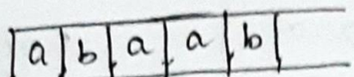
Finite Automata: (or) Finite state machine

RE (or) L= 

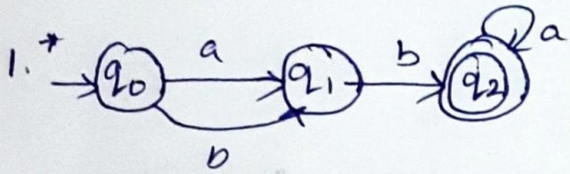
→ Input Tape

↑ Tape reader reading the I/P symbols.

Finite control

Finite Automata (FA).

DFA (Deterministic Finite Automata)



2. Transition moves to only one state (for one I/P symbol).

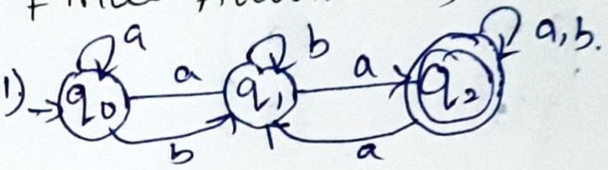
3. $M_D = (Q, \Sigma, \delta, \{q_0\}, F)$.

$\delta = Q \times \Sigma \to Q$.

$Q = \{q_0, q_1, q_2\}$.

δ_D	a	b
→ q_0	$\{q_1\}$	$\{q_1\}$
q_1	$\{\phi\}$	$\{q_2\}$
* q_2	$\{q_2\}$	$\{\phi\}$.

NFA / NDFA (Non-Deterministic Finite Automata)



2. Transition moves to more than one state (for more than one I/P symbol.

3. $M_N = (Q, \Sigma, \delta, \{q_0\}, F)$

$\delta = Q \times \Sigma \to 2^Q$.

$\{q_0, q_1, q_2\}$ $\{q_0, q_1\}$ $\{q_0, q_2\}$ $\{q_1, q_2\}$ $\{\phi\}$. $\{q_0\}$ $\{q_1\}$ $\{q_2\}$

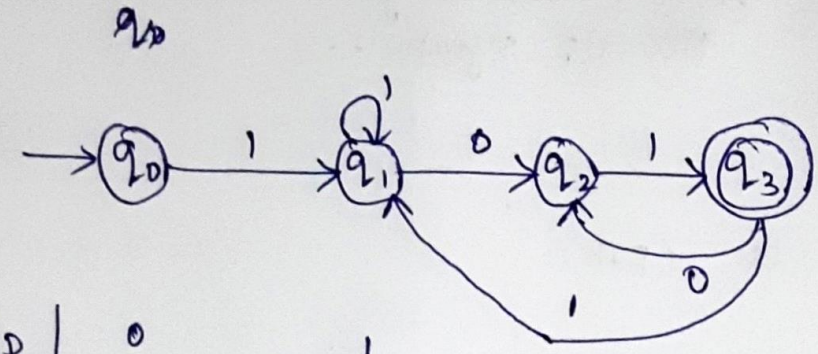
δ_N	a	b
→ q_0	$\{q_0, q_1\}$	$\{q_1\}$
q_1	$\{q_2\}$	$\{q_1\}$
* q_2	$\{q_2, q_1\}$	$\{q_2\}$.

Eg1: Design a DFA that accepts strings ending with 101 as substring.

$L = \{101, 0101, 1101, 001101, 10101, \ldots\}$.

Formula: $n+1 \Rightarrow 4$

- 101
- 1101
- 101101
- 10101



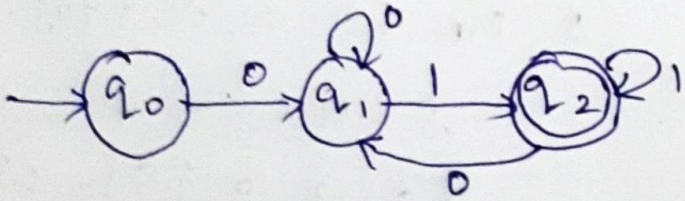
δ_D	0	1
$\Rightarrow q_0$	$\{\phi\}$	$\{q_1\}$
q_1	$\{q_2\}$	$\{q_1\}$
q_2	$\{\phi\}$	$\{q_3\}$
$* q_3$	$\{q_2\}$	$\{q_1\}$

Eg2: Design DFA with $\Sigma = \{0, 1\}$ accepts those strings which starts with 1 & ends with 0.

Formula: $n+1 = 3$

$L = \{01, 001, 0101, 0011, \ldots\}$

- 001
- 0101



δ_D	0	1
$\Rightarrow q_0$	$\{q_1\}$	$\{\phi\}$
q_1	$\{q_1\}$	$\{q_2\}$
$* q_2$	$\{q_1\}$	$\{\phi\}$