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8. Find canonical collection of LR(0) items of following grammar

$S \to Aa \mid bAc \mid Bc \mid bBa$
$A \to d$
$B \to d$

Augmented grammar is

$S' \to S$
$S \to Aa \mid bAc \mid Bc \mid bBa$
$A \to d$
$B \to d$

Soln

We obtain the canonical collection of sets of LR(0) items as follows

I_0 = closure $(\{S' \to S\})$
= $\{S' \to .S, S \to .Aa, S \to .bAc, S \to .Bc, S \to .bBa, A \to .d, B \to .d\}$

I_1 = goto (I_0, S)
= closure $(\{S' \to S.\})$
= $\{S' \to S.\}$

I_2 = goto (I_0, A)
= closure $(\{S \to A.a\})$
= $\{S \to A.a\}$

I_3 = goto (I_0, b)
= closure $(\{S \to b.Ac, S \to b.Ba\})$
= $\{S \to b.Ac, A \to .d, S \to b.Ba, B \to .d\}$

I_4 = goto (I_0, B) = closure $(\{S \to B.c\})$ = $\{S \to B.c\}$

$I_5 = goto(I_0, d) = closure(\{A \to d\cdot, B \to d\cdot\$\}) = \{A \to d\cdot, B \to d\cdot\$\}$

No possible goto for I_1

$I_6 = goto(I_2, a) = closure(\{S \to Aa\cdot\$\}) = \{S \to Aa\cdot\$\}$

$I_7 = goto(I_3, A) = closure(\{S \to bA\cdot c\$\}) = \{S \to bA\cdot c\$\}$

$I_8 = goto(I_3, d) = closure(\{A \to d\cdot, B \to d\cdot\$\}) = \{A \to d\cdot, B \to d\cdot\$\}$

$I_9 = goto(I_3, B) = closure(\{S \to bB\cdot a\$\}) = \{S \to bB\cdot a\$\}$

$I_{10} = goto(I_4, c) = closure(\{S \to Bc\cdot\$\}) = \{S \to Bc\cdot\$\}$

No possible goto for I_5, I_6

$I_{10} = goto(I_7, c) = closure(\{S \to bAc\cdot\$\}) = \{S \to bAc\cdot\$\}$

$I_{11} = goto(I_8, a) = closure(\{S \to bAa\cdot\$\}) = \{S \to bAa\cdot\$\}$

No possible goto for I_9, I_{10} & I_{11}, So none finished step and total number of state = 12

Canonical collection of sets of LR(0) in figure