* DFA to Right Linear Regular grammar :-

① Rename $q_0 \in Q$ as $S \in V$

② Rename States of Q as A, B, C, D, ... $\in V$

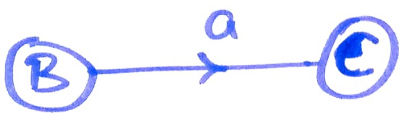
③ Creating Set of production P

$$Q \to V \; ; \; q_0 \to S$$

- DFA $M = \{ Q, \Sigma, \delta, q_0, F \}$

$$G = \{ V, T, P, S \}$$

① If $q_0 \in F$ then add production $S \to \epsilon$ to P

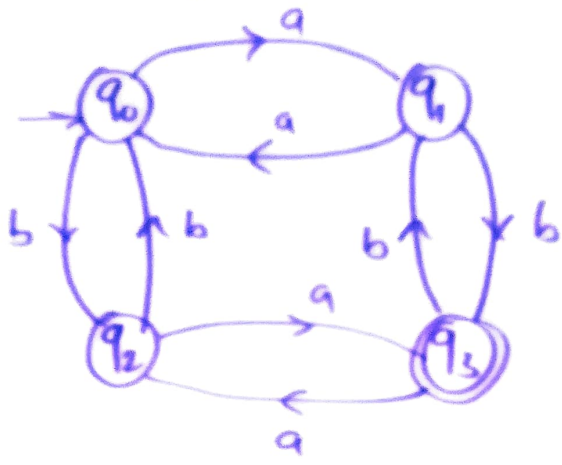


$B \to aC$ add it

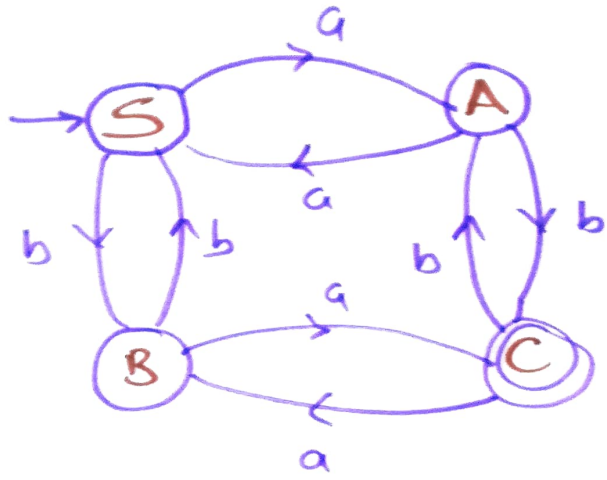
$B \to aC$
$B \to a$ } Productions

$C \to \epsilon$

① Give RLG for the DFA



→ i) Rename the states, we get



ii) Set of productions are :-

$S \rightarrow aA \mid bB$

$A \rightarrow aS \mid bC \mid b$

$B \rightarrow bS \mid aC \mid a$

