Grammar: Set of production rules for deriving the strings of a language

Chomsky Classification of Grammar

Note: All programming language grammar, is Context Free Grammar (CFG), but programming language is Context Sensitive Language (CSL).

Grammar to Language:

Language generated by G is the set $L(G) = \{w \mid w \in T^*, s \Rightarrow w\}$ of all strings generated by G

Example: Find the language L(G) = ? If start symbol is S, G = $S \rightarrow bS \mid aA \mid b$
$A \rightarrow bA \mid aB$
$B \rightarrow bB \mid aS \mid a$

Let $N_a(W)$ and $N_b(W)$ denote the number of a and b in a string W respectively. The language $L(G) \subseteq (a, b)^+$, is generated by G is

a) $\{W \mid N_a(W) > 3\ N_b(W)\}$
b) $\{W \mid N_a(W) > 3N_a(W)\}$
c) $\{W \mid N_a(W) = 3K, K \in (0, 1, 2, \ldots)\}$
d) $\{W \mid N_b(W) = 3K, K \in (0, 1, 2, \ldots)\}$

Language to Grammar:

Regular Grammar: If every production is of the form either $A \rightarrow xB \mid y$ OR $A \rightarrow Bx \mid y$

where $A, B \in V, x, y \in T^*$

Note: $A \rightarrow xB \mid Bx \mid y$ is a Linear grammar or CFG but not Regular Grammar.

Finite Automata to Right Linear Regular Grammar:

Finite Automata to Left Linear Regular Grammar: