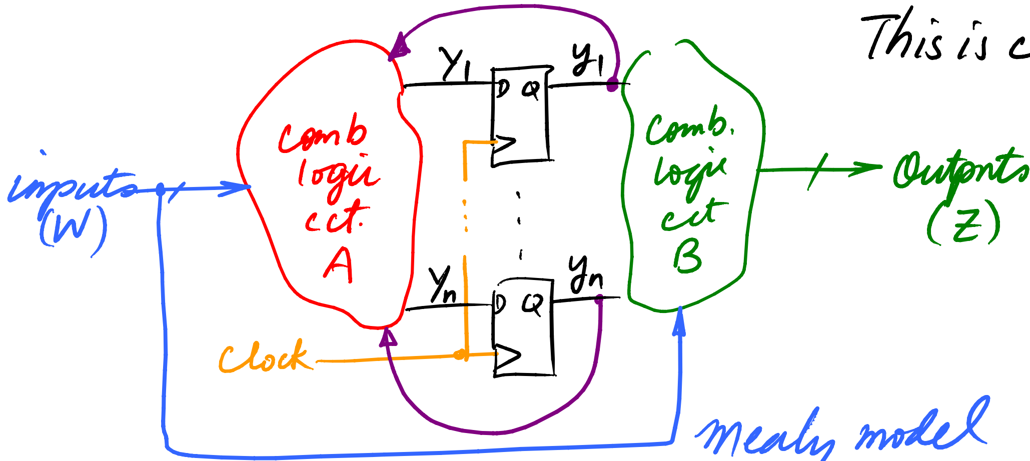
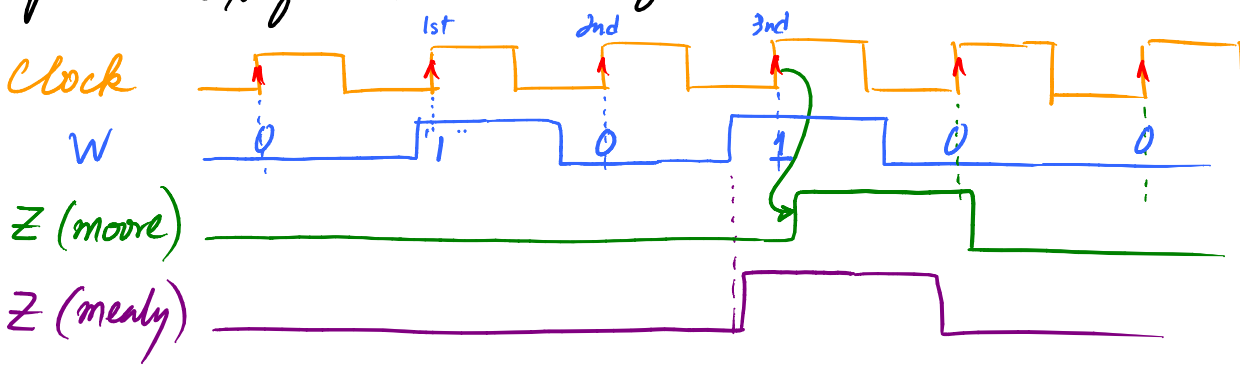
General model of FSM



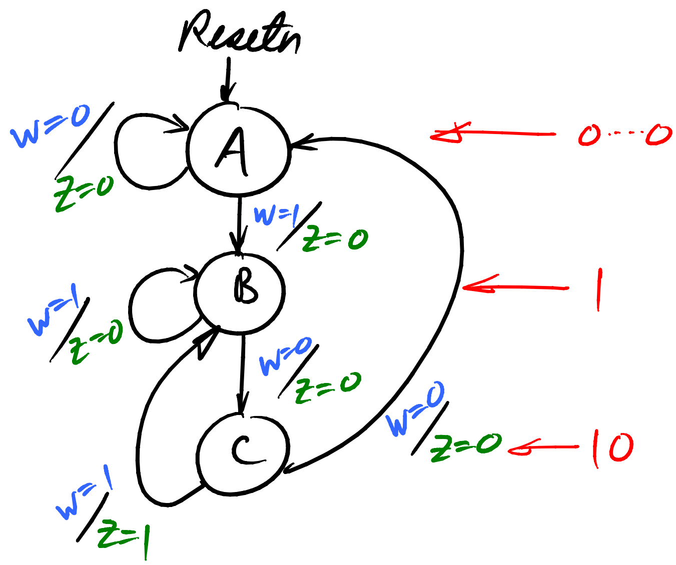
This is called the **Moore model**

Mealy model

example: the sequence detector for W = 101.