$C \rightarrow aB \mid bA$

Final state C

$A \rightarrow bC$

$A \rightarrow b$

⊛ Right linear grammar to DFA:-

$A \to aB \Rightarrow$ 

$A \to aB|a \Rightarrow$ 

⇒ Every transition entering B terminates in B

⇒ A production of the form $A \to \epsilon$ will make A as final state as –

⇒ An independent production of the form $A \to b$

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$S \to 0A|1B$

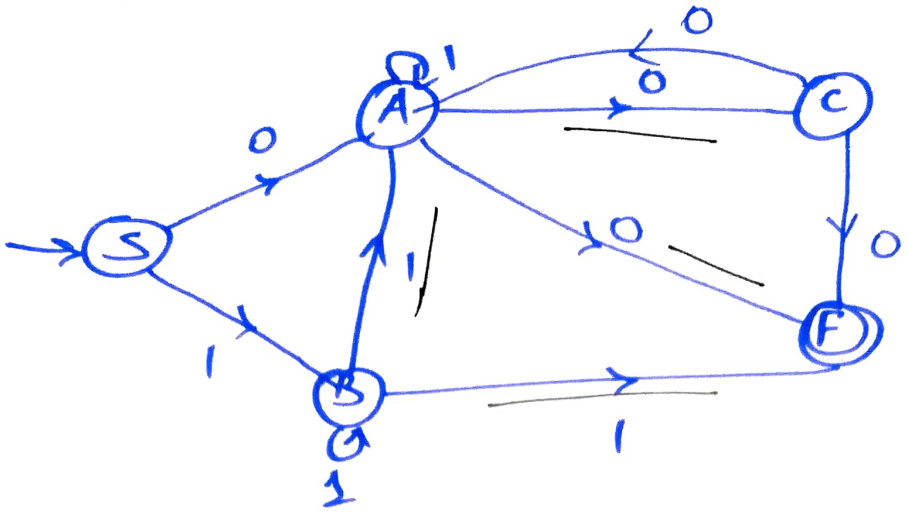
$A \to 0C|1A|0$

$B \to 1B|1A|1$

$C \to 0|0A$

→ A new final state F requires for

$A \to 0$, $B \to 1$, $C \to 0$

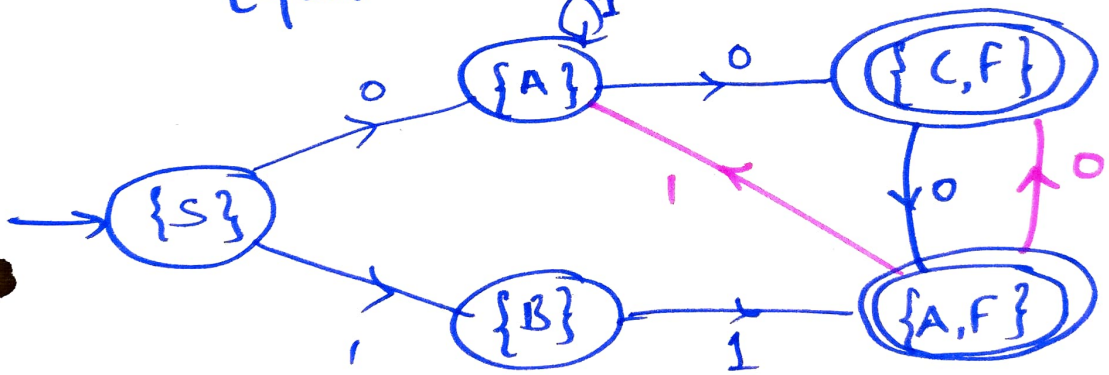


From: $\left.\begin{matrix} A \to C \\ A \to F \end{matrix}\right\} 0 \Rightarrow \{C, F\}$

