Chapter 6

Bottom-Up Parsing

A Bottom-up Parse

int * int + int

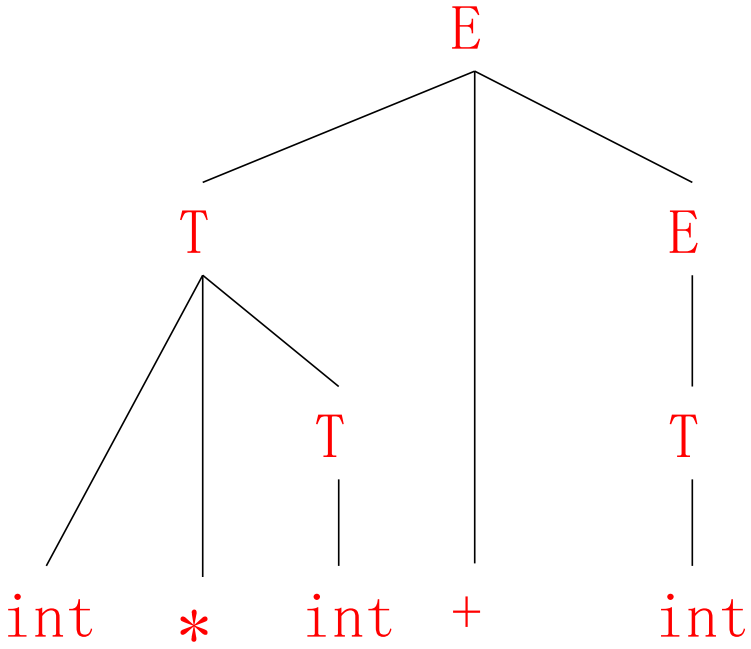
int * T + int

T + int

T + T

T + E

E



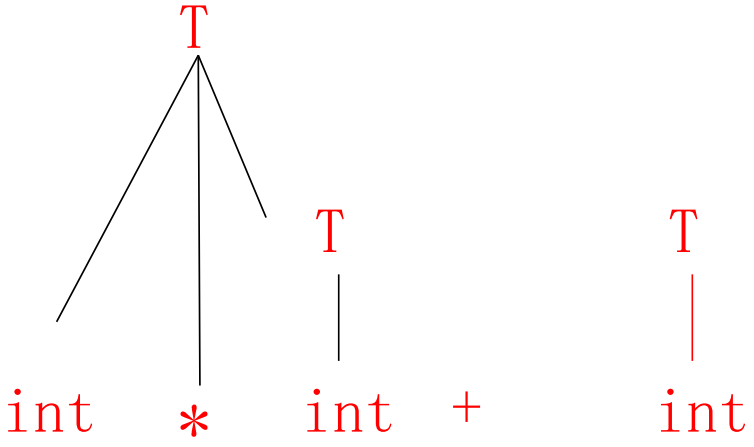
A Bottom-up Parse in Detail (4)

int * int + int

int * T + int

T + int

T + T



A Shift-Reduce Parse in Detail (11)

|int * int + int

int | * int + int

int * | int + int

int * int | + int

int * T | + int

T | + int

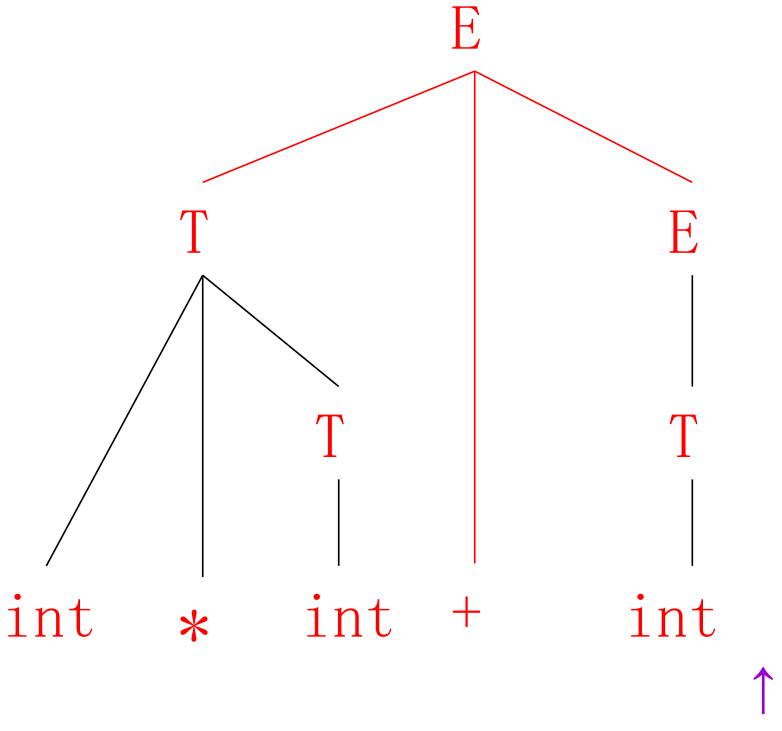
T + | int

T + int |

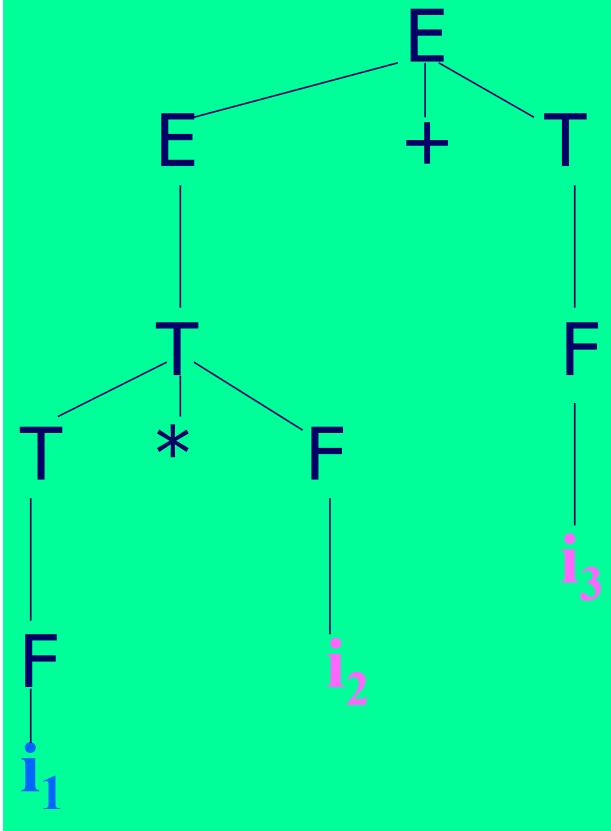
T + T |

T + E |

E |



Example : i*i+i



G[E]: E→E+T|T
T→T*F|F
F→(E)|i

Pattern: i*i+i

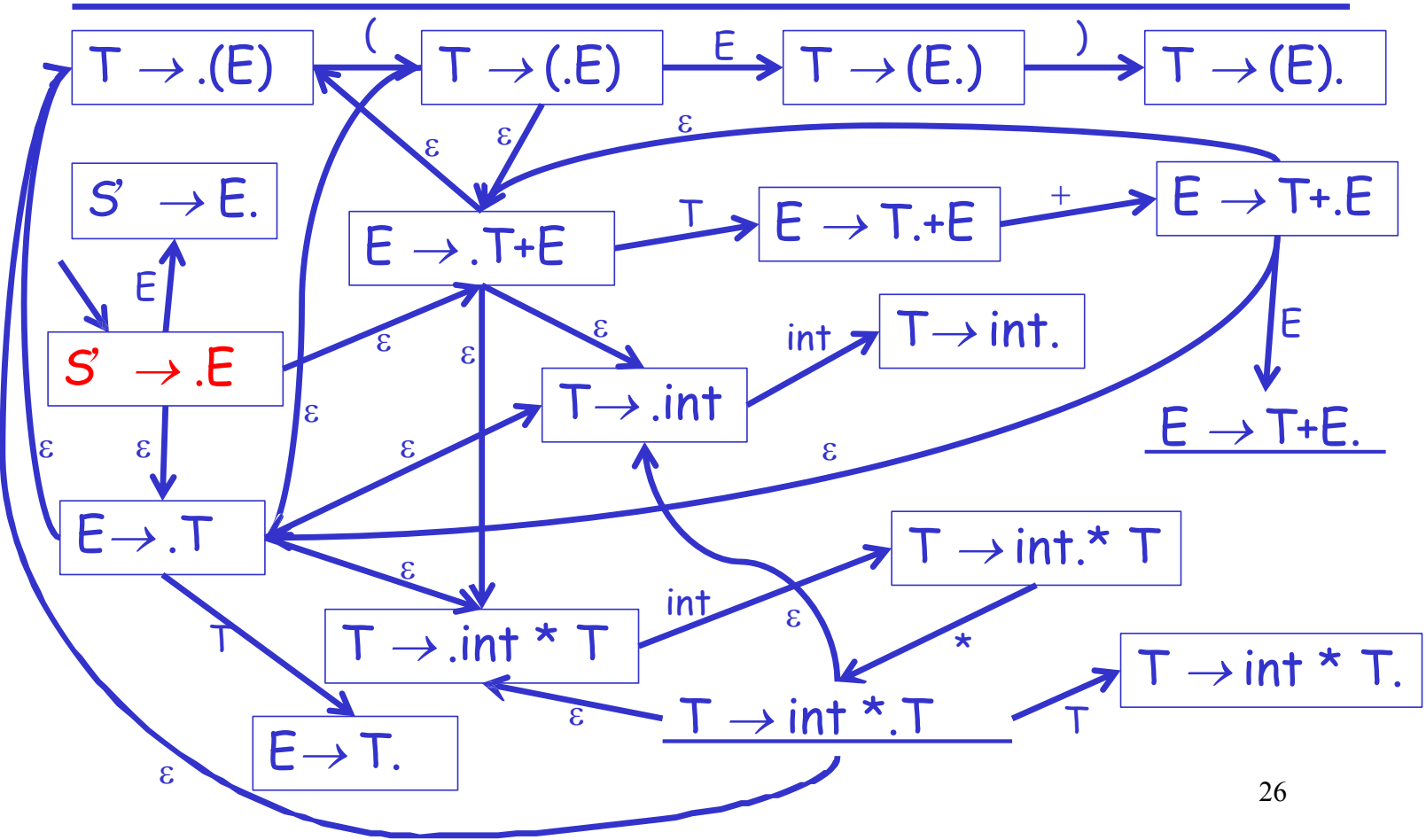
Phrase: $i_1 * i_2 + i_3$, $i_1 * i_2$, i_1, i_2, i_3

Immediate phrase: i_1, i_2, i_3

Handle: i_1

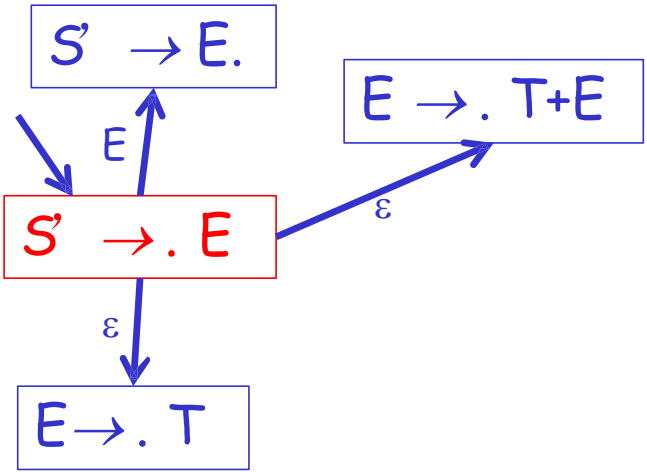
NFA for Viable Prefixes

$S' \rightarrow E$
$E \rightarrow T + E \mid T$
$T \rightarrow int * T \mid int \mid (E)$



