

## Example: CYK Parsing

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Consider the CFG  $G = \langle N, T, P, S \rangle$  with  $N = \{S, A, B, T\}$ ,  $T = \{a, c\}$  and  $P$  containing the following productions:

$$\begin{aligned}
 S &\rightarrow AT \mid AB \\
 T &\rightarrow SB \\
 A &\rightarrow a \\
 B &\rightarrow AC \mid a \mid c \\
 C &\rightarrow c
 \end{aligned}$$

1. Give the complete chart for CYK parsing (as on slide 19 and in the example on slide 20) for this grammar and the input  $w = aaaca$ .

{	5	$S \rightarrow A_{1,1}T_{2,4}$ $T \rightarrow S_{1,4}B_{5,1}$	-	-	-	-
	4	$S \rightarrow A_{1,1}T_{2,3}$ $T \rightarrow S_{1,2}B_{3,2}$	$S \rightarrow A_{2,1}T_{3,3}$ $T \rightarrow S_{2,3}B_{5,1}$	-	-	-
	3	$T \rightarrow S_{1,2}B_{3,1}$	$S \rightarrow A_{2,1}B_{3,2}$ $T \rightarrow S_{2,2}B_{4,1}$	$T \rightarrow S_{3,2}B_{5,1}$	-	-
	2	$S \rightarrow A_{1,1}B_{2,1}$	$S \rightarrow A_{2,1}B_{3,1}$	$B \rightarrow A_{3,1}C_{4,1}$ $S \rightarrow A_{3,1}B_{4,1}$	-	-
	1	$A \rightarrow a, B \rightarrow a$	$A \rightarrow a, B \rightarrow a$	$A \rightarrow a, B \rightarrow a$	$B \rightarrow c, C \rightarrow c$	$A \rightarrow a, B \rightarrow a$
		1	2	3	4	5
	w	a	a	a	c	a

Format: i,l

2. Give the parse tree for  $w$  (there is only a single tree) and show which chart entries contribute to this parse tree.

