

Que: →

$(q_0, \underline{aabb}, z_0)$

we start always
with initial state

Input strings

we start stack
top symbol with
 z_0

$(q_0, \underline{aabb}, z_0) \vdash (q_0, \overbrace{abb}^{\text{from (i)}}, \underline{az_0})$

$\vdash (q_0, \overbrace{bb}^{\text{from (ii)}}, \underline{aaz_0})$

$\vdash (q_1, \overbrace{b}^{\text{from (v)}}, \underline{aaz_0})$

$\vdash (q_1, \wedge, \underline{z_0})$ from (iii)

$\vdash (q_f, \wedge, \wedge)$ from (iv)

(Remaining
string to be
processed)

we get finally $(q_f, \wedge, \wedge)$

final state

string has
been processed
completely

stack is
empty

So we get

(i) final state

(ii) string has been processed completely

(iii) stack is empty

So string $aabb$ is accepted by this pushdown automata.

Suppose $\Sigma = \{a, b, c\}$

$A = (\{q_0, q_1, q_f\}, \{a, b, c\}, \{a, b, z_0\}, \delta, q_0, z_0, \{q_f\})$ is a pda, where δ is defined as.

$$\delta(q_0, a, z_0) = \{(q_0, a z_0)\} \quad \text{--- (i)}$$

$$\delta(q_0, b, z_0) = \{(q_0, b z_0)\} \quad \text{--- (ii)}$$

$$\delta(q_0, a, a) = \{(q_0, a a)\} \quad \text{--- (iii)}$$

$$\delta(q_0, b, a) = \{(q_0, b a)\} \quad \text{--- (iv)}$$

$$\delta(q_0, a, b) = \{(q_0, a b)\} \quad \text{--- (v)}$$

$$\delta(q_0, b, b) = \{(q_0, b b)\} \quad \text{--- (vi)}$$

$$\delta(q_0, c, a) = \{(q_1, a)\} \quad \text{--- (vii)}$$

$$\delta(q_0, c, b) = \{(q_1, b)\} \quad \text{--- (viii)}$$

$$\delta(q_0, c, z_0) = \{(q_1, z_0)\} \quad \text{--- (ix)}$$

$$\delta(q_1, a, a) = \{(q_1, \Lambda)\} \quad \text{--- (x)}$$

$$\delta(q_1, b, b) = \{(q_1, \Lambda)\} \quad \text{--- (xi')}$$

$$\delta(q_1, \Lambda, z_0) = \{(q_f, \Lambda, \Lambda)\} \quad \text{--- (xii')}$$

Que: input string is bacab.

Sol: (q_0, bacab, z_0)

Initial state

String to be processed

Initial stack symbol

$$\begin{aligned} (q_0, \text{bacab}, z_0) &\vdash (q_0, \text{acab}, b z_0) \quad \text{--- (i)} \\ &\vdash (q_0, \text{cab}, a b z_0) \quad \text{--- (ii)} \\ &\vdash (q_1, \text{ab}, a b z_0) \quad \text{--- (vii')} \\ &\vdash (q_1, \text{b}, b z_0) \quad \text{--- (x)} \\ &\vdash (q_1, \Lambda, z_0) \quad \text{--- (xi')} \\ &\vdash (q_f, \Lambda, z_0) \quad \text{--- (xii')} \end{aligned}$$

Final state

String has been processed

stack top is z_0

NOTE BOOK

If we can say that general $w \in w^T$ is accepted by this PDA A, where $w = \{a, b\}^*$

Soln (i) $aabbcbbaa$

$$w = aabb$$

$$w^T = bbaa$$

(ii) $ababcbaba$

$$w = abab$$

$$w^T = baba$$

Ques Input string $aacbb$

Soln $(q_0, aacbb, z_0) \vdash (q_0, acbb, a z_0) \text{ --- (i)}$

$\vdash (q_0, cbb, aa z_0) \text{ --- (ii)}$

$\vdash (q_1, bb, aa z_0) \text{ --- (iii)}$

There for no rule for further transition
So we will stop here.

Therefore this string $aacbb$ is not accepted by PDA because

(i) q_1 is not a final state

(ii) bb string remain to be processed.

(iii) Stack does not contain z_0 only or empty.

we see that $aacbb$

$$w = aa$$

$$w^T = bb \neq w^T$$