CS & IT ENGINEERING

Compiler Design

Lexical Analysis & Syntax Analysis

Lecture No. 7

By- DEVA Sir

01 Closure ( )

02 goto ( )

03 LR(0) DFA

04 Conflicts in LR(0)

05

closure ( ) : It is set of items

$$closure(X \to \alpha \cdot Y\beta)$$

$$= \{ X \to \alpha \cdot \boxed{Y} \beta \}$$

$Y \to \cdot t_1 \ldots$

$Y \to \cdot \boxed{Z} \ldots$

$Y \to \cdot t_2 \ldots$

$Z \to \cdot \alpha_1$

$Z \to \cdot \alpha_2$

$\}$

closure is recursive call applied on every item.

$S \rightarrow AaB$

$A \rightarrow d$

$B \rightarrow f$

$\Rightarrow$

$S' \rightarrow S$

$S \rightarrow AaB$

$A \rightarrow d$

$B \rightarrow f$

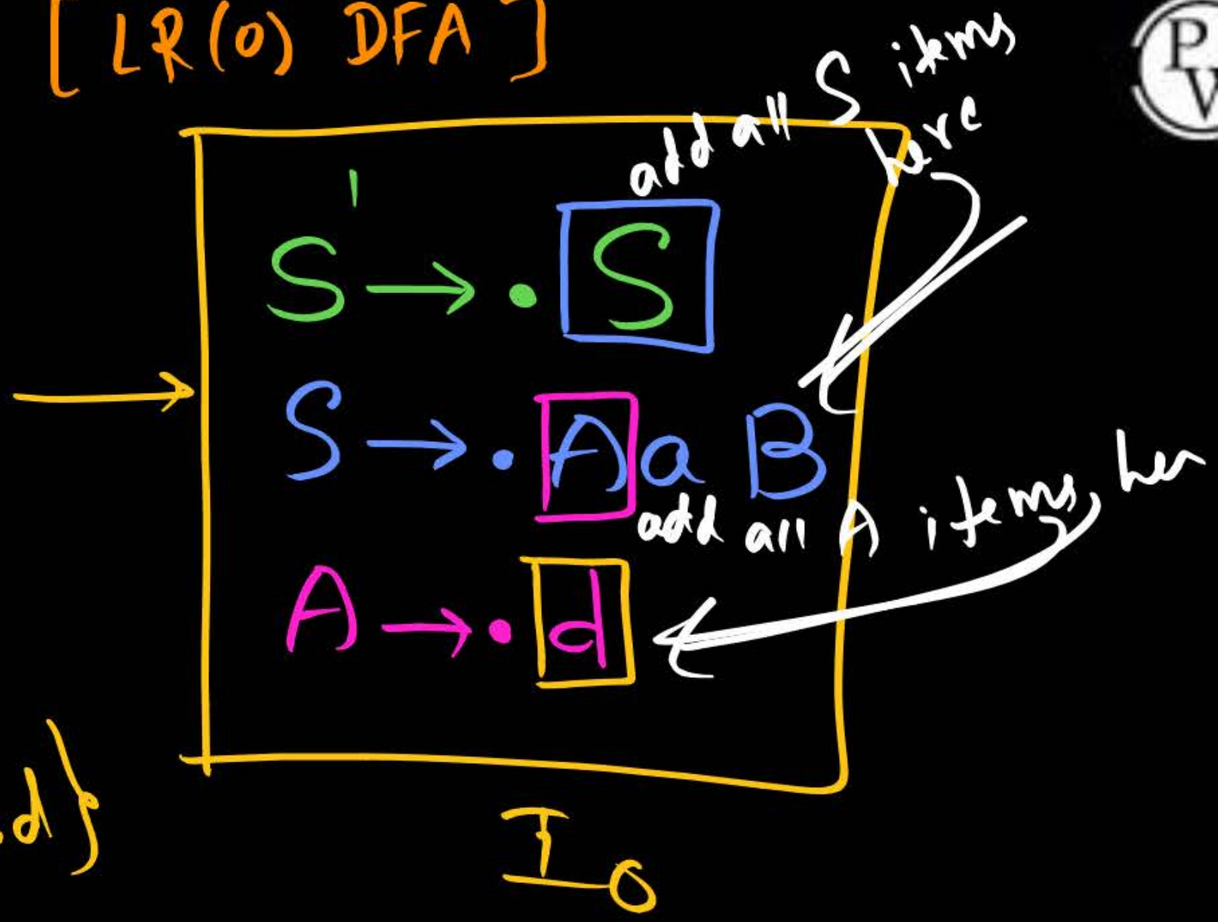
Augmented CFG

LR(0) parsing Diagram [LR(0) DFA]