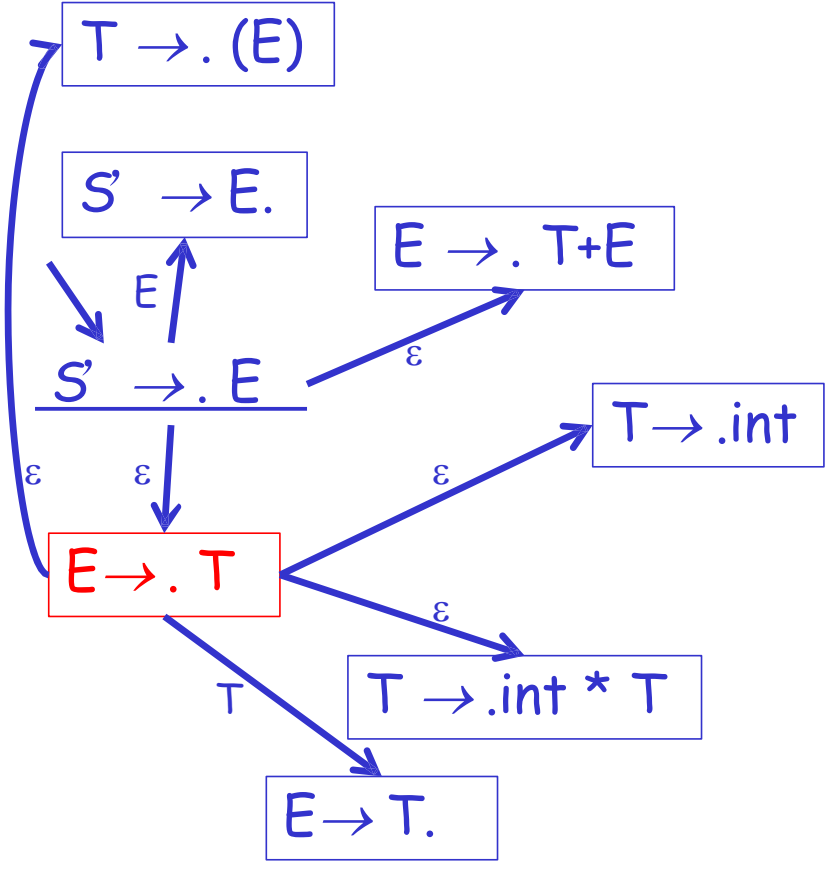
E → T + E | T
T → int * T | int | (E)

NFA for Viable Prefixes

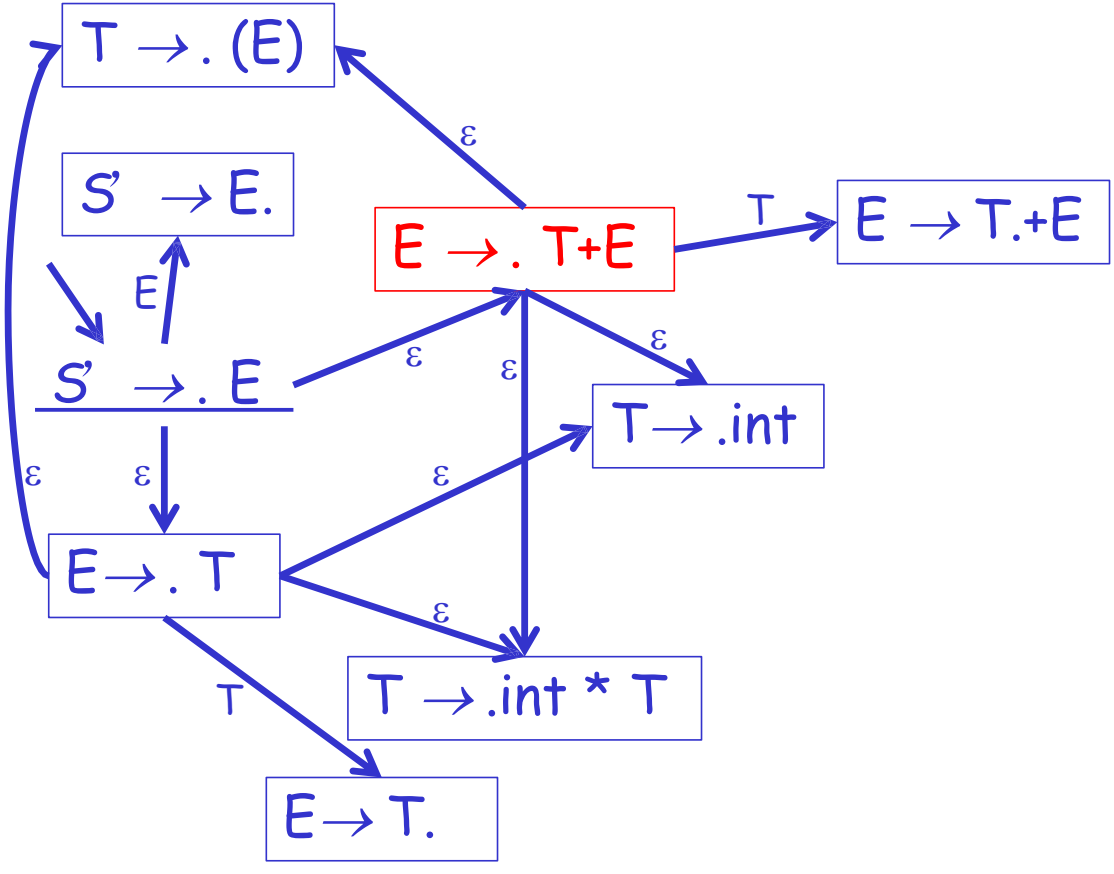


E → T + E | T
T → int * T | int | (E)

