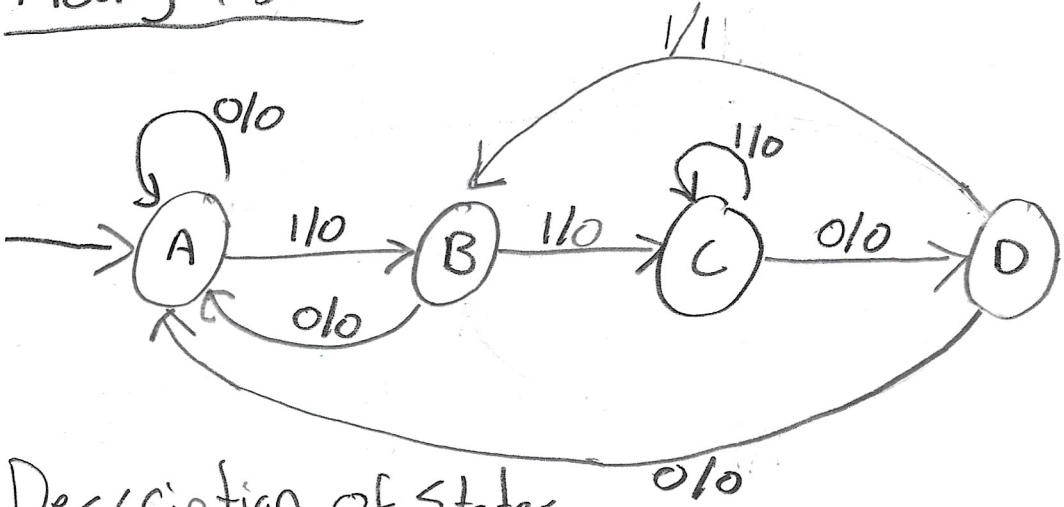
Mealy FSM



Description of States

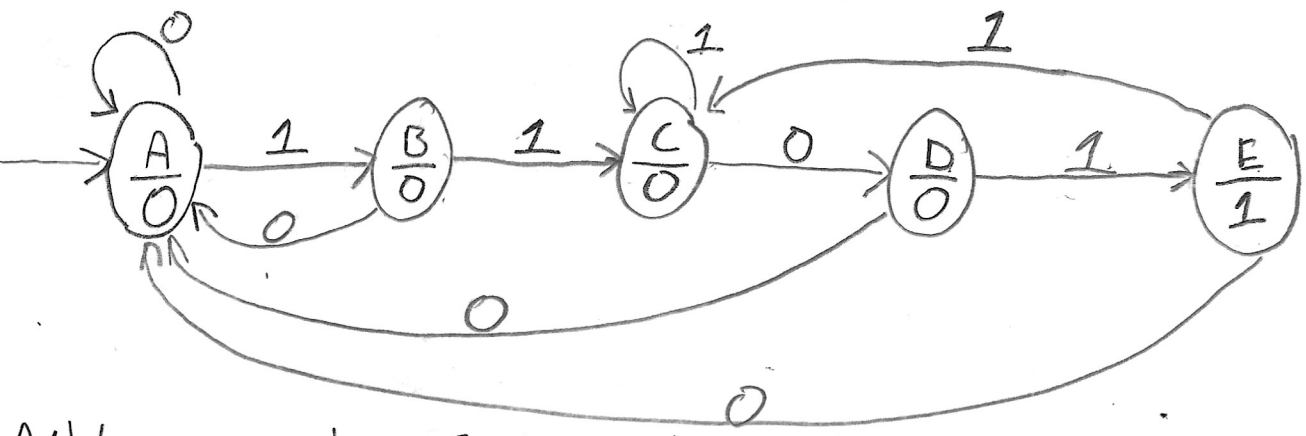
A: We are waiting 1, that can be the first symbol of 1101

B: We have seen 1, we are now waiting 1, to be the second symbol of 1101

C: We have seen 11, we are now waiting 0, to be the third symbol of 1101

D: We have seen 110, we are now waiting 1, to be the last symbol of 1101

Moore FSM



A: We are waiting 1, to be the first symbol of 1101

B: We have seen 1, we are now waiting 1, to be the second symbol of 1101

C: We have seen 11, we are now waiting 0, to be the third symbol of 1101

D: We have seen 110, we are now waiting 1, to be th last symbol of 1101

E: We have seen 1101

Compare FSM's

The Mealy FSM has 4 states, and the Moore FSM has 5 states. Since the Mealy FSM has 4 states, we can do the state-encoding with 2-bit binary code, the Moore FSM has 5 states we would need 3-bit binary codes. We would need more logic gates for the Moore FSM, which means that the Mealy FSM is more cost-efficient.

State Encoding

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

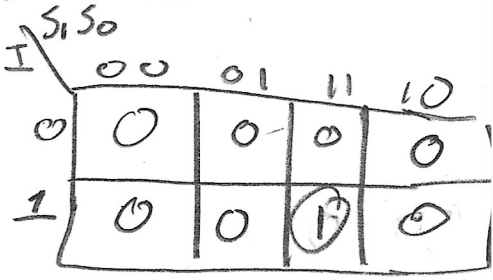
Current state	Input	Next state	Output
A	0	A	0
A	1	B	0
B	0	A	0
B	1	C	0
C	0	D	0
C	1	C	0
D	0	A	0
D	1	B	1

State-Transition and Output Tables

After State Encoding

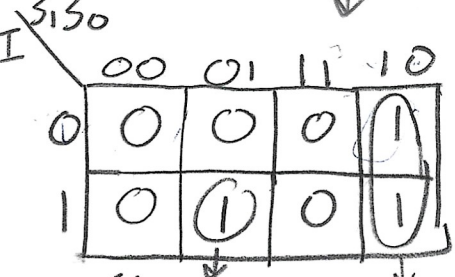
Current State		Input	Next State		Output
S_1	S_0	I	S_1'	S_0'	Y
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	0	0	0
0	1	1	1	1	0
1	0	0	1	0	0
1	0	1	1	0	0
1	1	0	0	0	1
1	1	1	0	0	1

K-Maps

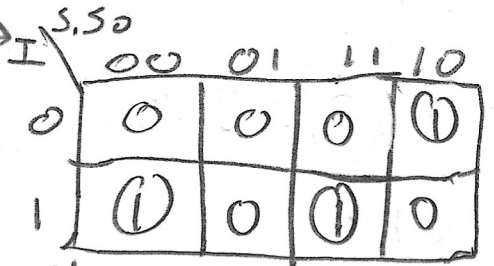


$Y = S_1 S_0 I$

K-Maps



$S_1' = \bar{S_1} S_0 I + S_1 \bar{S_0}$ or $S_1' = S_1 S_0 I + S_1 \bar{S_0} \bar{I} + S_1 \bar{S_0} I$



$S_0' = \bar{S_1} \bar{S_0} I + S_1 S_0 I + S_1 \bar{S_0} \bar{I}$

Circuit Schematic