

# Context-free Grammars and Regular Languages

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Write a context free grammar for every rular language.

Every state is nothing but a rule. If  $\delta(a, qi) = qj$

then  $Ri \rightarrow aRj$

$Rj \rightarrow \epsilon$  if  $qj \in F$

And the Context free grammar is -  $V = \{Rj\}$  -  $\Sigma = \Sigma$  -  $R$  given as above -  $S$  is  $R0$

Contd.

Parse to check if Expr.

1. Initialise a Stack with  $\$$
2. Push  $S$  to a Stack
3. Branch and make stacks every possible rule
4. If left most element

Push Down automaton

Defn: It is a Tuple  $P = (Q, \Sigma, \Gamma, \delta, q_0, F)$  -  $Q$  is a finite set of "states" -  $\Sigma$  is a finite set called the alphabet -  $\Gamma$  is a finite set called the stack alphabet -  $q_0 \in Q$  is start state -  $F \subseteq Q$  -  $\delta: Q \times (\Sigma \cup \{\epsilon\}) \times (\Gamma \cup \{\epsilon\}) \rightarrow \mathcal{P}(Q \times (\Gamma \cup \{\epsilon\}))$

Example

0N1N

Informal- 1. If read a zero, push to stack 2. If read a one, pop from stack 3.  
Accept if stack is empty

Formal

Build  $P = (Q, \Sigma, \Gamma, q_0, F, \delta)$