NFA for Viable Prefixes

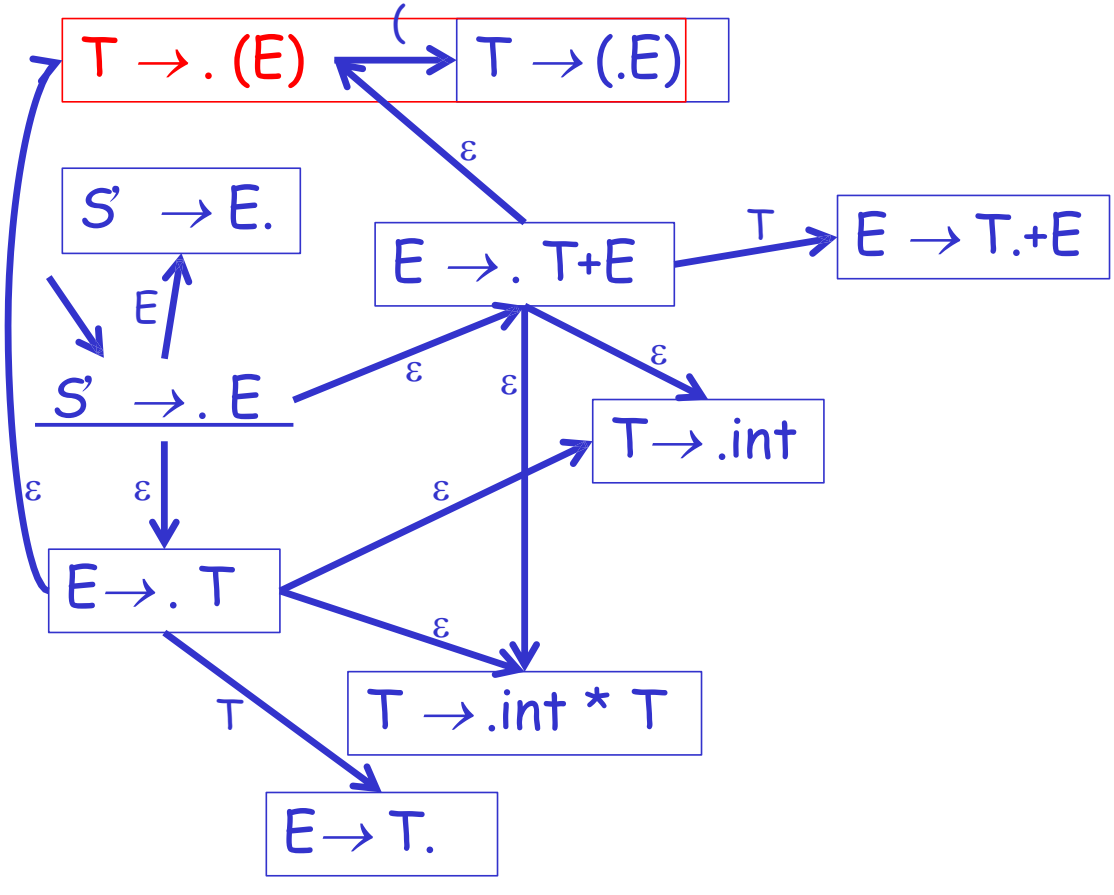


NFA for Viable Prefixes



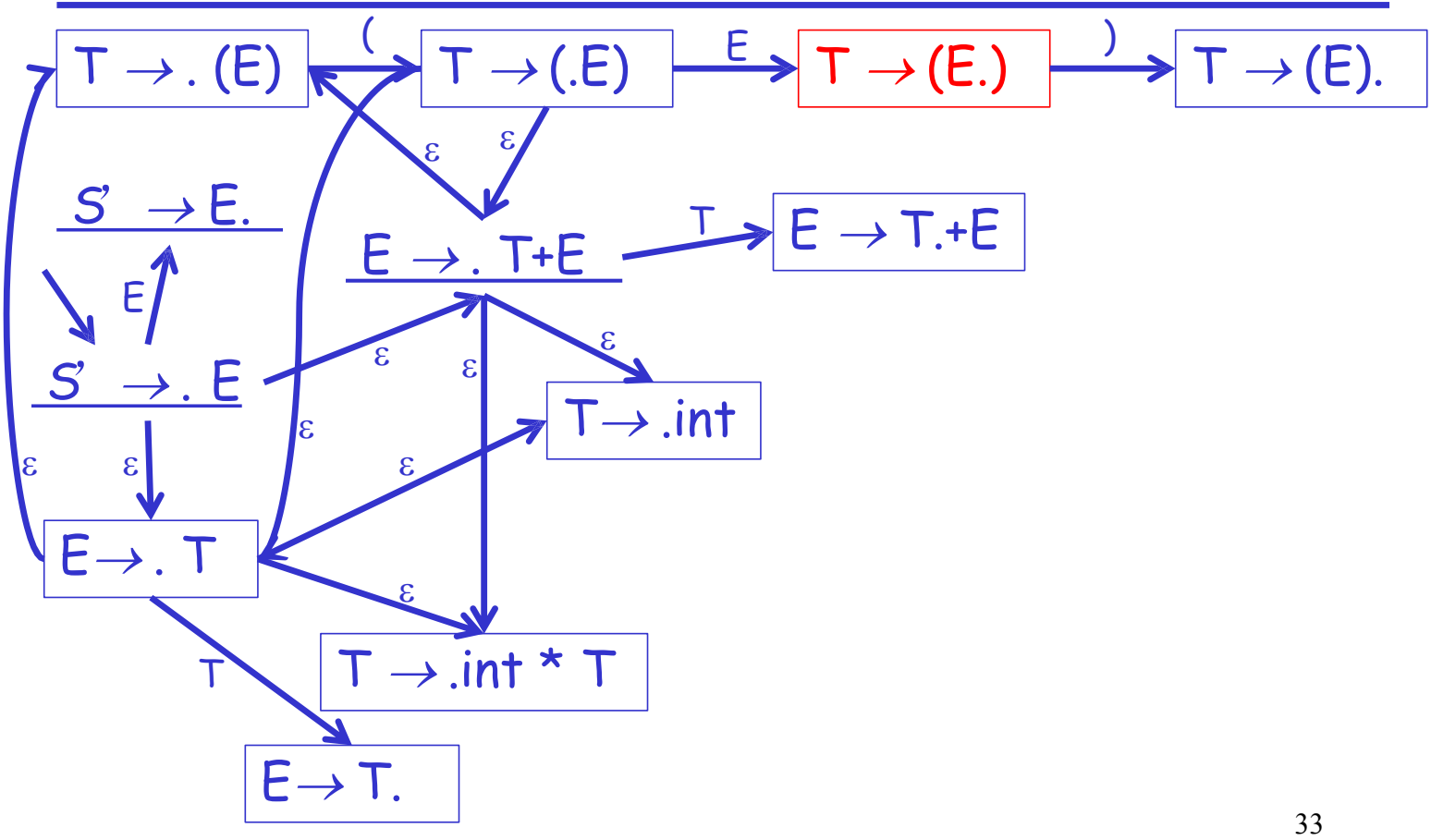
E → T + E | T
T → int * T | int | (E)

