

Laboratorio No. 7

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Ejercicio No. 1

$$\textcircled{1} S \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B$$

$$A \rightarrow c$$

$$B \rightarrow S \mid A$$

$$C \rightarrow S \mid \varepsilon$$

a) Eliminar producciones - ε : $anulable = \{C\}$

$$S \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

$$A \rightarrow c$$

$$B \rightarrow S \mid A$$

$$C \rightarrow S$$

b) Eliminar Producciones Unitarias

$$\text{unitaria } S = \{S, B\}$$

$$\text{unitaria } A = \{A, S\}$$

$$\text{unitaria } B = \{B, S, A\}$$

$$\text{unitaria } C = \{C, S\}$$

$$S \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

$$A \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

$$B \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

$$C \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

c) Eliminar símbolos inútiles

→ Quitar variables no generadoras

$$\text{Generadoras} = \{S, A, B, c\}$$

∴ No hay variables no generadoras.

→ Quitar variables no alcanzables

$$\text{Alcanzables} = \{S, A, B, c\}$$

∴ No hay variables no alcanzables

d) CFG en la Forma Normal de Chomsky (CNF)

$$S \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

$$A \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

$$B \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

$$c \rightarrow \emptyset A \emptyset \mid 1 B 1 \mid B B \mid \emptyset \emptyset \mid 1 1$$

$$\textcircled{2} S \rightarrow aAa | bBb | \epsilon$$

$$A \rightarrow c | a$$

$$B \rightarrow c | b$$

$$C \rightarrow CDE | \epsilon$$

$$D \rightarrow A | B | ab$$

a) Eliminar producciones - ϵ : $anulable = \{S, C\}$

$$S \rightarrow aAa | bBb$$

$$A \rightarrow c | a$$

$$B \rightarrow c | b$$

$$C \rightarrow CDE | DE$$

$$D \rightarrow A | B | ab$$

b) Eliminar Producciones Unitarias

$$\text{unitaria } S = \{S\}$$

$$\text{unitaria } A = \{A, C\}$$

$$\text{unitaria } B = \{B, C\}$$

$$\text{unitaria } C = \{C\}$$

$$\text{unitaria } D = \{D, A, B\}$$

$$S \rightarrow aAa | bBb$$

$$A \rightarrow CDE | DE | a$$

$$B \rightarrow CDE | DE | b$$

$$C \rightarrow CDE | DE$$

$$D \rightarrow CDE | DE | a | b | ab$$

c) Eliminar símbolos inútiles

→ Quitar variables no generadoras

$$\text{Generadoras} = \{A, B, D\}$$

$$S \rightarrow aAa \mid bBb$$

$$A \rightarrow DE \mid a$$

$$B \rightarrow DE \mid b$$

$$D \rightarrow DE \mid a \mid b \mid ab$$

→ Quitar variables no alcanzables

$$\text{Alcanzables} = \{S, A, B\}$$

$$S \rightarrow aAa \mid bBb$$

$$A \rightarrow a$$

$$B \rightarrow b$$

d) CFG en la Forma Normal de Chomsky (CNF)

→ Nuevas variables:

$$V_a \rightarrow a$$

$$V_b \rightarrow b$$

$$S \rightarrow V_a A V_a \mid V_b B V_b$$

$$A \rightarrow a$$

$$B \rightarrow b$$

→ Factorizar producciones largas

$$S \rightarrow V_a X_1 | V_b X_2$$

$$A \rightarrow a$$

$$B \rightarrow b$$

$$V_a \rightarrow a$$

$$V_b \rightarrow b$$

$$X_1 \rightarrow A V_a$$

$$X_2 \rightarrow B V_b$$