Syntax Analysis

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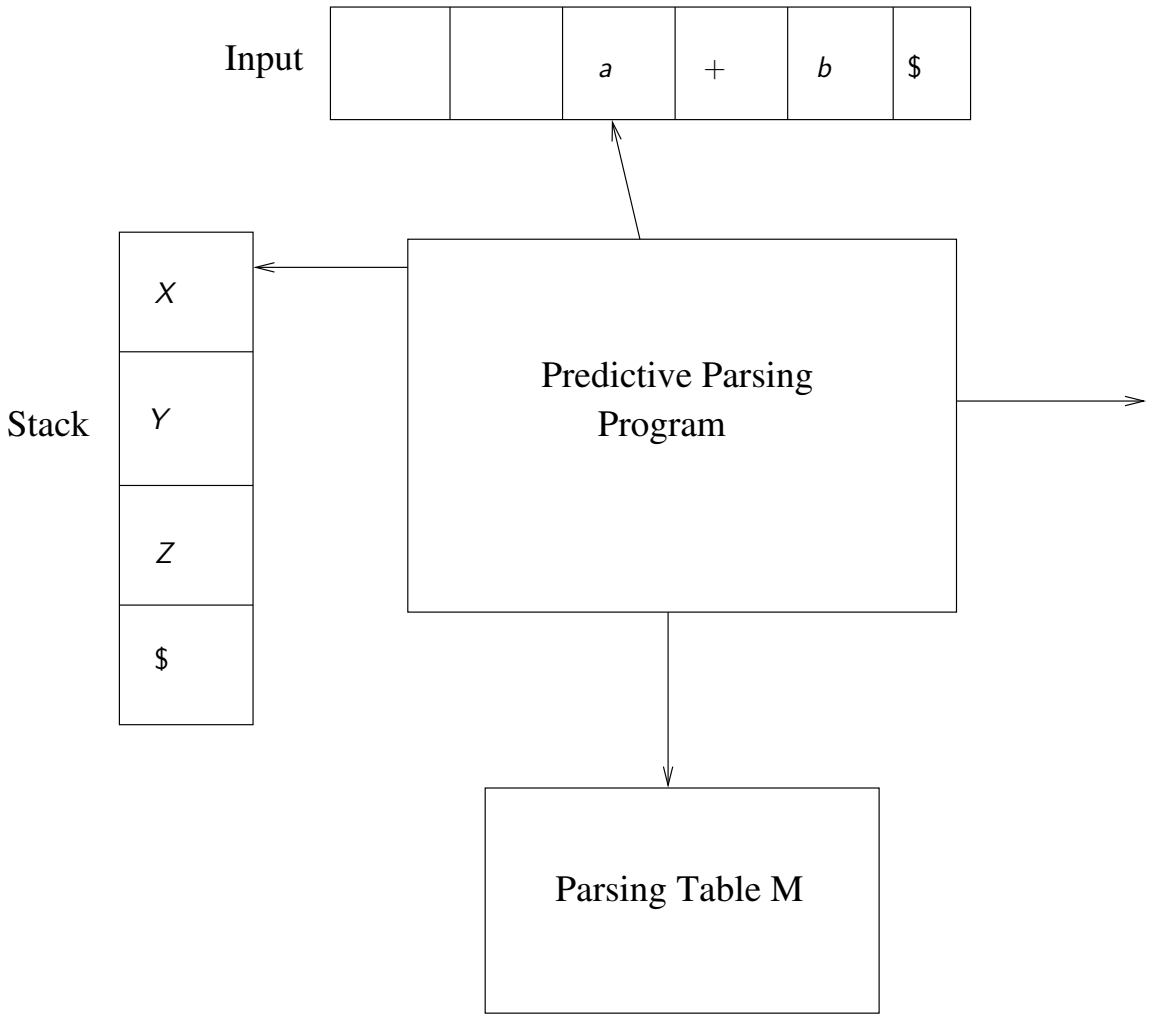
Predictive parsing framework