NFA for Viable Prefixes



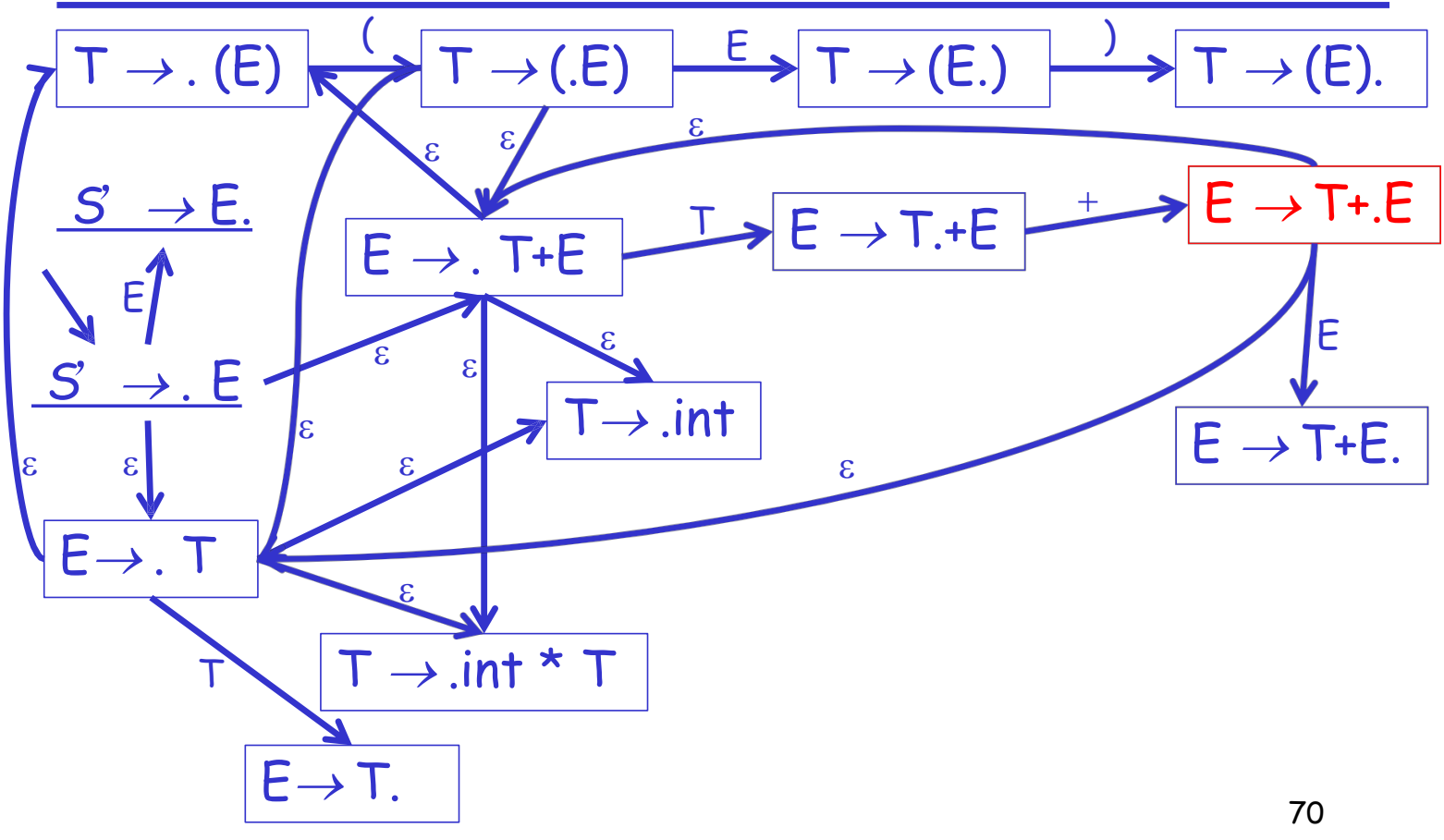
E → T + E | T
T → int * T | int | (E)

NFA for Viable Prefixes



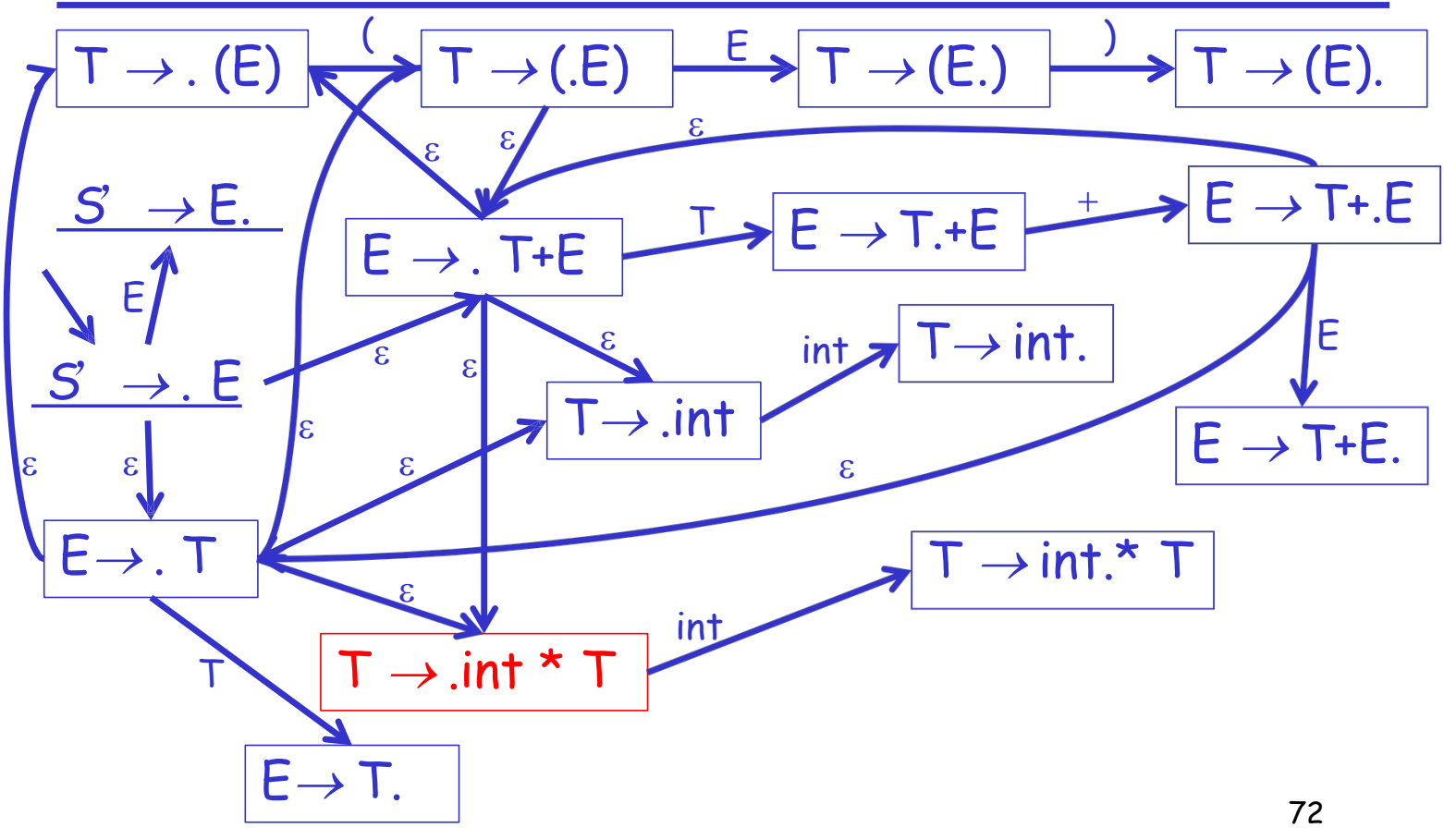
E → T + E | T
T → int * T | int | (E)