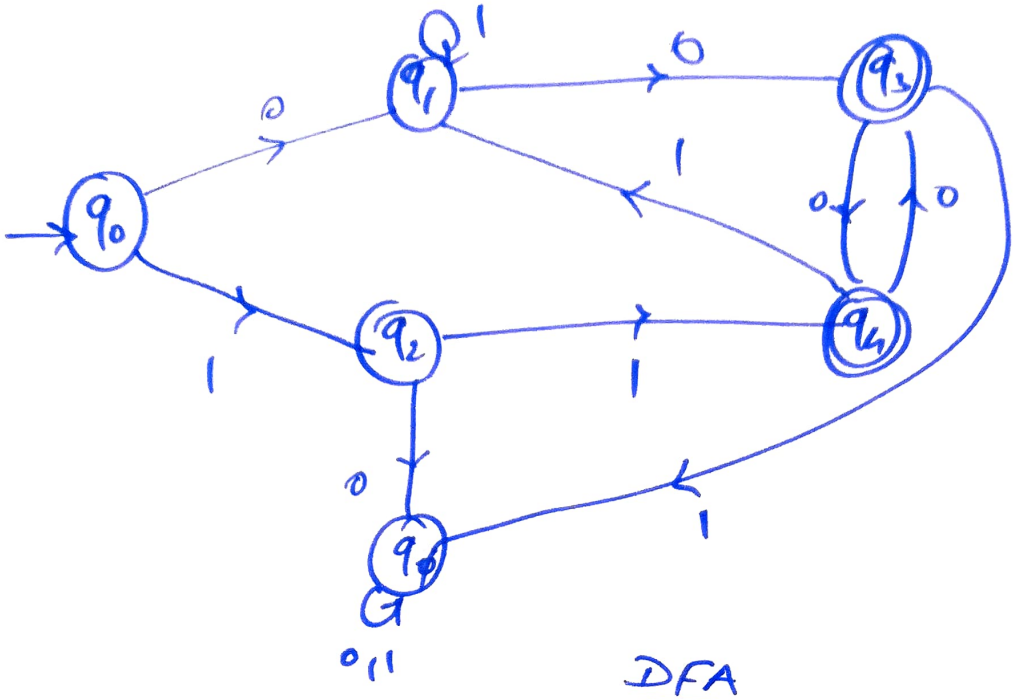
$\left.\begin{matrix} B \to A \\ B \to F \end{matrix}\right\} 1 \Rightarrow \{A, F\}$

Step II :-

Equivalent DFA



S, A, B, {C,F} & {A,F} are renamed as q_0, q_1, q_2, q_3, q_4 & a dead state q_ϕ is introduced to handle ϕ transitions

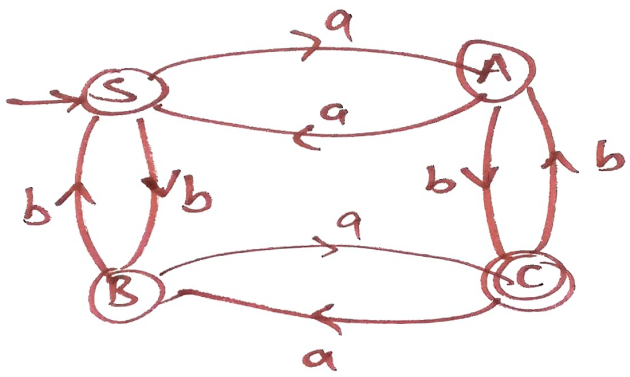


DFA

* DFA to Left Linear Grammar :-

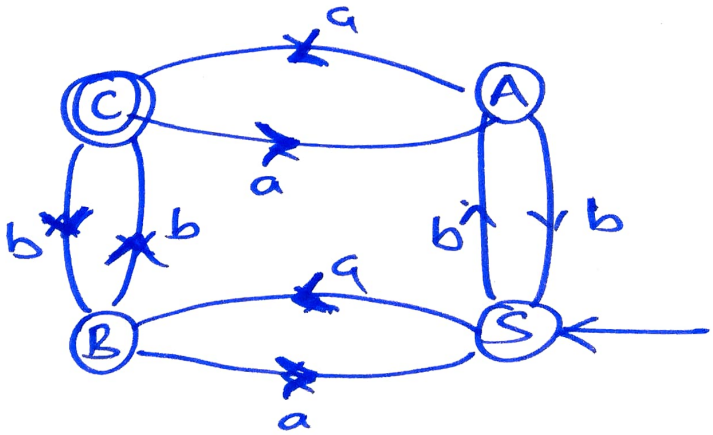
1. Interchange the starting state & final state
2. Reverse the direction of all transitions
3. Write the grammar from transition graph in left linear form.

● →



→

●



$S \rightarrow Ba \mid Ab$

$A \rightarrow Sb \mid Ca \mid a$

$B \rightarrow Sa \mid Cb \mid b$

$C \rightarrow Bb \mid Aa$

* Left linear grammar to DFA :-

① Draw a transition graph from the given left linear grammar.