Algorithm to construct Predictive Parsing Table

- **Input** : Grammar G
- **Output** : Parsing table M

Method

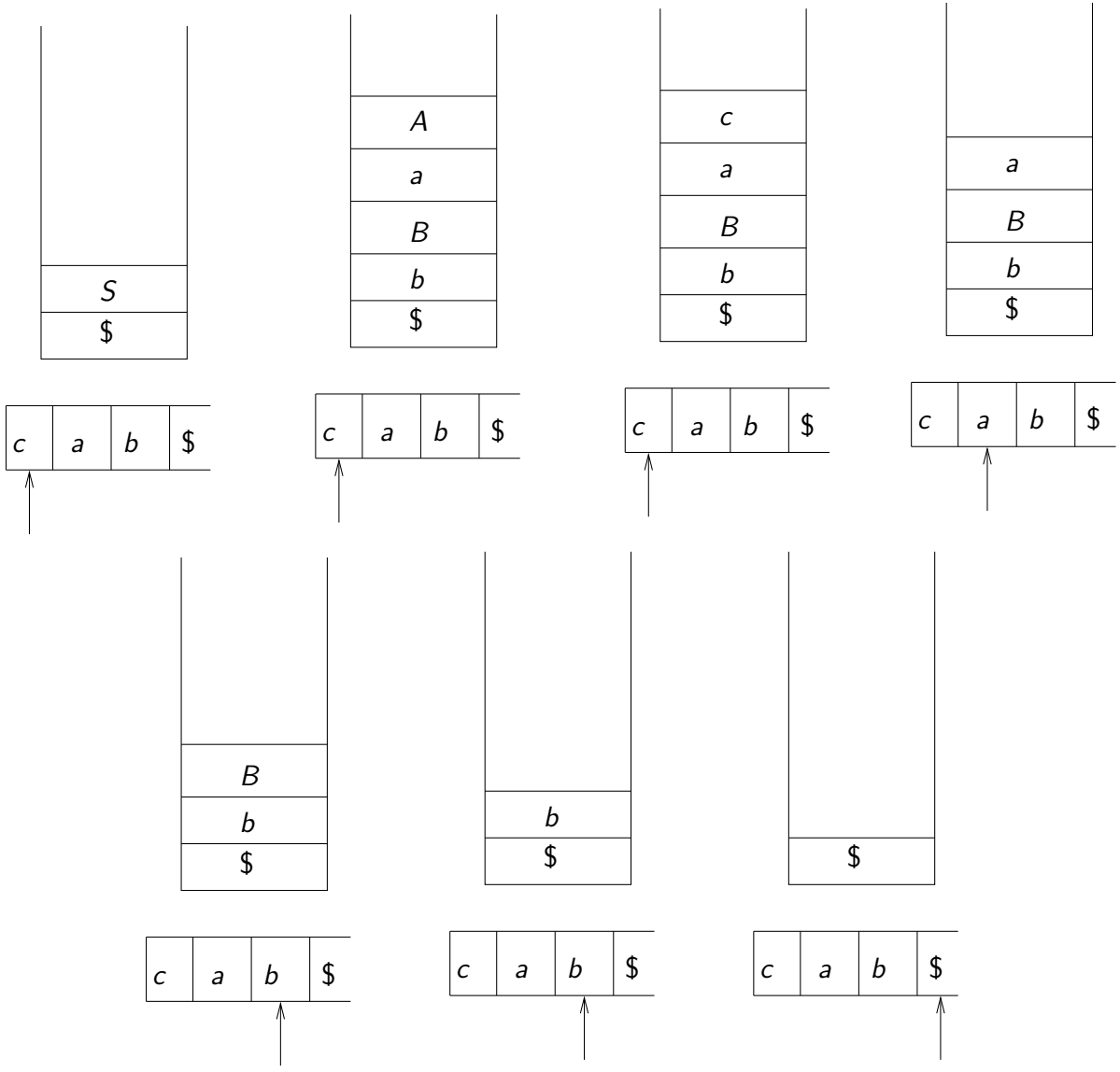
For each production $A \rightarrow \alpha$ of the grammar, do the following:

- For each terminal *a* in FIRST(α), add $A \rightarrow \alpha$ to $M[A, a]$
- If ϵ is in FIRST(α), then for each terminal *b* in FOLLOW(A), add $A \rightarrow \alpha$ to $M[A, b]$. If ϵ is in FIRST(α) and \$ is in FOLLOW(A), add $A \rightarrow \alpha$ to $M[A, \$]$ as well.

- **Example**
  Consider the following grammar
  $$S \rightarrow AaBb \; A \rightarrow c|\epsilon \; B \rightarrow d|\epsilon$$
- $FIRST(S) = \{c, a\}$, $FIRST(A) = \{c, \epsilon\}$, $FIRST(B) = \{d, \epsilon\}$
- $FOLLOW(S) = \{\$\}$, $FOLLOW(A) = \{a\}$, $FOLLOW(B) = \{b\}$
- Consider the input string to be "cab"

Don't forget writing in the Cheat Sheet the way to label the rows & columns in the Predictive Parsing Table.

NON–TERMINAL	INPUT SYMBOL				
	a	b	c	d	\$
S	$S \rightarrow AaBb$		$S \rightarrow AaBb$		
A	$A \rightarrow \epsilon$		$A \rightarrow c$		
B		$B \rightarrow \epsilon$		$B \rightarrow d$	


S
$
c a b $
A
a
B
b
$
c a b $
c
a
B
b
$
c a b $
a
B
b
$
c a b $
B
b
$
c a b $
b
$
c a b $
$
c a b $

Bottom-up Parsing

- It corresponds to the construction of a parse tree for an input string beginning at the leaves and working towards the root
- The input is scanned from left-to-right
- **Reductions :** The parsing can be thought of as reducing the input string to the start symbol. At each reduction step, a specific substring matching the rhs of the production is replaced with the lhs

Handle pruning

- Handle is the substring which matches the rhs of the production
- Handle pruning is basically replacing the rhs of a production with the lhs to get right-most derivation in reverse