











EARLEY PARSE $G: S \rightarrow ABC \mid BCA$  $A \rightarrow BB \mid a$  $B \rightarrow AA \mid B$  $C \rightarrow AB \mid c$  $S \rightarrow ABC$  $\rightarrow BB Bc$  $\rightarrow BB Bc$ 

Parliamo la stringa "BBBc" utilizzando l'algoritmo di EARLEY:

PASSO 0:

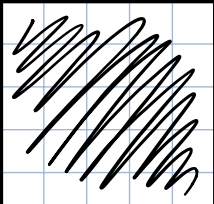
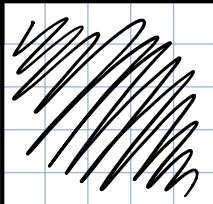





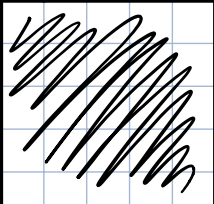

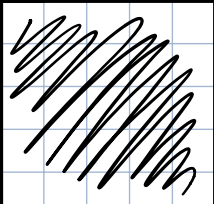
↓ B B B C ←

Mostra il carattere  
che si riceve attualmente  
essendo dall' INPUT

				(4,4)
			(3,3)	(3,4)
		(2,2)	(2,3)	(2,4)
	(1,1)	(1,2)	(1,3)	(1,4)
(0,0) TOP → • S	(0,1)	(0,2)	(0,3)	(0,4)

Insieriamo nelle celle (0,0) la regola  
TOP → • S per indicare che vogliamo provare e  
vedere se partendo da S riusciamo in grado di  
parare l'intera stringa.

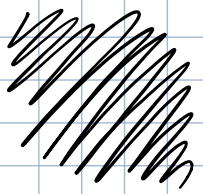
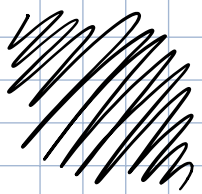

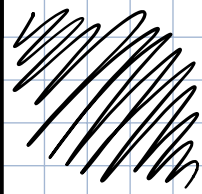
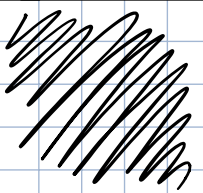
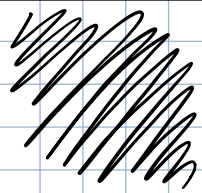
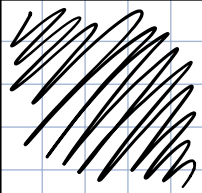
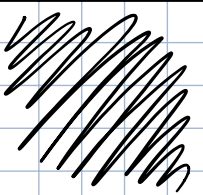
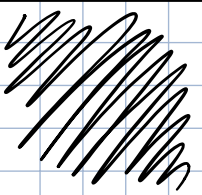
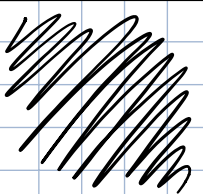
PASSO 1: PREDICT  $\rightarrow$   $BBBC$

				(4,1)
			(3,3)	(3,4)
		(2,2)	(2,3)	(2,4)
	(1,1)	(1,2)	(1,3)	(1,4)
(0,0) TOP $\Rightarrow$ S S $\Rightarrow$ · ABC S $\Rightarrow$ · BCA A $\Rightarrow$ · BB A $\Rightarrow$ · ε B $\Rightarrow$ · AA B $\Rightarrow$ · B	(0,1)	(0,2)	(0,3)	(0,4)

Eseguiamo l'operazione di PREDICT per espandere tutti i NON-TERMINAZI che si trovano alla DESTRA del  $\cdot$  fino a quando non abbiamo più simboli da espandere

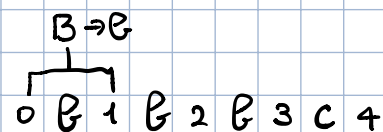
# PASSO 2: SCAN

↓  
B B B C

				(4,A)
			(3,3)	(3,4)
		(2,2)	(2,3)	(2,4)
	(1,1)	(1,2)	(1,3)	(1,4)
(0,0) TOP → S S → ·ABC S → ·BCA A → ·BB A → ·B B → ·AA B → ·B	(0,1) B → B·	(0,2)	(0,3)	(0,4)