NFA for Viable Prefixes



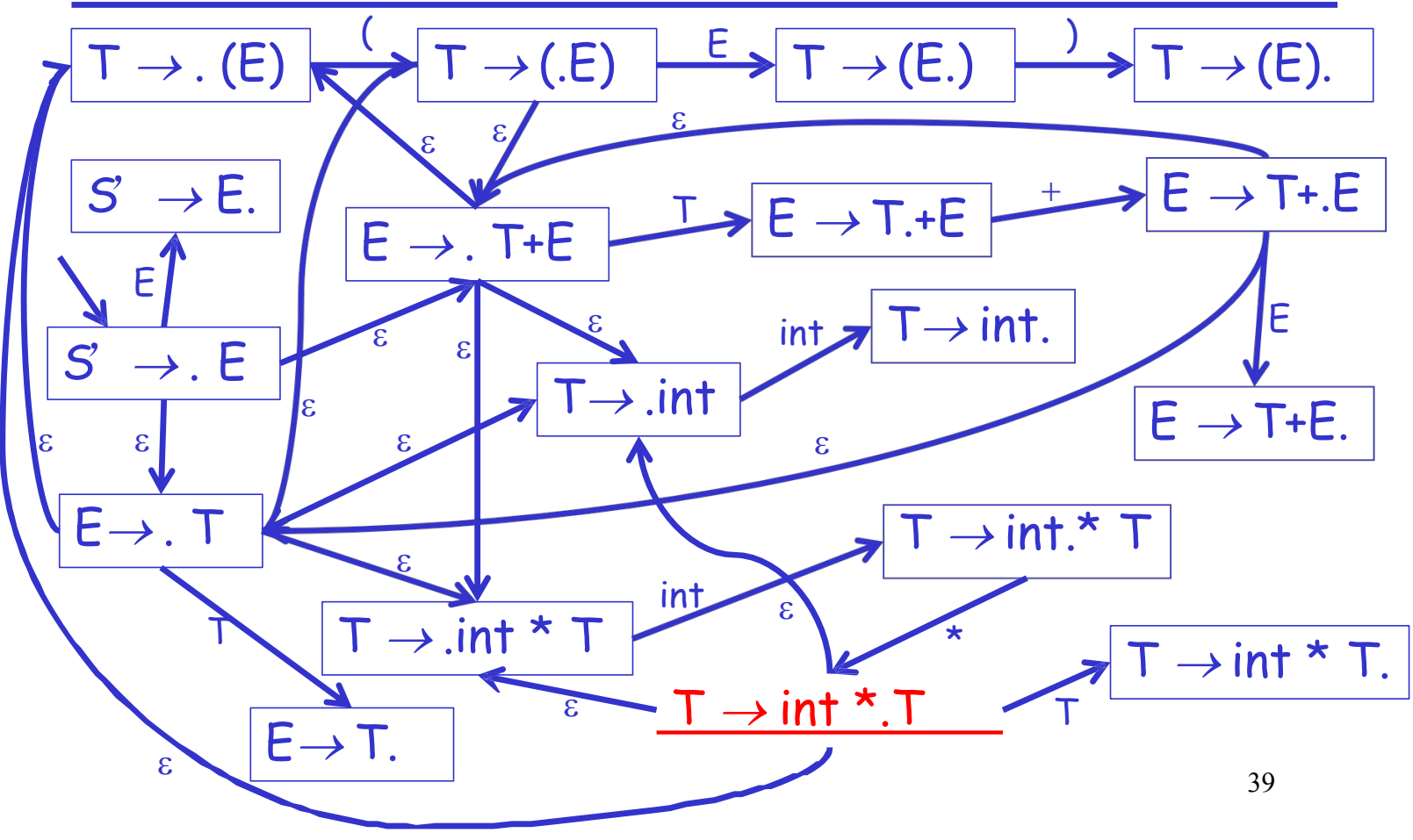
E → T + E | T
T → int * T | int | (E)