1. State Diagram (Mealy model)



2. State Table

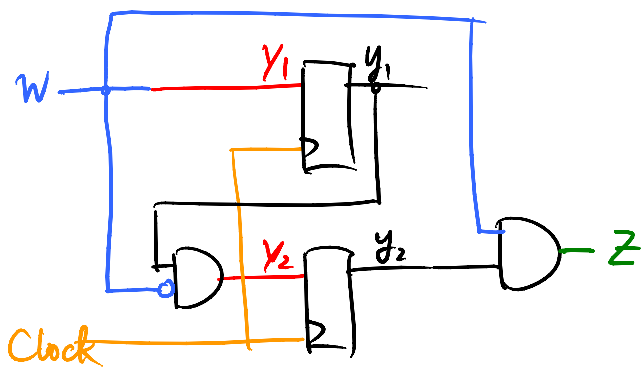
P.S.	N.S. W=0	N.S. W=1	output (Z) W=0	output (Z) W=1
A	A	B	0	0
B	C	B	0	0
C	A	B	0	1

3. State-assigned Table

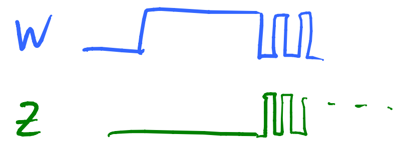
	$y_2 y_1$	W=0 $Y_2 Y_1$	W=1 $Y_2 Y_1$	W=0 Z	W=1 Z
A	0 0	00	01	0	0
B	0 1	10	01	0	0
C	1 0	00	01	0	1

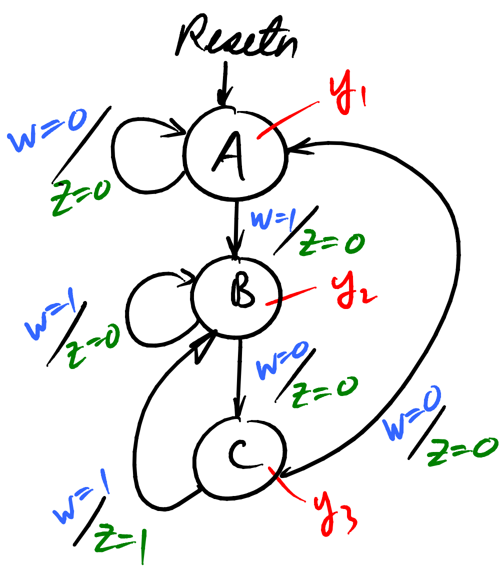
Next state expressions: $Y_2 = \overline{w}\, y_1$, $Y_1 = w$

Output expression: $z = w\, y_2$



this could happen.





to do "one-hot" encoding

$$Y_1 = y_1 \overline{w} + y_3 \overline{w}$$

$$Y_2 = y_1 w + y_2 w + y_3 w = w$$

$$Y_3 = y_2 \overline{w}$$

$$z = y_3 w$$

State minimization

→ partitioning procedure   example: 101 detector

P.S.		N.S. w=0		N.S. w=1		z
A	S_{000}	A	S_{000}	E	S_{100}	0
B	S_{001}	A	S_{000}	E	S_{100}	0
C	S_{010}	B	S_{001}	F	S_{101}	0
D	S_{011}	B	S_{001}	F	S_{101}	0
E	S_{100}	C	S_{010}	G	S_{110}	0
F	S_{101}	C	S_{010}	G	S_{110}	1
G	S_{110}	D	S_{011}	H	S_{111}	0
H	S_{111}	D	S_{011}	H	S_{111}	0

$P_1 = (ABCDEFGH)$

$P_2 = (ABCDEGH)(F)$

according to z

$P_3 = (ABEGH)(CD)(F)$

looking at the 1-successors

looking at the 1-successors of $\underline{(ABCDEGH)}$

They are E E F F G H H ←

$$\begin{array}{ccccccc} \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ A & B & C & D & E & G & H \end{array}$$

(∴ CD should be in a diff. partition than (ABEGH).

looking at the 0-successors of (ABCDEGH)

they are A A B B C D D ← all fall into the same block as (ABCDEGH)

$P_4 = (AB)(EGH)(CD)(F)$ ← looking at the 0-successors

$P_5 = (AB)(EGH)(CD)(F)$ ← no more dividing

$P_5 = P_4$ stop!

AB → A

CD → C

EGH → E

F → F

P.S.	N.S $w=0$	N.S $w=1$	Z
A	A	E	0
C	A	F	0
E	C	E	0
F	C	E	1