Eseguiamo l'operazione di SCAN andando a vedere il PRIMO simbolo dell'INPUT (B) e vediamo se nelle celle precedenti ci sono delle regole che iniziano con (B)





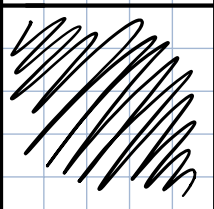
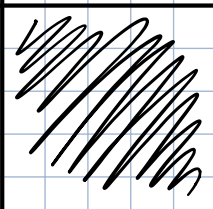
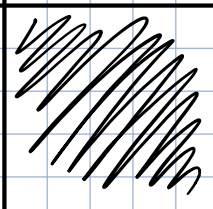
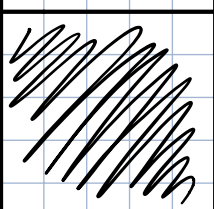
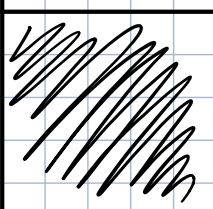
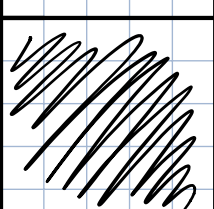
**NOTA:** la regola  $B \rightarrow B \cdot$  viene messa nelle celle (0,1) per indicare il fatto che il PRIMO carattere della stringa è coperto dalle regole  $B \rightarrow B \cdot$ .





# PASSO 3: COMPLETE

↓  
B B B C





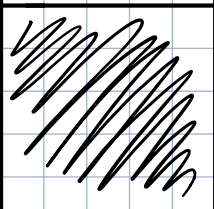
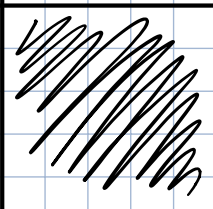
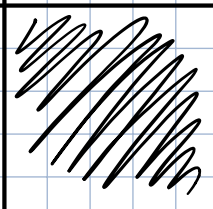
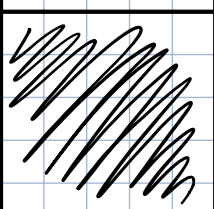
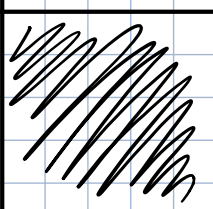
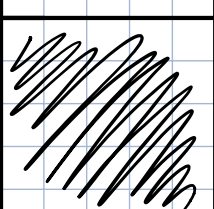
				(4,1)
			(3,3)	(3,4)
		(2,2)	(2,3)	(2,4)
	(1,1)	(1,2)	(1,3)	(1,4)
(0,0) TOP → S S → ·ABC S → ·BCA A → ·BB A → ·ε B → ·AA B → ·B	(0,1) B → B· A → B·B S → B·CA	(0,2)	(0,3)	(0,4)

Eseguiamo l'operazione di COMPLETE per propagare il fatto che abbiamo finito di matchare la regola  $B \rightarrow B$ .

Questa propagazione consiste nel portare avanti il DOT (·) in tutte le regole che iniziano con B, e viene fatto per significare che una parte della regola è stata MATCHATA.