$S' \to S$
$S \to AaB$
$A \to d$
$B \to f$

$I_0 = \text{closure}(S' \to \cdot S)$

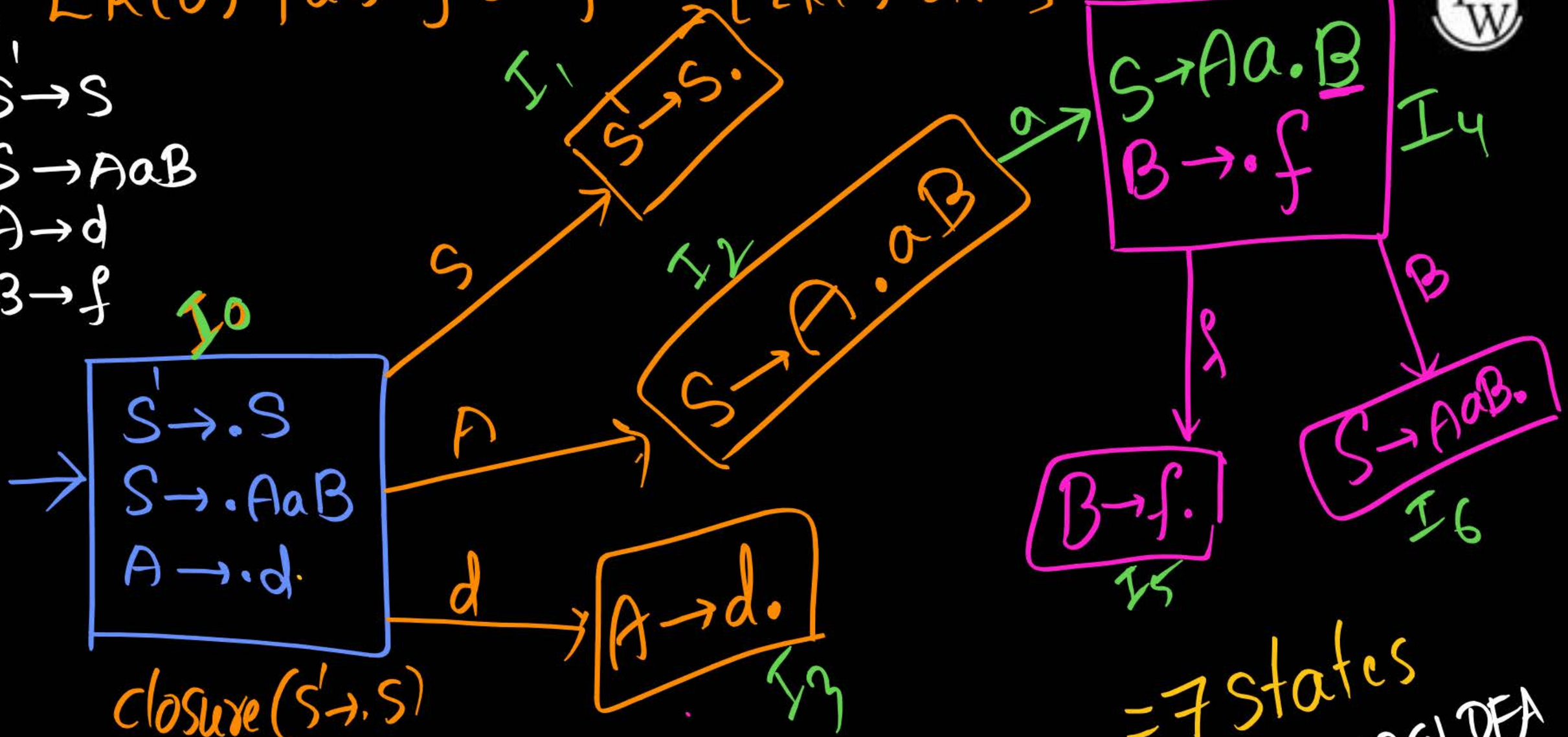
$= \{S' \to \cdot S,\ S \to \cdot AaB,\ A \to \cdot d\}$



LR(0) parsing Diagram [LR(0) DFA]

(1)

