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Tutorial - 5

1] CFG to generate strings starting and ending with diff letter over {a,b}
possible strings are: $a(a+b)^*b \mid b(a+b)^*a$
∴ min requirement: $S \to ab \mid ba$
Let $T \to aT \mid bT \mid \varepsilon$
in general $S \to aTb \mid bTa$
$G = (V, T, P, S)$ where $V = \{S, T\}$
$T = \{a, b\}$
$P = \{S \to aTb, S \to bTa, T \to aT, T \to bT, T \to \varepsilon\}$
S = start symbol.

2] CFG with equal number of 'a's and 'b's
→ possible strings are $b^m a^n b^p a^m b^n a^p \mid m \geq 0, n \geq 0, p \geq 0$
∴ $S \to \varepsilon$ $m = n = p$
$S \to aSb$ $m = 0$
$S \to bSaS$ $m \neq 0$
$G = (V, T, P, S)$ where,
$V = \{S\}$, $T = \{a, b\}$ $P = \{S \to \varepsilon, S \to aSbS, S \to bSaS\}$,
S = start symbol

3] Right and left linear grammar for $1(01)^* 0 (0+1)^*$ All strings consist of at least single 1 & 0
linear grammar
$S \to 1OB \mid 1A$
$A \to 01A \mid \varepsilon$
$B \to 00 \mid 1B \mid \varepsilon$
Left linear grammar
$S \to 01 \mid A0 \mid B$ $A \to 1 \mid A01$ $B \to 10 \mid B0 \mid B1$

4] Find LMD & RMD and Parse tree for 001122

$S \to 0S|1A|2B|\varepsilon$

$A \to 1A|2B|\varepsilon$

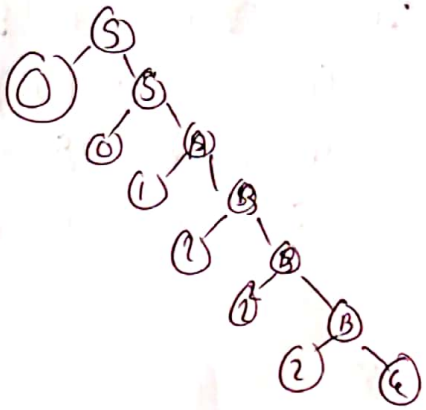
$E \to 2B|\varepsilon$

→ LMD

$S \to 0S$
$\to 00S$
$\to 001A$
$\to 0012B$
$\to 00122B$
$\to 001122B$
$\to 1001122\varepsilon$
i.e. 001122

RMD

$S \to 0S$
$\to 00S$
$\to 001A$
$\to 0012B$
$\to 00122B$
$\to 001122B$
$\to 1001122\varepsilon$
i.e. 001122



5] TEST if 001100, 001010 are in language given by:

G: $S \to 0S0|1A11B|0|1$

For 001100

$S \to 0S0$
$\to 00S00$
$\to 001B00$
$\to 0010-1100$

∴ 001100 is in language

001010 is not in language.