# PASSO 4: PREDICT



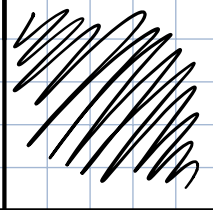
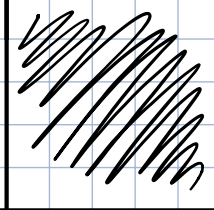
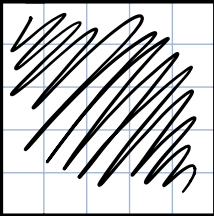
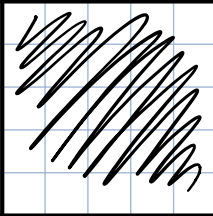
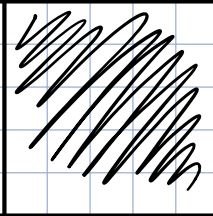
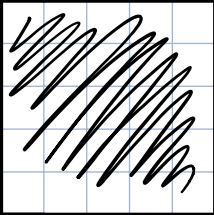
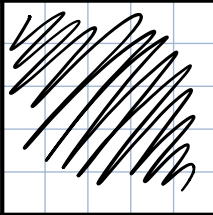
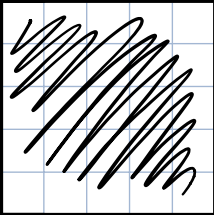
↓  
e e e c

				(4,1)
			(3,3)	(3,4)
		(2,2)	(2,3)	(2,4)
	(1,1) B → · AA, B → · e C → · AB, C → · c A → · BB, A → · a	(1,2)	(1,3)	(1,4)
(0,0) TOP → · S S → · ABC S → · BCA A → · BB A → · e B → · AA B → · e	(0,1) B → e · A → B · B S → B · CA	(0,2)	(0,3)	(0,4)

Dato che nel passo precedente avevamo mosso il DOT (·), dobbiamo effettuare l'operazione di PREDICT per capire come far PROGREDIRE ulteriormente il DOT (·) utilizzando il prossimo TOKEN dell'input.

PASSO 5: SCAN











$\downarrow$   
 $\beta \beta \beta c$

				(4,4)
			(3,3)	(3,4)
		(2,2)	(2,3)	(2,4)
	(1,1) $B \rightarrow \cdot AA, B \rightarrow \cdot \beta$ $C \rightarrow \cdot AB, C \rightarrow \cdot c$ $A \rightarrow \cdot BB, A \rightarrow \cdot \alpha$	(1,2) $B \rightarrow \beta \cdot$	(1,3)	(1,4)
(0,0) TOP $\rightarrow \cdot S$ $S \rightarrow \cdot ABC$ $S \rightarrow \cdot BCA$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot \alpha$ $B \rightarrow \cdot AA$ $B \rightarrow \cdot \beta$	(0,1) $B \rightarrow \beta \cdot$ $A \rightarrow B \cdot B$ $S \rightarrow B \cdot CA$	(0,2)	(0,3)	(0,4)

Simile al passo 2.











PASSO 6 : COMPLETE

εεεε

				(4,1)
			(3,3)	(3,4)
		(2,2)	(2,3)	(2,4)
	(1,1) B → ·AA, B → ·B C → ·AB, C → ·C A → ·BB, A → ·a	(1,2) B → B· A → B·B	(1,3)	(1,4)
(0,0) TOP → ·S S → ·ABC S → ·BCA A → ·BB A → ·a B → ·AA B → ·B	(0,1) B → ε· A → B·B S → B·CA	(0,2) A → BB· B → A·A S → A·BC	(0,3)	(0,4)

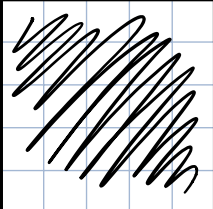




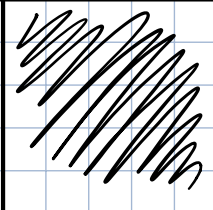
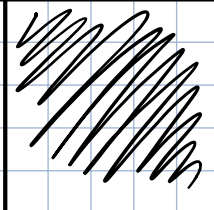