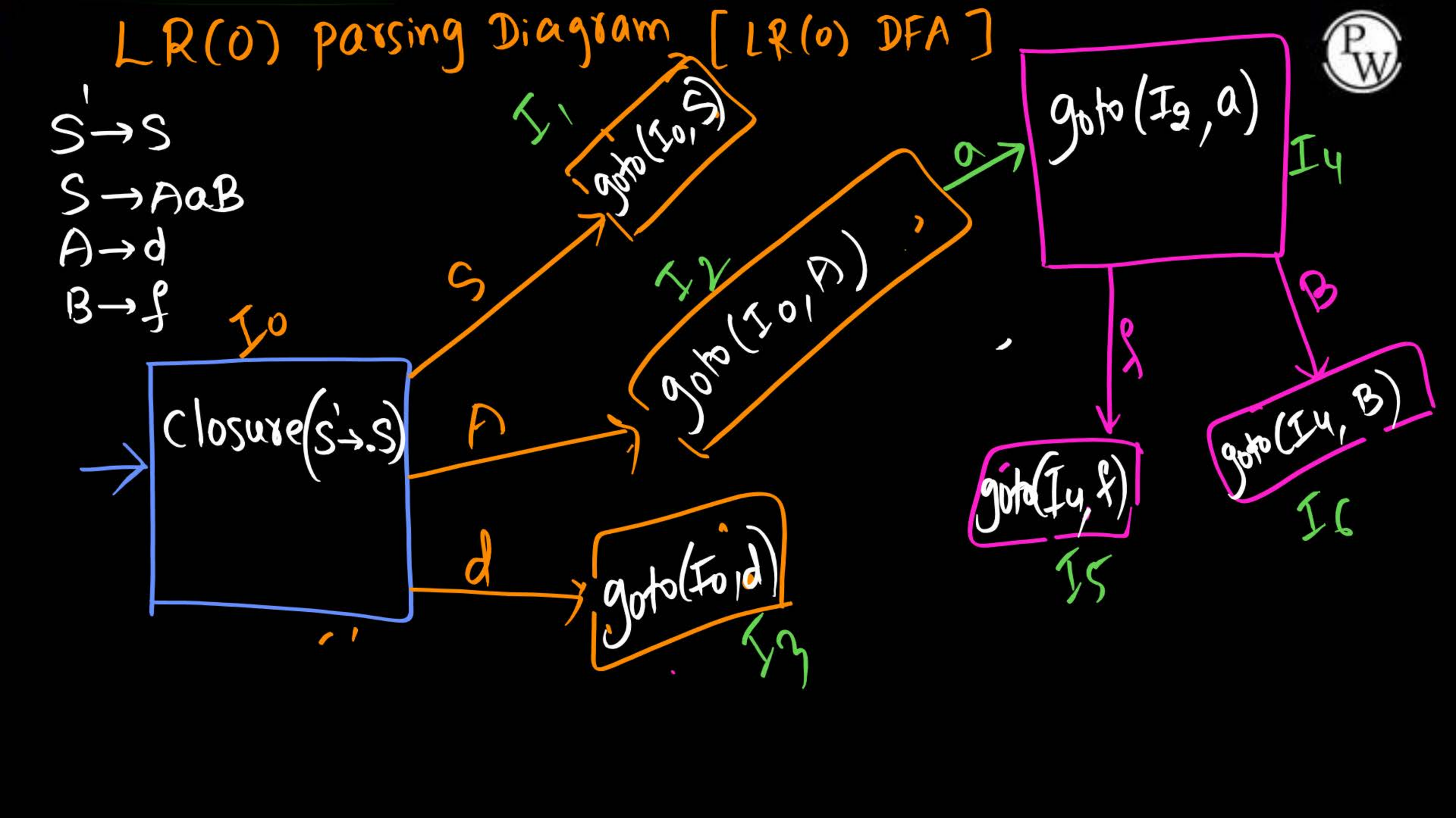
$S' \to S$
$S \to AaB$
$A \to d$
$B \to f$