NFA for Viable Prefixes

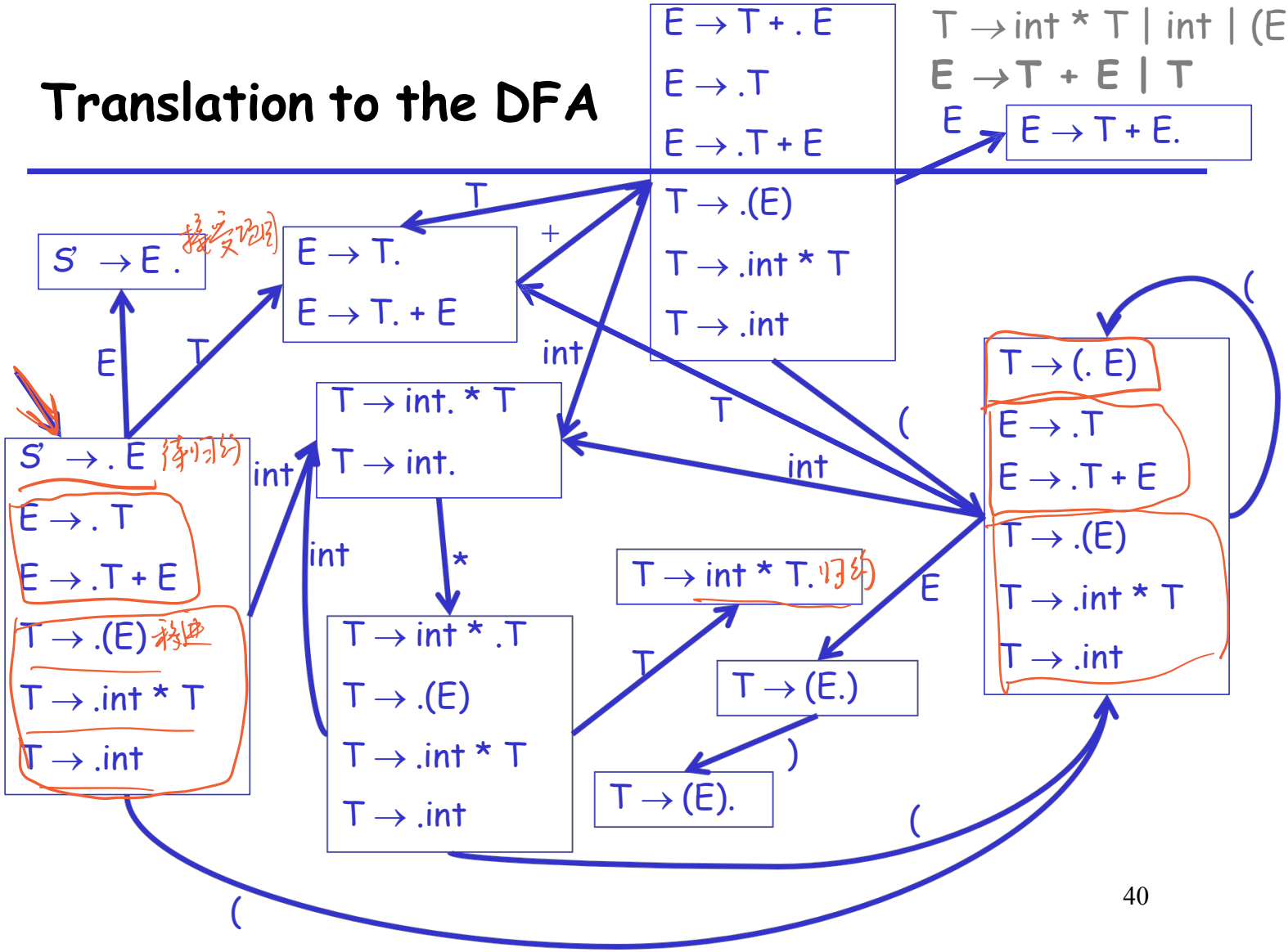


E → T + E | T
T → int * T | int | (E)

