## Problem

Show that every DCFG generates a prefix-free language.

## Step-by-step solution

**Step 1** of 1

DCFG stands for deterministic context free grammars. It is subset of context-free grammars. DCFGs are derived from the deterministic pushdown automata (variation of pushdown automata) for generating deterministic context free languages.

Prefix-free language refers to language in which any of its members does not have any prefix. By contradiction, it can be proved that DCFG always generates prefix-free language. It is given below:

Consider there are two strings $w$ and $wz$ in $L(G)$, where $w$ and $wz$ are unequal strings, $L(G)$ is language of grammar and $G$ is DCFG. As both strings are valid, handles of them will exist. Both can be written as:

$w = xhy$ and

$$\begin{aligned} wz &= xhyz \\ &= xh\hat{y} \end{aligned}$$

'$h$' refers to handle of $w$.

Now consider $u$ and $uz$ valid strings as first reduced step of $w$ and $wz$. The process is continued till $S_1$ and $S_1z$, where $S_1$ refers to start variable. Since $S_1$ never appears at the right side, so $S_1z$ cannot be reduced. This leads to contradiction.

Comment