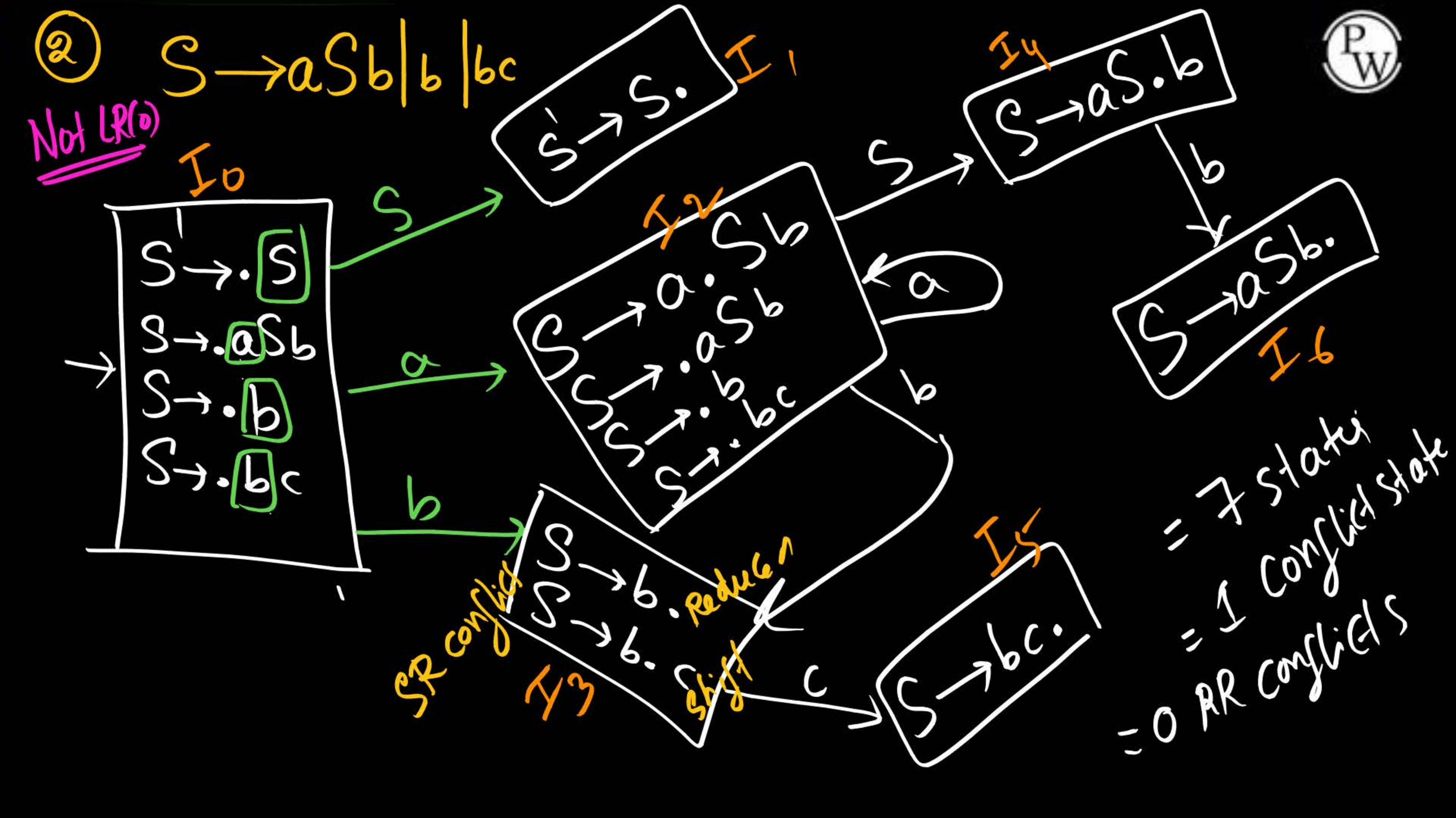


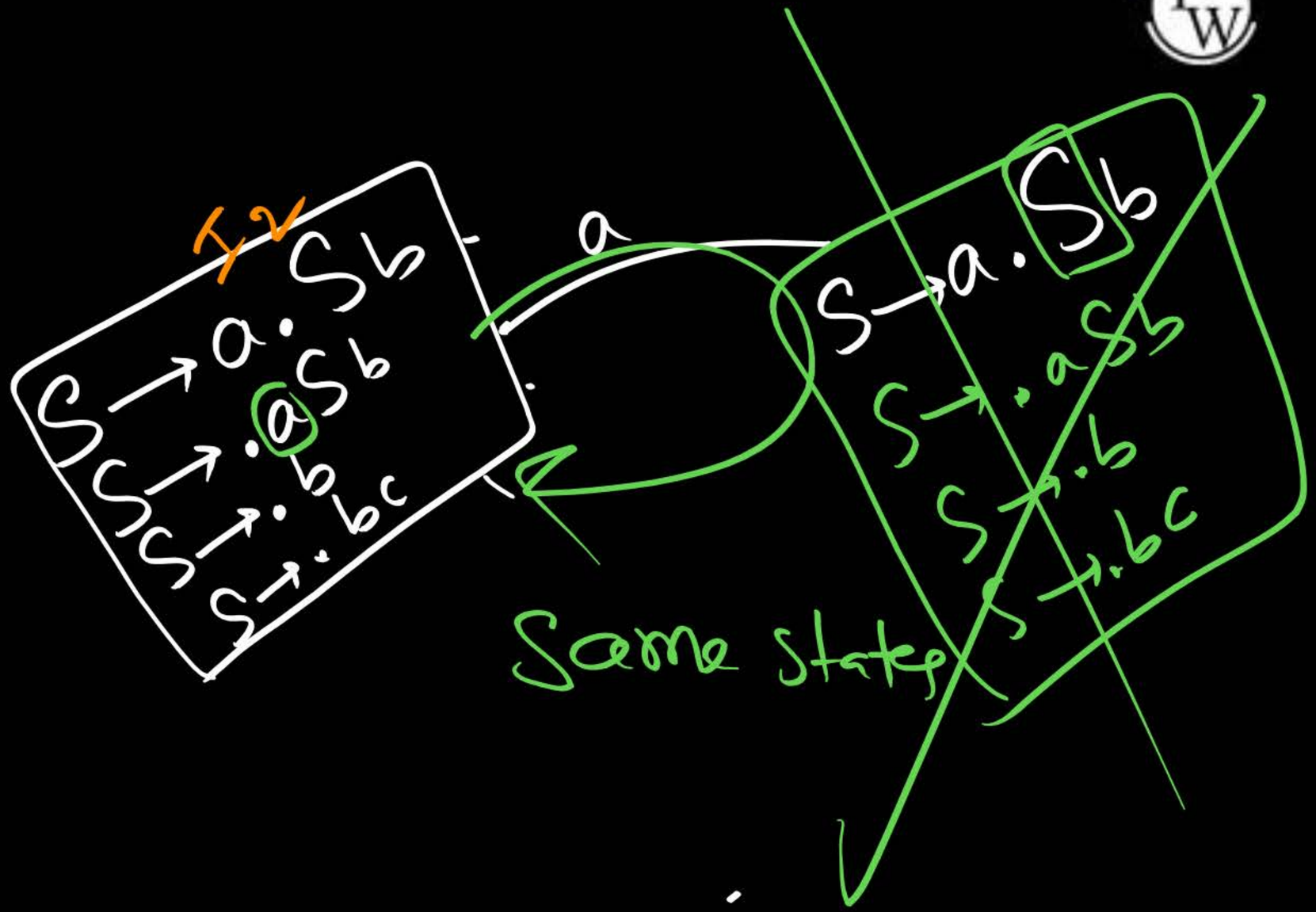
= 7 states

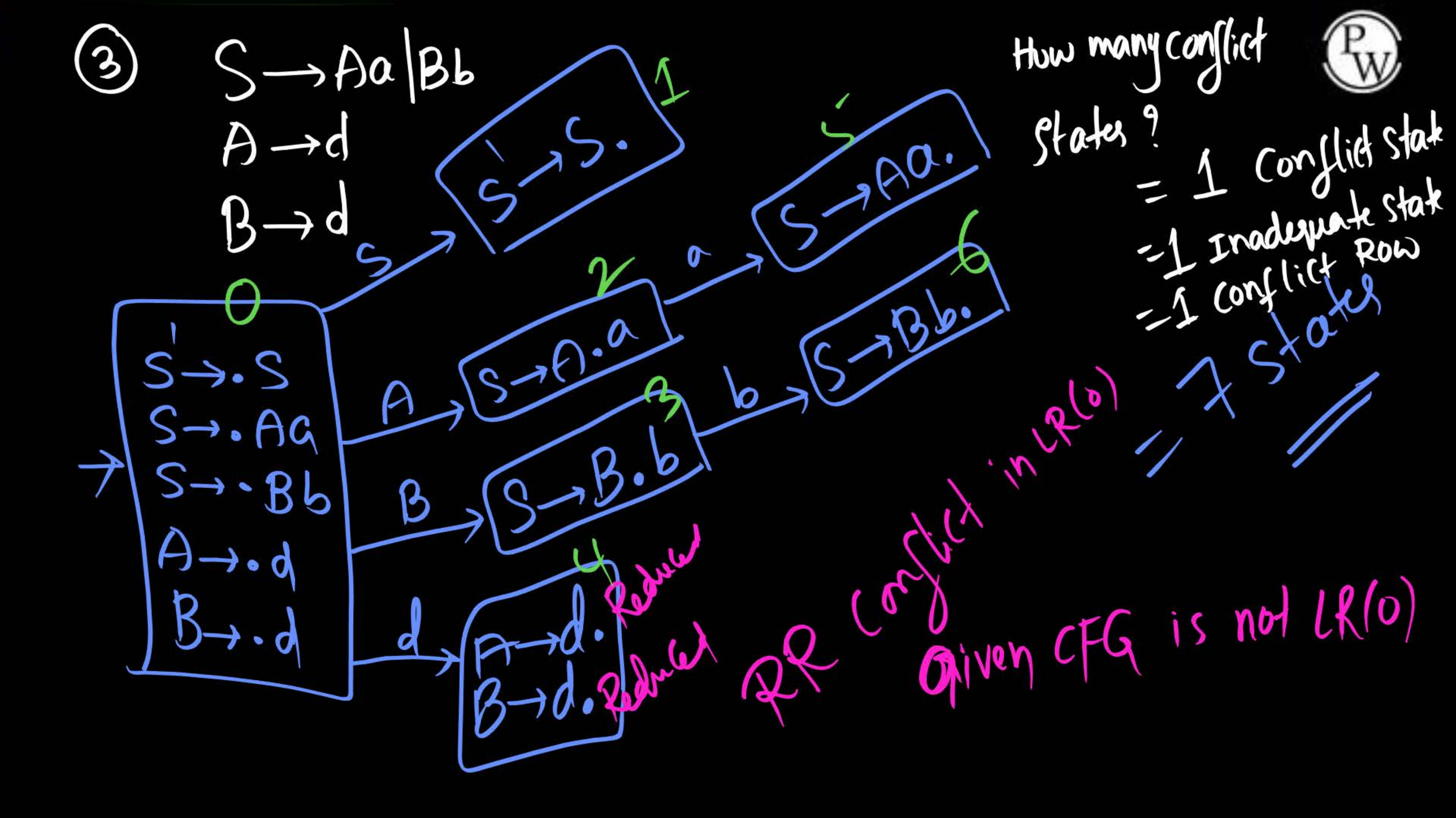
No conflict in LR(0) DFA

LR(0) parsing Diagram [LR(0) DFA]




② S → aSb | b | bc
Not LR(0)
I0
S' → .S
S → .aSb
S → .b
S → .bc
S
a
b
I1
S' → S.
I2
S → a.Sb
S → .aSb
S → .b
S → .bc
I3
S → b.
S → b.
SR conflict
Reduce
Shift
I4
S → aS.b
I5
S → bc.
c
I6
S → aSb.
= 7 states
= 1 Conflict state
= 0 RR Conflicts


S → a . Sb
S → . aSb
S → . b
S → . bc
a