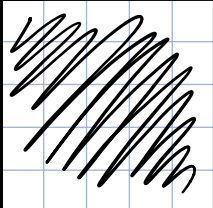
# PASSO 6: PREDICT

$B \rightarrow B \rightarrow c$

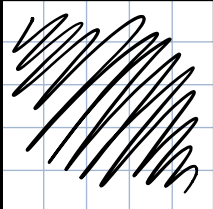






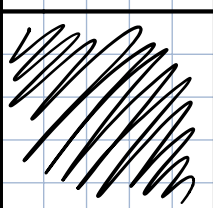
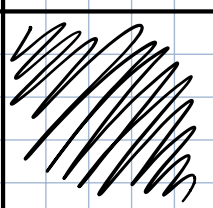
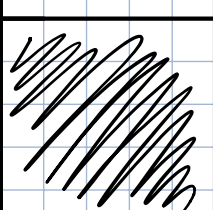
				(4,1)
			(3,3)	(3,4)
		(2,2) $B \rightarrow \cdot AA$ $B \rightarrow \cdot B$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$	(2,3)	(2,4)
	(1,1) $B \rightarrow \cdot AA, B \rightarrow \cdot B$ $C \rightarrow \cdot AB, C \rightarrow \cdot c$ $A \rightarrow \cdot BB, A \rightarrow \cdot a$	(1,2) $B \rightarrow B \cdot$ $A \rightarrow B \cdot B$	(1,3)	(1,4)
(0,0) $TOP \rightarrow \cdot S$ $S \rightarrow \cdot ABC$ $S \rightarrow \cdot BCA$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$ $B \rightarrow \cdot AA$ $B \rightarrow \cdot B$	(0,1) $B \rightarrow B \cdot$ $A \rightarrow B \cdot B$ $S \rightarrow B \cdot CA$	(0,2) $A \rightarrow BB \cdot$ $B \rightarrow A \cdot A$ $S \rightarrow A \cdot BC$	(0,3)	(0,4)

PASSO 7 : SCAN

$\downarrow$   
 $BBC$

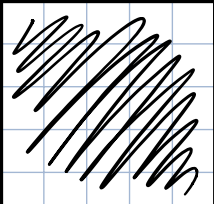
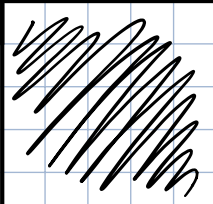


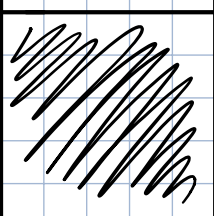
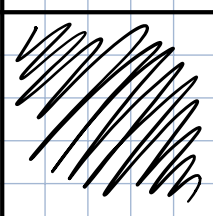
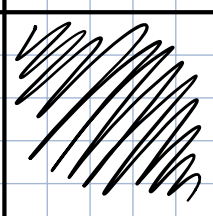
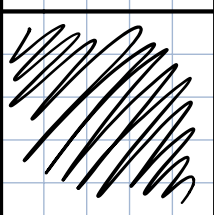
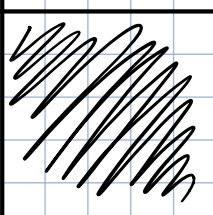
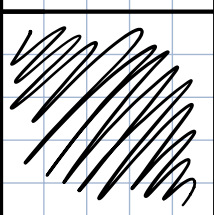
				(4,4)
			(3,3)	(3,4)
		(2,2) $B \rightarrow \cdot AA$ $B \rightarrow \cdot B$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$	(2,3) $B \rightarrow B \cdot$	(2,4)
	(1,1) $B \rightarrow \cdot AA, B \rightarrow \cdot B$ $C \rightarrow \cdot AB, C \rightarrow \cdot c$ $A \rightarrow \cdot BB, A \rightarrow \cdot a$	(1,2) $B \rightarrow B \cdot$ $A \rightarrow B \cdot B$	(1,3)	(1,4)
(0,0) $TOP \rightarrow \cdot S$ $S \rightarrow \cdot ABC$ $S \rightarrow \cdot BCA$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$ $B \rightarrow \cdot AA$ $B \rightarrow \cdot B$	(0,1) $B \rightarrow B \cdot$ $A \rightarrow B \cdot B$ $S \rightarrow B \cdot CA$	(0,2) $A \rightarrow BB \cdot$ $B \rightarrow A \cdot A$ $S \rightarrow A \cdot BC$	(0,3)	(0,4)

