Conversion of CFG to PDA

Procedure

1) Convert a given CFG to GNF
2) From the start symbol q_0 without seeing any input push start symbol S to stack and move to q_1

   $\delta(q_0, \lambda\ Z_0) = (q_1, SZ_0)$
3) **For every production**
   A -> a α
   Add the transition

$\delta(q_{1,}\ a, A) = (q_{1,}\ \alpha)$

Pop current Top of the Stack A and push α

4) $\delta(q_{1,} \lambda_, Z_0) = (q_f , Z_0)$

Note: Stack contents are nothing but the variables in the sentential form of corresponding string derivation by the grammar

Machine has the power of Non Determinism

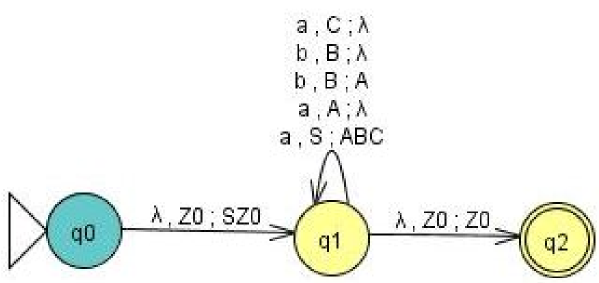
Example:

1) S -> aABC

A -> aB | a

B -> bA | b

C -> a



Consider the leftmost derivation string aababa

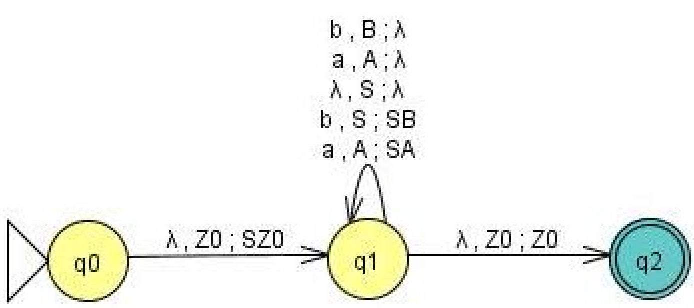
S ⇒ aABC
⇒ aaBBC
⇒ aabABC
⇒aabaBC
⇒aababC
⇒aababa

Instantaneous description

$\delta(q_0, aababa, Z_0) \vdash \delta(q_0, aababa, S\,Z_0)$
$\vdash \delta(q_0, ababa, ABC\,Z_0)$
$\vdash \delta(q_0, baba, BBC\,Z_0)$
$\vdash \delta(q_0, aba, ABC\,Z_0)$
$\vdash \delta(q_0, ba, BC\,Z_0)$
$\vdash \delta(q_0, a, C\,Z_0)$
$\vdash \delta(q_0, \lambda, Z_0)$
$\vdash (q_f, Z_0)$

Example 2:

S -> aSA | bSB | λ
A -> a
B -> b



Instantaneous description

$\delta(q_0, abaaba, Z_0) \vdash \delta(q_0, abaaba, S\,Z_0)$
$\vdash \delta(q_0, baaba, S\,AZ_0)$
$\vdash \delta(q_0, aaba, S\,BAZ_0)$
$\vdash \delta(q_0, \lambda aba, S\,ABAZ_0)$

$\vdash \delta(q_0, \quad aba, ABA Z_0)$
$\vdash \delta(q_0, \quad ba, BA Z_0)$
$\vdash \delta(q_0, \quad a, AZ_0)$
$\vdash \delta(q_0, \quad \lambda, Z_0)$
$\vdash (q_f \;, \; Z_0 \;)$ **(Accepted)**

Example 3:
S -> aSA | λ)
A -> bB
B -> b