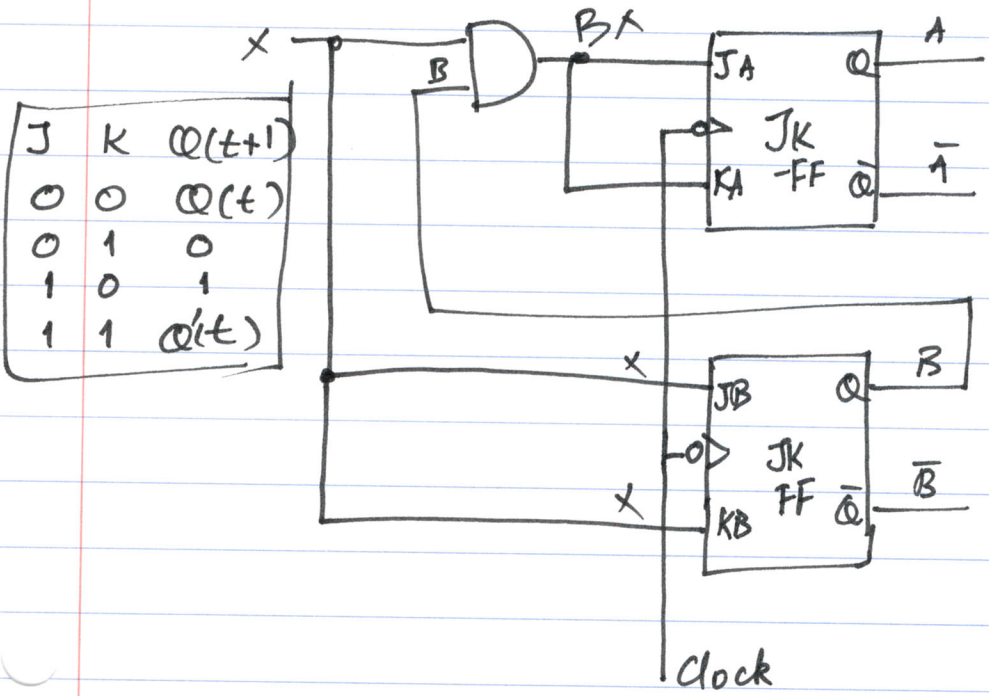
April 5, 2017



J	K	Q(t+1)
0	0	Q(t)
0	1	0
1	0	1
1	1	Q'(t)

⇒ state diagram

word explanation

2FF → 2 bits → 4 states

Step 1: FF - input Equations?

$JA = Bx$ $\quad KA = Bx$

$JB = x$ $\quad KB = x$

Step 2: state table

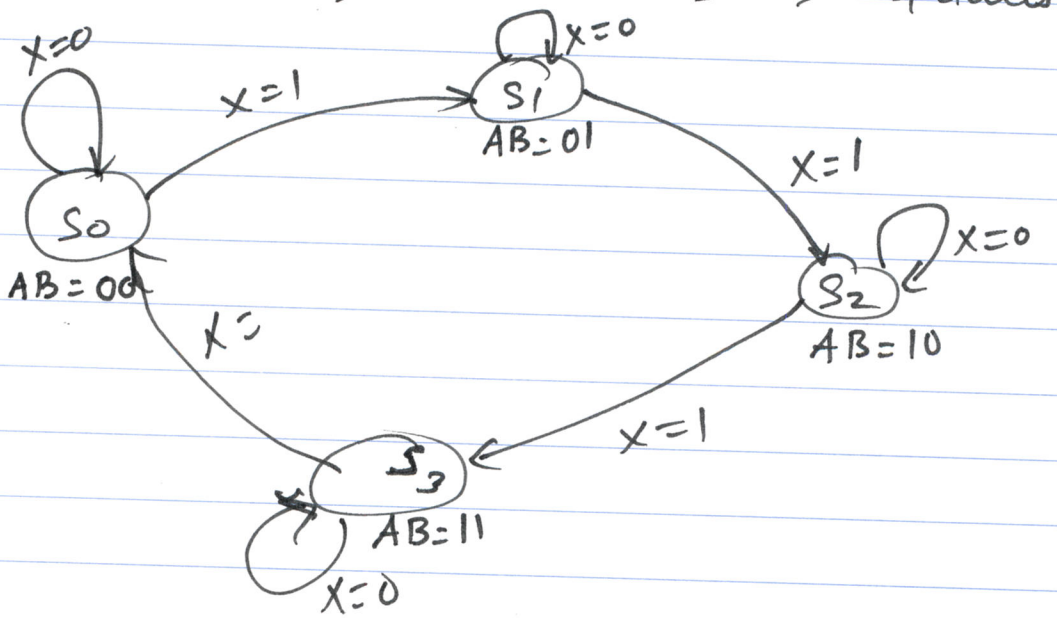
Current state A(t)	Current state B(t)	input x	FF input JA = Bx	FF input KA = Bx	FF input JB = x	FF input KB = x	next state A(t+1)	next state B(t+1)
0	0	0	0	0	0	0	0	0
0	0	1	0	0	1	1	0	1
0	1	0	0	0	0	0	0	1
0	1	1	1	1	1	1	1	0
1	0	0	0	0	0	0	1	0
1	0	1	0	0	1	1	1	1
1	1	0	0	0	0	0	1	1
1	1	1	1	1	1	1	0	0

