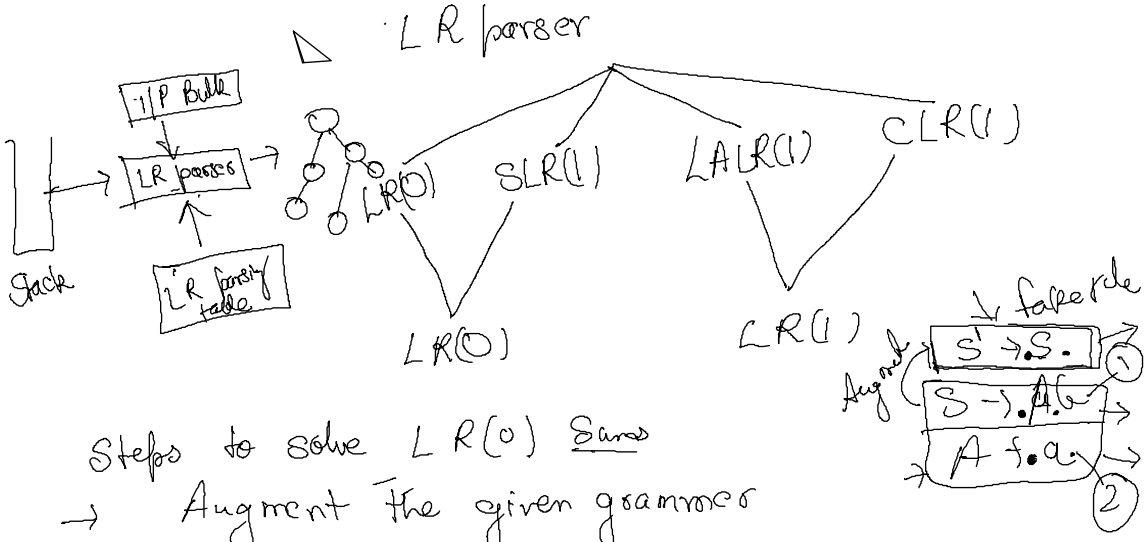
LR(0)

07 September 2022 08:38

LR parser → Bottom top approach



Steps to solve LR(0) Sums

→ Augment the given grammer
→ Number the production
→ Draw conical collection of LR(0) item (DFD
→ Create the parsing table → Grammer to be passed LR(0) or not
→ Stack implementation
→ Draw parse tree

I → cc dd $

Q
E → BB
B → cB
B → d → LR(0) or not?
cc dd $ → accepted or not - ?

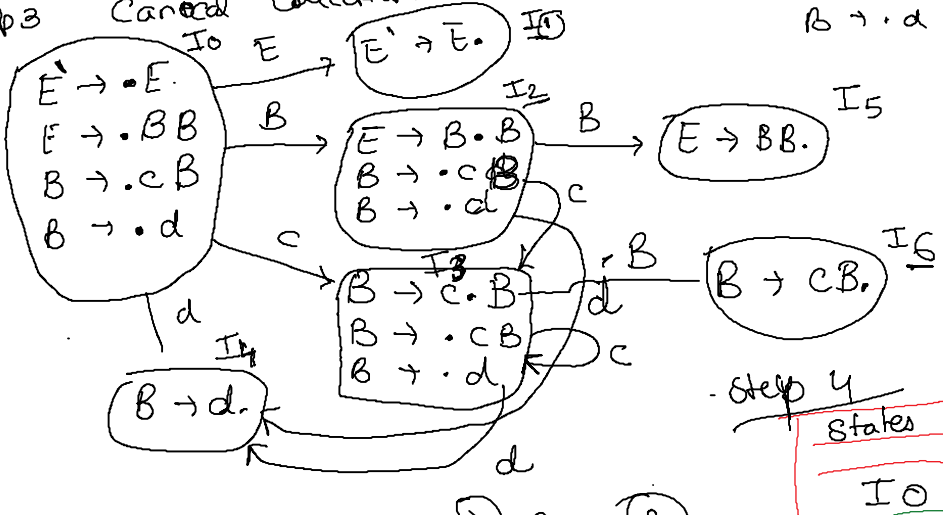
Solution

Step 1 → Augment the given grammer

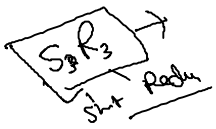
E' → E ← Augmented
E → BB → (1)
B → cB → (2)
B → d → (3)

