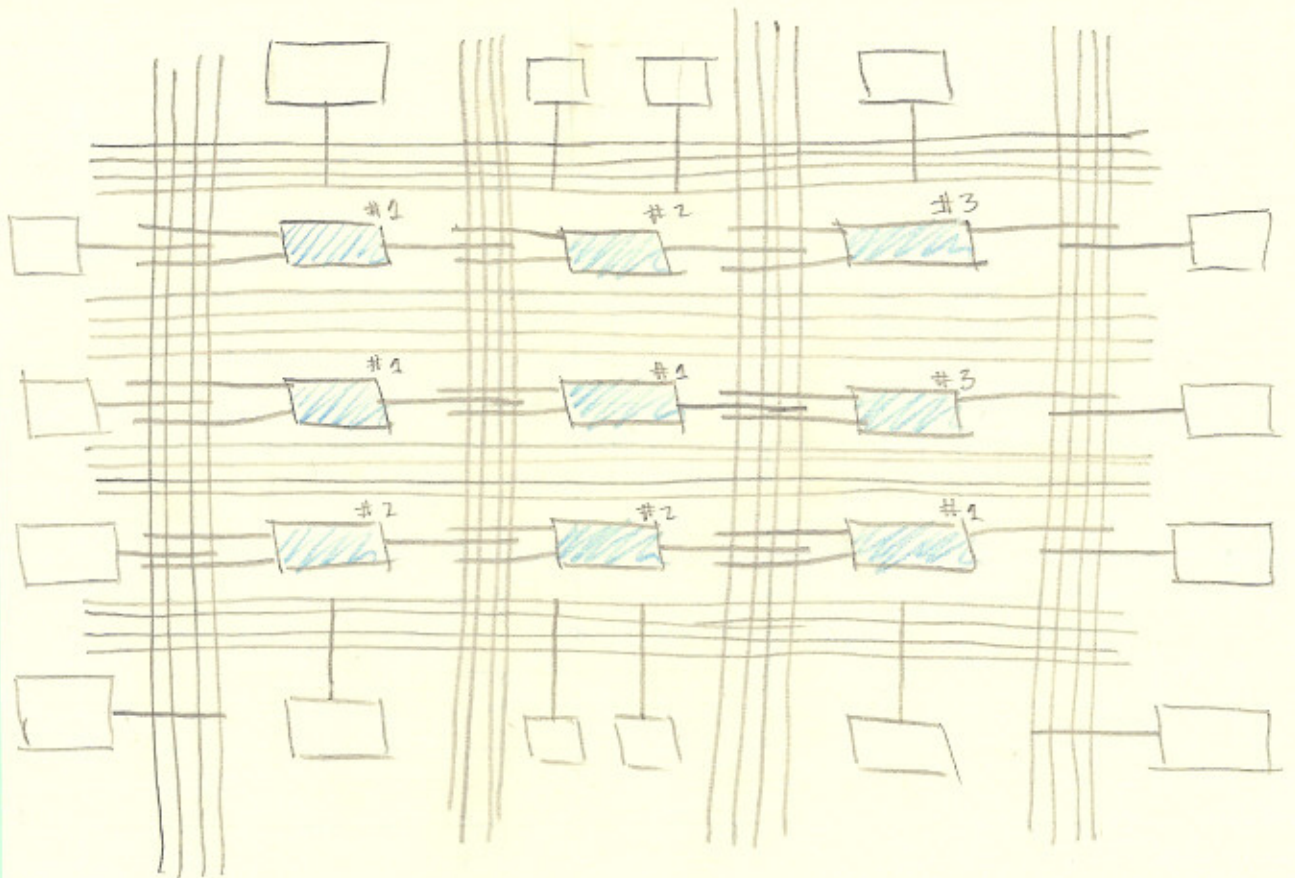



# Field Programmable Gate array (FPGA)



  $\Rightarrow$  Look up table: (LUT) These are logic circuits.

Each look up table has 2 i/p's and one output. They each have a different corresponding truth table.

