

$$S \rightarrow bSbb \mid A$$

$$A \rightarrow aA \mid \epsilon$$

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(1) add a new start rule

$$S_0 \rightarrow S$$

(2) remove  $\epsilon$  rules  $A \rightarrow \epsilon$   
 $S_0 \rightarrow S$

$$S \rightarrow bSbb \mid A \mid \epsilon$$

$$A \rightarrow aA \mid a$$

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remove  $S \rightarrow \epsilon$

$$S_0 \rightarrow S \mid \epsilon$$

$$S \rightarrow bSbb \mid A \mid bbb$$

$$A \rightarrow aA \mid a$$

(3) remove unit rules

$$S_0 \rightarrow \epsilon \mid bSbb \mid bbb \mid aA \mid a$$

$$S \rightarrow bSbb \mid bbb \mid aA \mid a$$

$$A \rightarrow aA \mid a$$

(4)

$$S_0 \rightarrow \dots$$

$$S \rightarrow a \mid TA \mid UV \mid UX$$

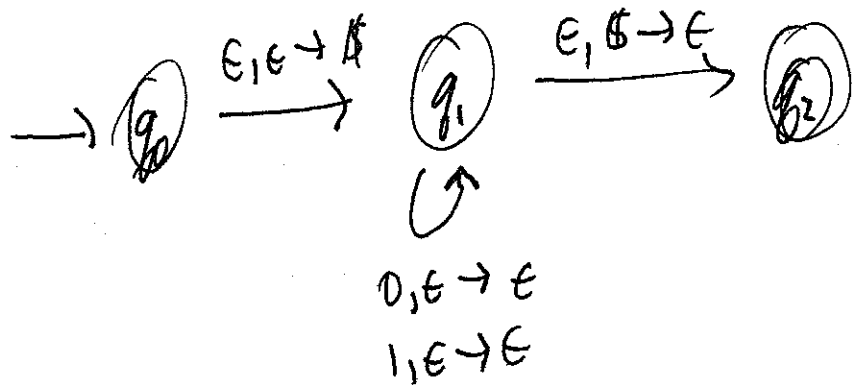
$$A \rightarrow TA \mid a$$

$$T \rightarrow a$$

$$U \rightarrow b$$

$$V \rightarrow UV$$

$$X \rightarrow SV$$



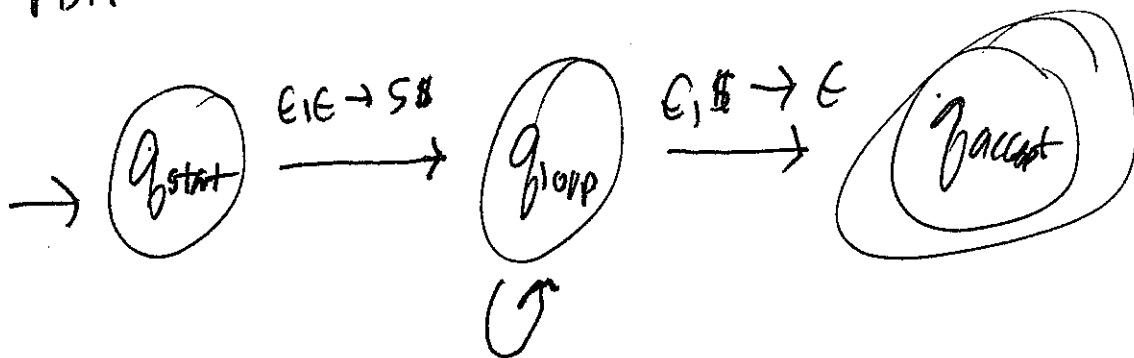
$$\delta(q_0, \epsilon, \epsilon) \rightarrow \{(q_1, \#)\}$$

$$\delta(q_1, 0, \epsilon) \rightarrow \{(q_1, \epsilon)\}$$

$$\delta(q_1, 1, \epsilon) \rightarrow \{(q_1, \epsilon)\}$$

$$\delta(q_1, \epsilon, \#) \rightarrow \{(q_2, \epsilon)\}$$

CFG  $\rightarrow$  PDA



$$a, a \rightarrow \epsilon$$

$$b, b \rightarrow \epsilon$$

$$\epsilon, s \rightarrow bsb^* *$$

$$\epsilon, s \rightarrow A$$

$$\epsilon, A \rightarrow aA *$$

$$\epsilon, A \rightarrow \epsilon$$