S_0 S_1 S_2 S_3

Step 3: state diagram

April 5, 2017

2 FFs 2 bits ⇒ 4 states



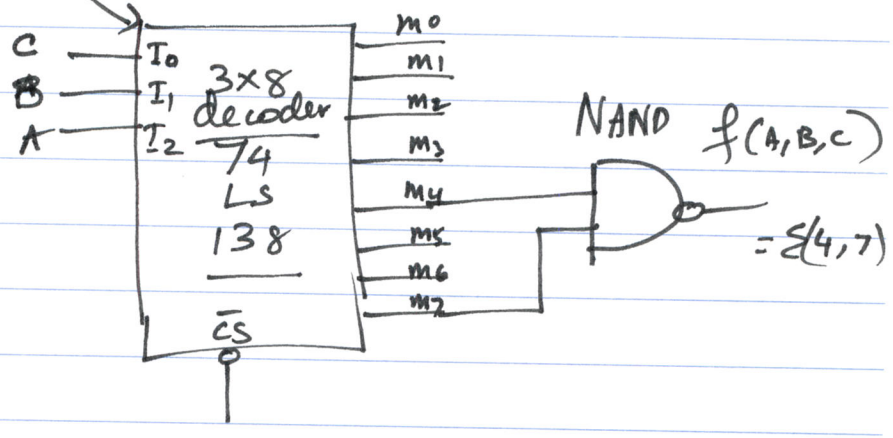
Word explanation: FSM counts the input x in fours {0, 1, 2, 3}

April 5, 2017

NAND - based decoder

74LS138 3x8 decoder

$f(A,B,C) = \Sigma(4,7)$



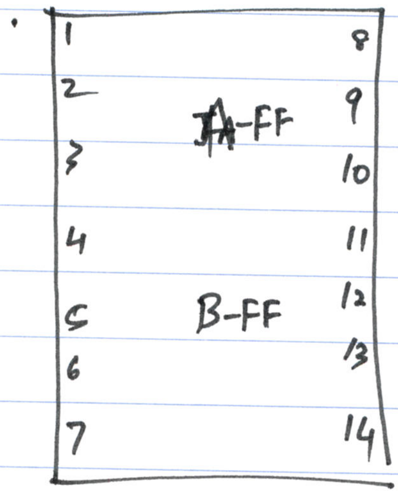
Pins

1	2	3
A	B	C

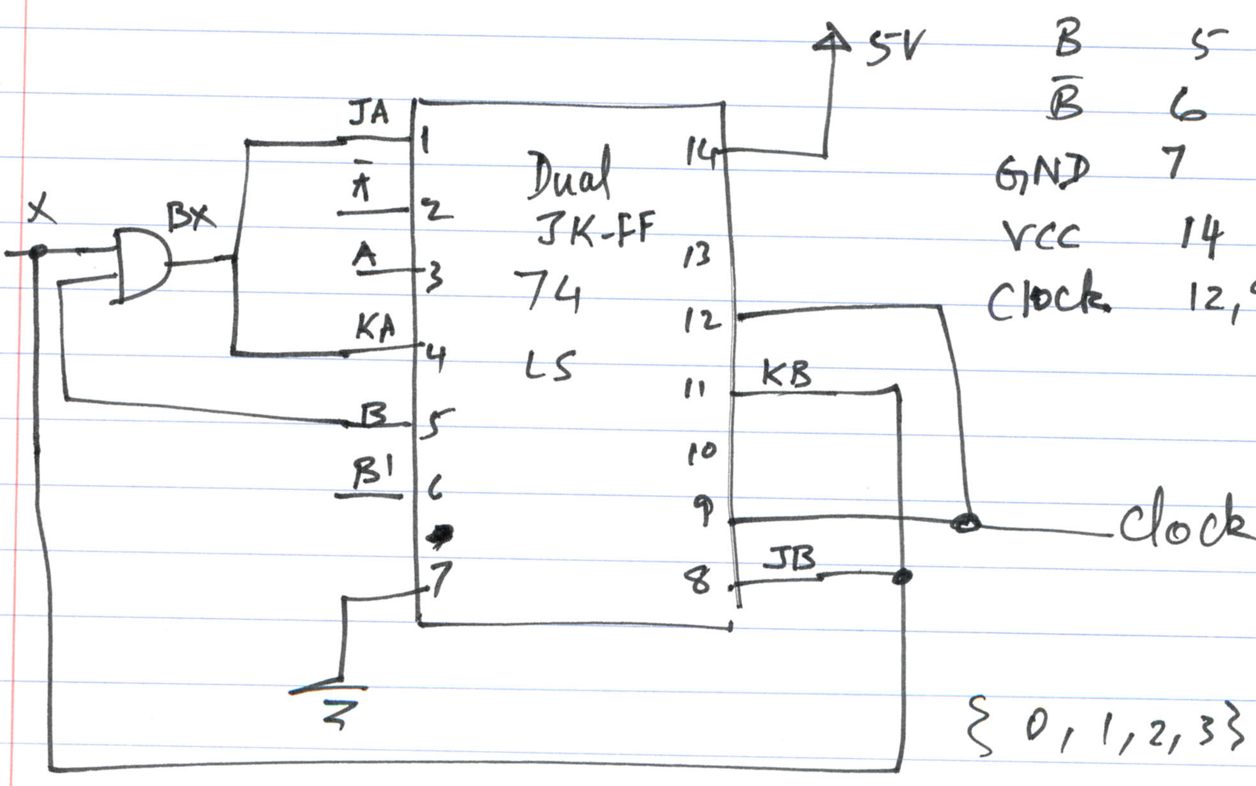
on the chip 74LS138

External C B A ← your inputs

Lab 3



	Pin#
JA	1
KA	4
~~A(LH)~~	
A	3
$\bar{A}$	2
JB	8
KB	11
B	5
$\bar{B}$	6
GND	7
VCC	14
Clock	12, 9



{0, 1, 2, 3}