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Parsing-VIII

Complete Course on Compiler Design

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LR(0)-PT construction

1. Closure() 2. Goto()

ex

G: $S \to AA$
$A \to aA \mid b$

$G' = S' \to S$
$S \to AA$
$A \to aA \mid b$

Augmented Grammar

$S \to \cdot x y z$
$S \to x \cdot y z$
$S \to x y \cdot z$
$S \to x y z \cdot$

LR(0)-items

completed LR(0)-item
(or) Final "
(or) reduced "

Closure()

G: $S \to AA$
$A \to aA \mid b$

ex

Closure($S \to A \cdot A$)

1. $S \to A \cdot \underline{A}$
2. $A \to \cdot \underline{a} A$
   $\cdot \underline{b}$

ex

clo($S' \to \cdot S$) =

1. $S' \to \cdot \underline{S}$
2. $S \to \cdot \underline{A} A$
3. $A \to \cdot aA$
   $\cdot b$

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ex

closure $(A \rightarrow \cdot aA)$

$\Downarrow$

(1) $A \rightarrow \cdot aA$

(2)

ex

closure $(S \rightarrow \cdot AA)$

$\Downarrow$

(1) $S \rightarrow \cdot AA$

(2) $A \rightarrow \cdot aA$

$A \rightarrow \cdot b$

Definition

closure (I) = (1) add I

(2) If $A \rightarrow B C \cdot D E$ is I & $D \rightarrow FH$ is in G then add $D \rightarrow \cdot FH$ to closure (I)

(3) repeat 2nd step for every newly added LR(0)-item.

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Goto()

G: S → AA
A → aA/b

⇓

G': S' → S
S → AA
A → aA|b

ex

goto(S → ·AA, A)

⇓

① S → A·A
② A → ·aA
·b

ex

goto(A → ·aA, a)

⇓

① A → a·A
② A → ·aA
·b

ex

goto(A → a·A, A)

⇓

① A → aA·

Def

goto(I, x)

① add-I by moving dot after x.
② applying closure (1st step)

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Algo

① I_0 = closure (Augmented LR(0)-item)

② using I_0 construct DFA

③ convert DFA into LR(0)-PT.

	action			goto	
	a	b	$	S	A
0	s_3	s_4		1	2
1			acc		
2	s_3	s_4			5
3	s_3	s_4			6
4	r_2	r_2	r_3		
5	r_1	r_1	r_1		
6	r_2	r_2	r_2		

LR(0)-PT

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Construct LR(0)-PT for the following grammar

ex

G: $S \to AA$ (1)

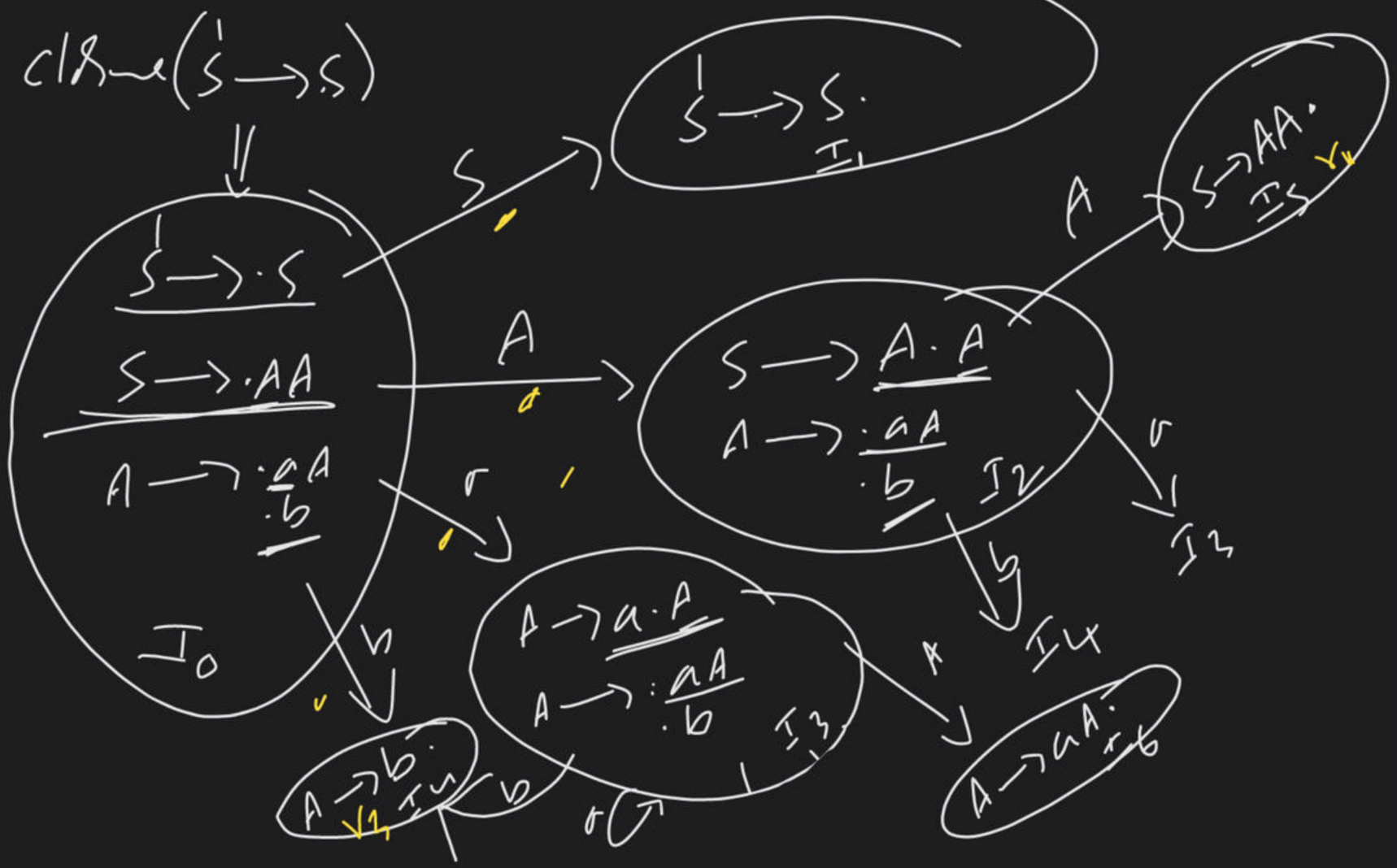
$A \to aA \mid b$ (2) (3)