PASSO 8 : COMPLETE  $B \downarrow B \downarrow B \downarrow C$

				(4,1)
			(3,3)	(3,4)
		(2,2) $B \rightarrow \cdot AA$ $B \rightarrow \cdot B$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$	(2,3) $B \rightarrow B \cdot$ $A \rightarrow B \cdot B$	(2,4)
	(1,1) $B \rightarrow \cdot AA, B \rightarrow \cdot B$ $C \rightarrow \cdot AB, C \rightarrow \cdot C$ $A \rightarrow \cdot BB, A \rightarrow \cdot a$	(1,2) $B \rightarrow B \cdot$ $A \rightarrow B \cdot B$	(1,3) $A \rightarrow BB \cdot$	(1,4)
(0,0) TOP $\rightarrow \cdot S$ $S \rightarrow \cdot ABC$ $S \rightarrow \cdot BCA$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$ $B \rightarrow \cdot AA$ $B \rightarrow \cdot B$	(0,1) $B \rightarrow B \cdot$ $A \rightarrow B \cdot B$ $S \rightarrow B \cdot CA$	(0,2) $A \rightarrow BB \cdot$ $B \rightarrow A \cdot A$ $S \rightarrow A \cdot BC$	(0,3) $S \rightarrow AB \cdot C$	(0,4)

PASSO 9 : PREDICT

$\downarrow$   
 $\epsilon \epsilon \epsilon c$

				(4,1)
			(3,3) $B \rightarrow \cdot \epsilon$ $B \rightarrow \cdot AA$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$ $C \rightarrow \cdot AB$ $C \rightarrow \cdot c$	(3,4)
		(2,2) $B \rightarrow \cdot AA$ $B \rightarrow \cdot \epsilon$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$	(2,3) $B \rightarrow \epsilon \cdot$ $A \rightarrow B \cdot B$	(2,4)
	(1,1) $B \rightarrow \cdot AA, B \rightarrow \cdot \epsilon$ $C \rightarrow \cdot AB, C \rightarrow \cdot c$ $A \rightarrow \cdot BB, A \rightarrow \cdot a$	(1,2) $B \rightarrow \epsilon \cdot$ $A \rightarrow B \cdot B$	(1,3) $A \rightarrow BB \cdot$	(1,4)
(0,0) $TOP \rightarrow \cdot S$ $S \rightarrow \cdot ABC$ $S \rightarrow \cdot BCA$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$ $B \rightarrow \cdot AA$ $B \rightarrow \cdot \epsilon$	(0,1) $B \rightarrow \epsilon \cdot$ $A \rightarrow B \cdot B$ $S \rightarrow B \cdot CA$	(0,2) $A \rightarrow BB \cdot$ $B \rightarrow A \cdot A$ $S \rightarrow A \cdot BC$	(0,3) $S \rightarrow AB \cdot C$	(0,4)

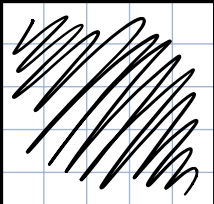
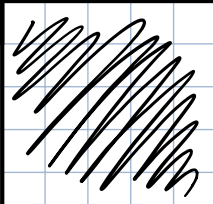


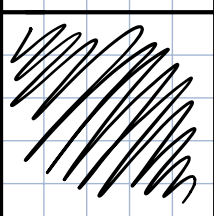
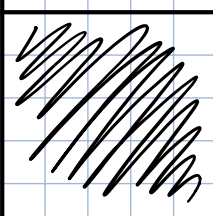
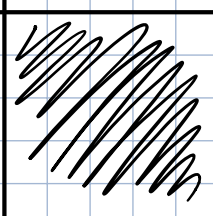
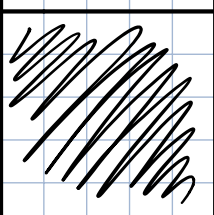
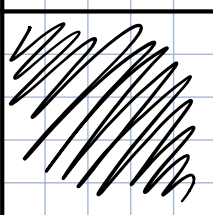
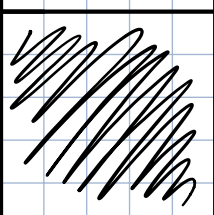
Abbiamo messo le regole  $C \rightarrow \cdot AB$  e  $C \rightarrow \cdot c$  nelle celle (3,3) in quanto nel precedente passo di COMPLETE avevamo messo nelle celle (0,3) la regola  $S \rightarrow AB \cdot C$ .