Step 2 ~~Draw the~~ Number the production

Step 3 Canonical Collection DFD



B → c.B
B → .cB
B → .d

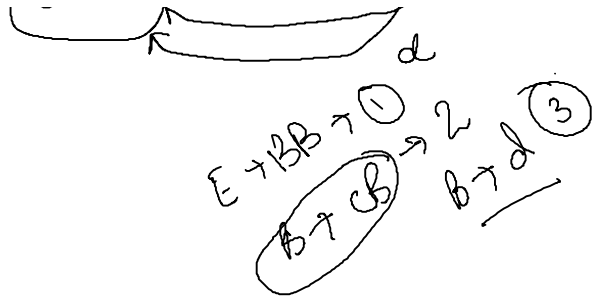


Shift-S
reduce-r

Step 4

Parsing Table

States	Action			Goto	
	c	d	$	E	B
I0	S3	S4		1	2



States	c	d	$	E	B
I0	S3	S4		1	2
I1			Accept		
I2	S3	S4			5
I3	S3	S4			6
I4	r3	r3	r3		
I5	r1	r1	r1		
I6	r2	r2	r2		

Step 5

Stack implementation →

$E' \to E$

$E \to BB \to (1)$

$B \to CB \to (2)$

$B \to d \to (3)$

cc dd $

Stack	Input
$0	cc dd $
$0c3	c dd $
$0c3c3	dd $
$0c3c3d4	d $
$0c3c3B6	d $
$0c3B6	d $
$0B2d4	$
$0B2B5	$
$0E1	$

Action

Shift c in Stack get the state 3

Shift c in Stack get the state 3

Shift d in stack get state 4

reduce r3 B → d

reduce r2 B → CB

reduce r2 B → CB

Shift d → state 4

reduce r3 B → d

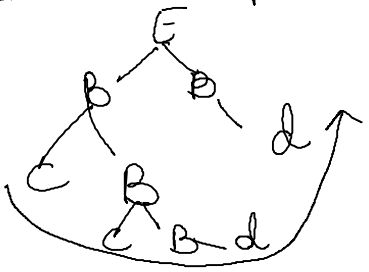
reduce r1 E → BB

Accepted

Step 6

Draw the parse tree.

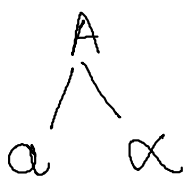
cc dd $



proved

first(A) → contain all terminals/epsilon in the first place of every string derived by A

① $A \to a\alpha$



first(A) → {a}

② $A \to \epsilon$

first(A) → {ϵ}

③ $A \to B$
$B \to C$
$C \to id$ first(A) = ?

$A \to B \to C \to \underline{id}$

first(A) → {id}

④ $A \to a \to$ first(A) = {a}

$B \to (c) \mid id \to$ first(B)

$B \to (c) \to$ first(B) = {c, id}

$B \to \underline{id}$

$C \to *T \mid \epsilon$
$C \to *T$ first(C) → {*, ϵ}
$C \to \epsilon$

⑤ $S \to ABC \mid ghi \mid jkl$
$A \to a \mid b \mid c$
$B \to b$
$D \to d$

first(S) = ? − ?

{a g j}

$S \to \underline{A}BC$ ⟶ first S = first(A)
$S \to ghi$

S → ghi
S → jkl
A → a
A → b
A → c

→ first S = { a, b, c, g, j }

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(6)

$E \to TE'$

$E' \to *TE' \mid \epsilon$

$T \to FT'$

$T' \to \epsilon \mid +FT'$

$F \to id \mid (E$

first (E) → { id, (}

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(7)

$S \to ABC$

$A \to a \mid b \mid \epsilon$

$B \to c \mid d \mid \epsilon$

$C \to e \mid f \mid \epsilon$

first (S) → first (A)

{ a, b, c, d, e, f, ε }

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follow (A) → contain set of all terminals presents immediate to right of 'A'

Rules → follow of start symbol is $

FO(A) = { $ }

(1). $A \to \alpha B \beta$

$B \to a$

follow of (B) → { first(β) } → { a }

→ first find what is after B then find the first of that element

(2)

$A \to \alpha B \beta$

$\beta \to \epsilon$

follow of (B) → follow(A) → { $ }

→ first β − { ε } X → (S)

→ follow

rule → we don't take ∈ as the result of follow
→ follow of first Element → {$}

(3) $E \to T E'$

follow(E) → {$}

follow E' → {$}

(4) $A \to \alpha B \beta$

$B \to a \mid \in$

follow B → {a, follow of A}

→ {a, $}

(5) $E \to A B$

$B \to \alpha$

$A \to T E \in$

$E \to + F \mid id$

follow(T) → {+, id}

follow(E) → follow of {A}

(6) $S \to AaAb \mid BbBa$

follow A = {a, b}

$S \to AaAb$

$S \to BbBa$

(7) $S \to aSbS \mid bSaS \mid \in$

follow(S) → {b, a, $}

(8) $S \to ABC$

$A \to DEF$

$B \to \in$

$C \to \in$

follow(A) →

C → £

D → €

E → £

F → €

$