G': $S' \to S$

$S \to AA$

$A \to aA$

b



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ex

$S \to (L) \mid a$ (1, 2)

$L \to L, S \mid S$ (3, 4)

Left R ✓

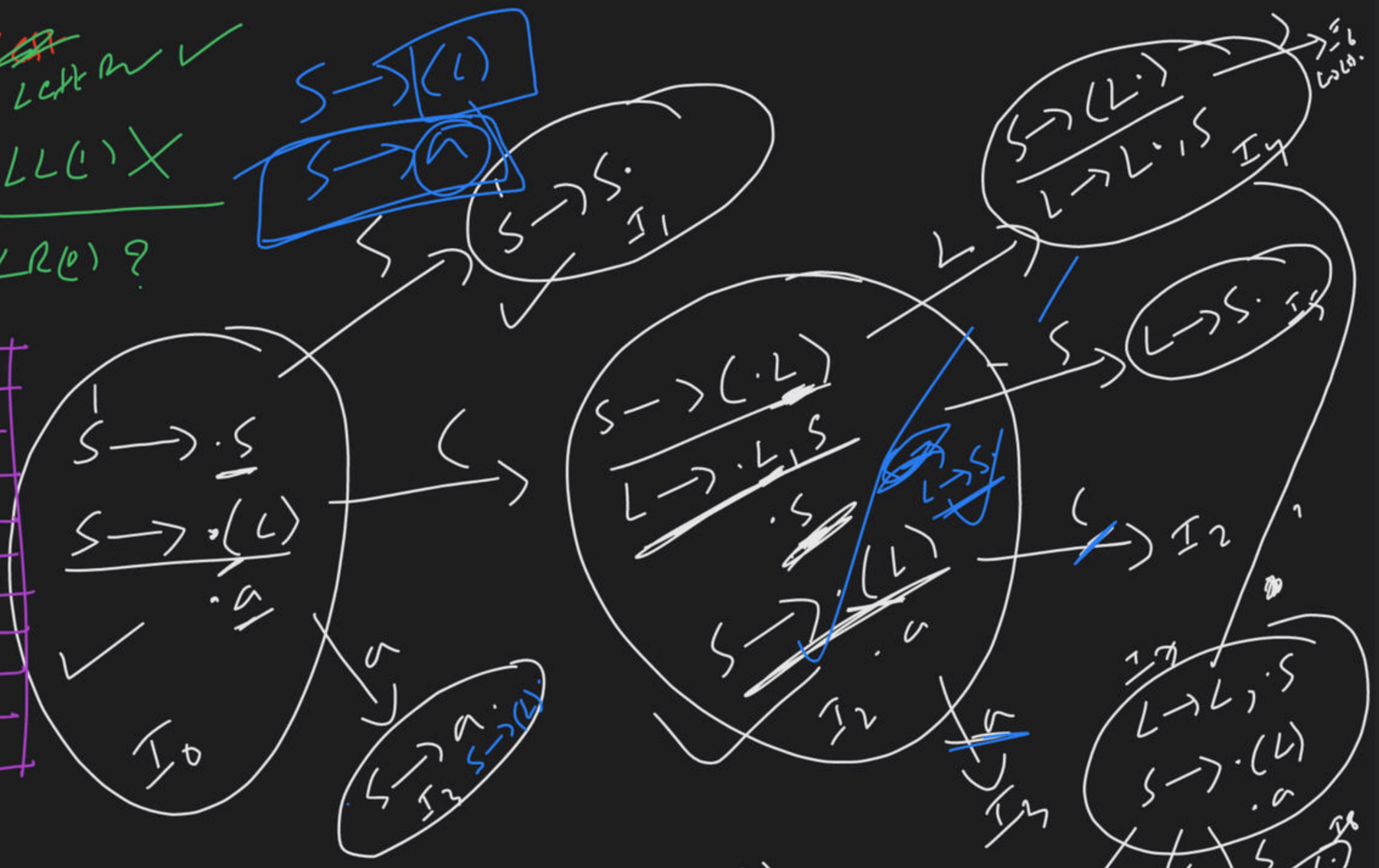
LL(1) ✗

LR(0) ?

$S \to (L)$

$S \to a$

	action					goto	
	)	a	(	)	$	S	L
0		s_3	s_2			1	
1					acc		
2	r_4	s_3	s_2	r_4	r_4	5	4
3	r_2	r_2	r_2	r_2	r_2		
4	s_7			s_6			
5	r_4	r_4	r_4	r_4	r_4		
6	r_1	r_1	r_1	r_1	r_1		
7		s_3	s_2			8	
8	r_3	r_3	r_3	r_3	r_3		



RR

SR

R5

SR ✓

no-conflict

⟹ LR(0), SLR(1), LALR(1), CLR(1)