S → a . Sb
S → . aSb
S → . b
S → . bc
Same state


③
S → Aa | Bb
A → d
B → d
How many conflict States ?
= 1 Conflict Stat
=1 Inadequate Stat
=1 Conflict Row
= 7 States
0
S' → .S
S → .Aa
S → .Bb
A → .d
B → .d
S
1
S' → S.
A
2
S → A.a
a
S → Aa.
B
3
S → B.b
b
S → Bb.
d
4
A → d.
B → d.
Reduced
Reduced
RR Conflict in LR(0)
Given CFG is not LR(0)

Note :

	a	b	d	$
I4	A → d B → d	A → d B → d	A → d D → d	A → d B → d

4 RR Conflicts

In DFA, state 4 has only one RR combination, but that can lead multiple RR conflicts in table.

How to find conflicts in LR(0) parsing DFA?

I) SR conflict [Shift - Reduced conflict]

If state has both shift item & Reduced item
then we say SR conflict.

II) RR conflict [Reduced - Reduced conflict]

If State has atleast 2 reduced items
then we say RR conflict.

④ $S \rightarrow a \mid \epsilon$

H.W.

$R_1 = \cdot\varepsilon$

$R_2 = \varepsilon\cdot$

$R_3 = \cdot$

$\Big\}\ \rho = \cdot$

all are same

Summary

- LR(0) DFA ✓


THANK YOU
GW
SOLDIERS !