LUT 1

$X'$	$X''$	$f$
0	0	0
0	1	0
1	0	0
1	1	1

LUT 2

$X'$	$X''$	$f$
0	0	0
0	1	1
1	0	1
1	1	1

LUT 3

$X'$	$X''$	$f$
0	0	1
0	1	1
1	0	1
1	1	0

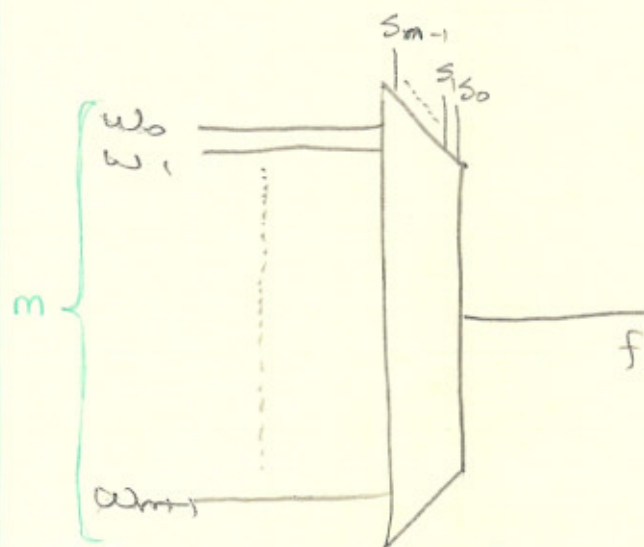
The designer is interested in making the connections between the wires to get the appropriate outputs.

The boxes around the outside

FPGA is good b/c it gives us the ability to program feedback (i.e. to make JK flip flop).

## Combinational logic

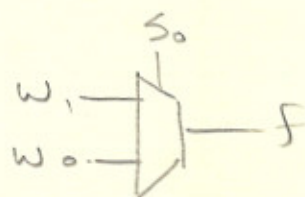
### \* Multiplexer.



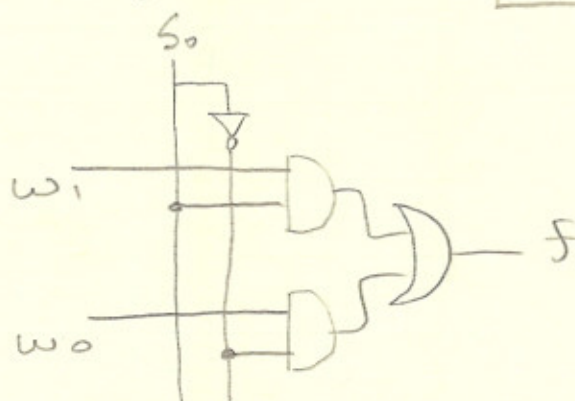
$$m = 2^n$$

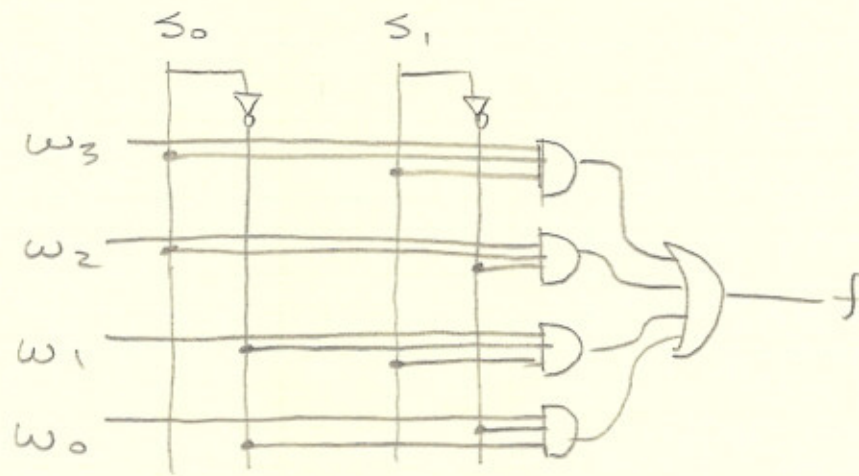
$s_{m-1}$	...	$s_1$	$s_0$	$f$
0	0	0	0	$w_0$
0	0	0	1	$w_1$
...	...	...	...	...
1	1	1	1	$w_{m-1}$

Ex: 2-to-1 multiplexer.

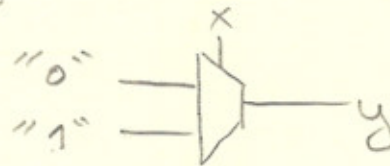


$s_0$	$f$
0	$w_0$
1	$w_1$

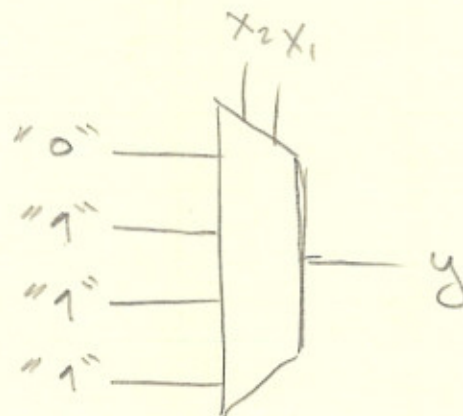


EX:EX

Using the multiplexer for logical negation.



We can use the 4-to-1 multiplexer for and/or operations as well.



$$Y = \overline{x_1 \cdot x_2}$$