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## Quasi-Simple Grammars

1.  $\langle s \rangle \rightarrow a\langle A \rangle\langle s \rangle$
2.  $\langle s \rangle \rightarrow b$
3.  $\langle A \rangle \rightarrow c\langle A \rangle\langle s \rangle$
4.  $\langle A \rangle \rightarrow \varepsilon$

aacbb

- $\langle s \rangle \xRightarrow{1} a\langle A \rangle\langle s \rangle$
- $a\langle A \rangle\langle s \rangle \xRightarrow{4} a\langle s \rangle$
- $a\langle s \rangle \xRightarrow{1} aa\langle A \rangle\langle s \rangle$
- $aa\langle A \rangle\langle s \rangle \xRightarrow{3} aac\langle A \rangle\langle s \rangle\langle s \rangle$
- $aac\langle A \rangle\langle s \rangle\langle s \rangle \xRightarrow{4} aac\langle s \rangle\langle s \rangle$
- $aac\langle s \rangle\langle s \rangle \xRightarrow{2} aacb\langle s \rangle$
- $aacb\langle s \rangle \xRightarrow{2} aacbb$

## FOLLOW and SELECT Sets

$\langle s \rangle \mid$
$\langle s \rangle \rightarrow a\langle A \rangle$
$\langle A \rangle \rightarrow c\langle A \rangle b$
$\langle A \rangle \rightarrow \varepsilon$

- $\text{FOLLOW}(\langle A \rangle) = \{b\} + \text{FOLLOW}(\langle s \rangle)$ 
  - $\langle A \rangle\langle s \rangle \xRightarrow{1} \langle A \rangle a\langle A \rangle\langle s \rangle$
  - $\langle A \rangle\langle s \rangle \xRightarrow{2} \langle A \rangle b$
- $\text{FOLLOW}(\langle s \rangle) = \{a, \mid\}$

In the case  $\langle s \rangle \rightarrow a\langle A \rangle$ , the only thing that could follow  $\langle A \rangle$  here is whatever could have followed  $\langle s \rangle$ . I.e. if you have  $\langle s \rangle \rightarrow \langle s \rangle c$ , then  $\text{FOLLOW}(\langle A \rangle) = \{c\}$

1.  $\langle s \rangle \rightarrow a\langle A \rangle\langle s \rangle$
2.  $\langle s \rangle \rightarrow b$
3.  $\langle A \rangle \rightarrow c\langle A \rangle\langle s \rangle$
4.  $\langle A \rangle \rightarrow \varepsilon$

- $\text{FOLLOW}(\langle A \rangle) = \{a\} + \{b\}$

	a	b	c	⊥
$\langle s \rangle$	1	2		
$\langle A \rangle$	4	4	3	
▽				ACCEPT

1. REPLACE( $\langle s \rangle\langle A \rangle$ ), ADVANCE
  - or PUSH( $\langle A \rangle$ ), ADVANCE
  - ( $\langle s \rangle$  already on the stack)
2. POP, ADVANCE
3. REPLACE( $\langle s \rangle\langle A \rangle$ ), ADVANCE
4. POP, RETAIN

- Action number 4 happens in the follow set of  $\langle A \rangle$

Stack	Input
▽ $\langle s \rangle$	aabcc⊥
▽ $\langle s \rangle\langle A \rangle$	acbb⊥
▽ $\langle s \rangle$	acbb⊥
▽ $\langle s \rangle\langle A \rangle$	cbb⊥
▽ $\langle s \rangle\langle s \rangle\langle A \rangle$	bb⊥
▽ $\langle s \rangle\langle s \rangle$	bb⊥
▽ $\langle s \rangle$	b⊥
▽	⊥

## ACCEPT

- Show that it's a left most derivation