Dato che  $C$  si troverà nel lato DESTRO del DOT (·) lo abbiamo messo.






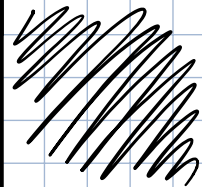
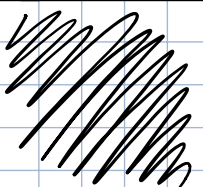
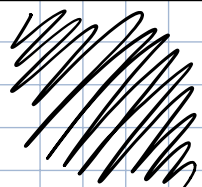
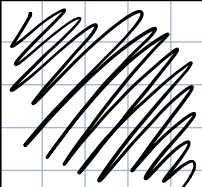



PASSO 10 : SCAN

$\epsilon \epsilon \epsilon c$  ↓

				(4,1) $C \rightarrow c \cdot$
			(3,3) $B \rightarrow \cdot \epsilon$ $B \rightarrow \cdot AA$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$ $C \rightarrow \cdot AB$ $C \rightarrow \cdot c$	(3,4)
		(2,2) $B \rightarrow \cdot AA$ $B \rightarrow \cdot \epsilon$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$	(2,3) $B \rightarrow \epsilon \cdot$ $A \rightarrow B \cdot B$	(2,4)
	(1,1) $B \rightarrow \cdot AA, B \rightarrow \cdot \epsilon$ $C \rightarrow \cdot AB, C \rightarrow \cdot c$ $A \rightarrow \cdot BB, A \rightarrow \cdot a$	(1,2) $B \rightarrow \epsilon \cdot$ $A \rightarrow B \cdot B$	(1,3) $A \rightarrow BB \cdot$	(1,4)
(0,0) $TOP \rightarrow \cdot S$ $S \rightarrow \cdot ABC$ $S \rightarrow \cdot BCA$ $A \rightarrow \cdot BB$ $A \rightarrow \cdot a$ $B \rightarrow \cdot AA$ $B \rightarrow \cdot \epsilon$	(0,1) $B \rightarrow \epsilon \cdot$ $A \rightarrow B \cdot B$ $S \rightarrow B \cdot CA$	(0,2) $A \rightarrow BB \cdot$ $B \rightarrow A \cdot A$ $S \rightarrow A \cdot BC$	(0,3) $S \rightarrow AB \cdot C$	(0,4)

# PASSO 11 : COMPLETE

$\downarrow$   
 $\epsilon \epsilon \epsilon c$

				(4,A) C → c.
			(3,3) B → •ε B → •AA A → •BB A → •a C → •AB C → •c	(3,A)
		(2,2) B → •AA B → •ε A → •BB A → •a	(2,3) B → ε• A → B•B	(2,A)
	(1,1) B → •AA, B → •ε C → •AB, C → •c A → •BB, A → •a	(1,2) B → ε• A → B•B	(1,3) A → BB•	(1,A)
(0,0) TOP → •S S → •ABC S → •BCA A → •BB A → •a B → •AA B → •ε	(0,1) B → ε• A → B•B S → B•CA	(0,2) A → BB• B → A•A S → A•BC	(0,3) S → AB•C	(0,4) S → ABC•

Dato che abbiamo analizzato tutte le stringhe in INPUT non continuiamo con l'operazione di PREDICT.

Infine, dato che nelle celle (0,4) abbiamo COMPLETAMENTE matchato la regola  $S \rightarrow ABC$ , possiamo concludere che la stringa è GENERATA dalla grammatica.