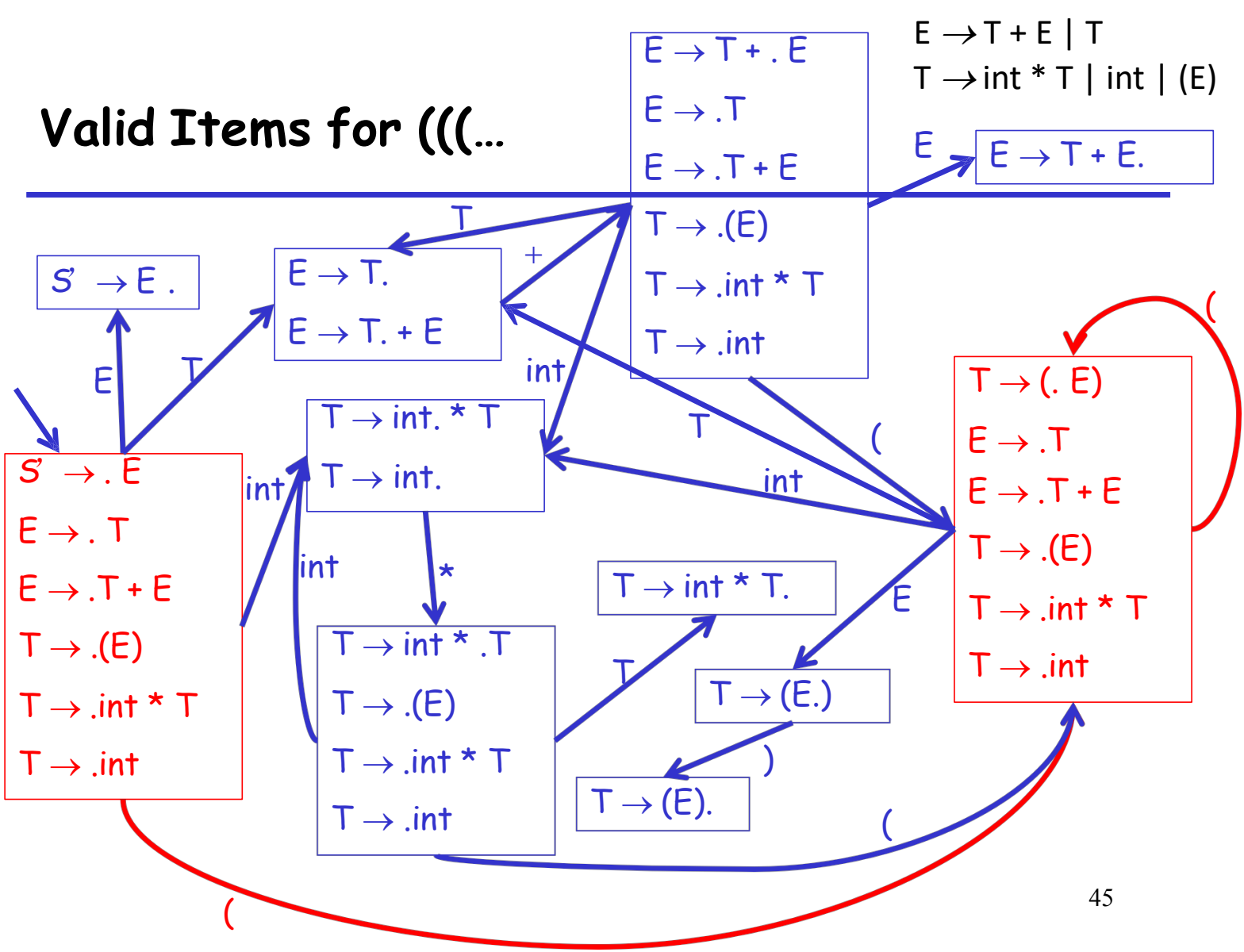
NFA for Viable Prefixes



Translation to the DFA



Valid Items for (((…



Example

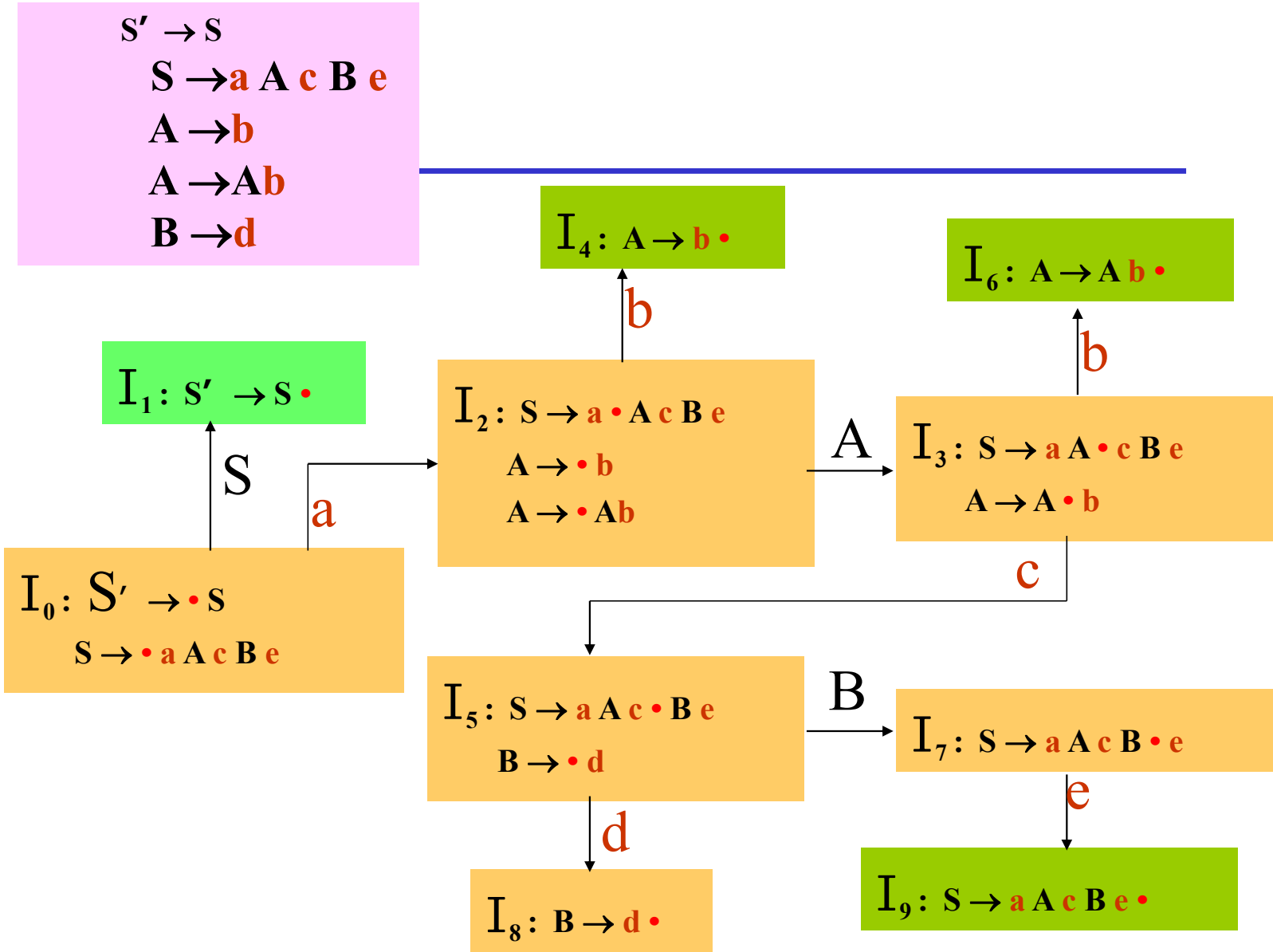
G[S]:

S → a A c B e

A → b

A → Ab

B → d


S′ → S
S → a A c B e
A → b
A → Ab
B → d
I0: S′ → • S
S → • a A c B e
I1: S′ → S •
I2: S → a • A c B e
A → • b
A → • Ab
I3: S → a A • c B e
A → A • b
I4: A → b •
I5: S → a A c • B e
B → • d
I6: A → A b •
I7: S → a A c B • e
I8: B → d •
I9: S → a A c B e •
S
a
b
A
b
c
B
d
e

LR(0) Parsing Table

	ACTION						GOTO		
	a	c	e	b	d	$	S	A	B
0	S_2						1		
1						acc			
2				S_4				3	
3		S_5		S_6					
4	r_2	r_2	r_2	r_2	r_2	r_2			
5					S_8				7
6	r_3	r_3	r_3	r_3	r_3	r_3			
7			S_9						
8	r_4	r_4	r_4	r_4	r_4	r_4			
9	r_1	r_1	r_1	r_1	r_1	r_1			