② Reverse the direction of all the transition

③ Interchange starting state & final state

④ Carry out conversion from FA to DFA

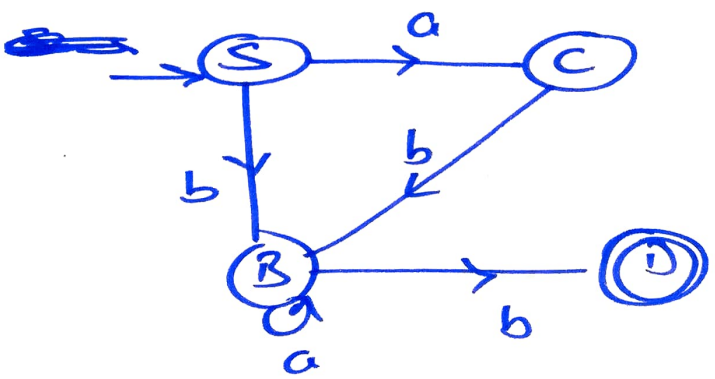
① $S \to Ca \mid Bb$

$C \to Bb$

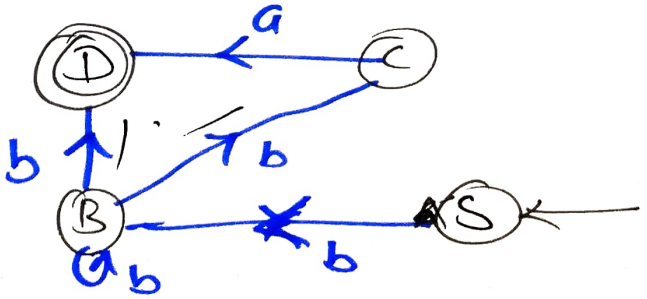
$B \to Ba \mid b$

$B \to b$ so one more state is added as final state

$\Rightarrow$ ①



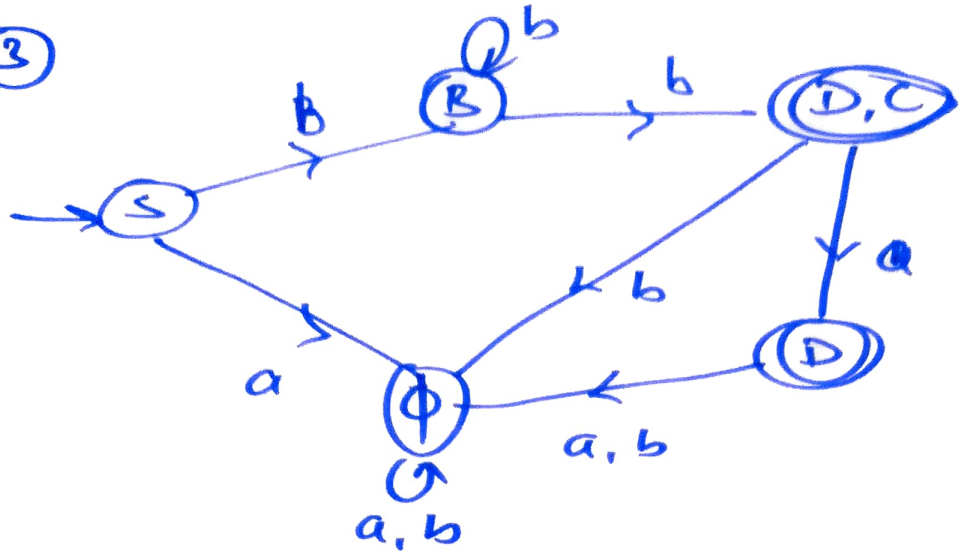
② Reverse the direction & interchange starting & final states



$B \to D$
$B \to C$ } b

{D, C}

(3)



Rename the states S, B, {D,C}, D as

q_0, q_1, q_2, q_3, q_4