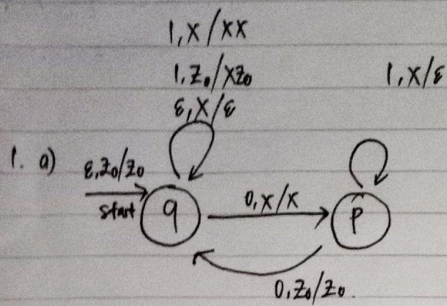


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 UAS TBO



b)	state	input	stack	new state	stack
	q	1	X	q	XX
	q	1	z ₀	q	Xz ₀
	q	ε	X	q	ε
	q	0	X	p	X
	p	0	z ₀	q	z ₀
	p	1	X	p	ε

ε adalah start symbol.

CFG = (V, T, P, S)

V = {S, [pXp], [pXq], [qXp], [qXq], [pzop], [pzog], [qzop], [qzog]}

T = {0, 1}

P: initial: S → [qzog] | [qzop]

pop: [qXq] → ε
 [pXp] → 1

push: [qXq] → 1[qXq][qXq] | 1[qXp][pXq] ~~ε[qXq]~~
 [qzog] → 1[qXq][qzog] | 1[qXp][pzog]
 [pzog] → 0[pzog]
~~[pXp] →~~
 [qXp] → 0[qXp]

P: S → [qzog] | [qzop]
 [qXq] → ε | 1[qXq][qXq] | 1[qXp][pXq]
 [pXp] → 1
 [qzog] → 1[qXq][qzog] | 1[qXp][pzog]
 [pzog] → 0[pzog]
 [qXp] → 0[qXp]

menghapus yang menyebabkan eternal looping (not generating). : $[q_2 o q]$ tidak menghasilkan apapun, begitupun $[p x q]$

$$\begin{aligned} S &\rightarrow [q_2 o q] \\ [q x q] &\rightarrow \epsilon \mid 1 [q x q] [q x q] \\ [p x p] &\rightarrow 1 \\ [q_2 o q] &\rightarrow 1 [q x q] [q_2 o q] \mid 1 [q x p] [p_2 o q] \\ [p_2 o q] &\rightarrow 0 [p_2 o q] \\ [q x p] &\rightarrow 0 [q x p] \end{aligned}$$

Menghapuskan yang menyebabkan eternal looping.

$$S \rightarrow \epsilon$$

$$\begin{aligned} 2) S &\rightarrow ASB \mid \epsilon \\ A &\rightarrow aAS \mid a \\ B &\rightarrow SBS \mid A \mid bb. \end{aligned}$$

- eliminasi ϵ -production.

S adalah nullable symbol.

$$\begin{aligned} S &\rightarrow ASB \mid AB \\ A &\rightarrow aAS \mid aA \mid a \\ B &\rightarrow SBS \mid SB \mid bS \mid b \mid A \mid bb \end{aligned}$$

- eliminasi unit-production.

$$\begin{aligned} S &\rightarrow ASB \mid AB \\ A &\rightarrow aAS \mid aA \mid a \\ B &\rightarrow SBS \mid SB \mid bS \mid b \mid aAS \mid aA \mid a \mid bb. \end{aligned}$$

- Eliminasi useless symbol.

- not generating: tidak ada
- unreachable: tidak ada.

Grammar in CNF.

$$\begin{aligned} X_a &\rightarrow a \\ X_b &\rightarrow b \\ A_1 &\rightarrow AS \\ S_1 &\rightarrow SX_b \end{aligned}$$

$$\begin{aligned} S &\rightarrow A_1 B \mid AB \\ A &\rightarrow X_a A_1 \mid X_a A \mid a \\ B &\rightarrow S_1 S \mid SX_b \mid X_b S \mid b \mid X_a A_1 \mid X_a A \mid a \mid X_b X_b \end{aligned}$$