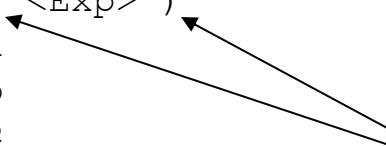


Grammars in Action

Example: A simple programming language grammar.

$G: \langle \text{Exp} \rangle^* ::= \langle \text{Exp} \rangle + \langle \text{Exp} \rangle$
 $| \quad \langle \text{Exp} \rangle * \langle \text{Exp} \rangle$
 $| \quad (\langle \text{Exp} \rangle)$
 $| \quad a$
 $| \quad b$
 $| \quad c$



Terminal symbols!!!

$S = a$
 $S = a + b$
 $S = a + b * c$
 $S = (a + b) * c$
 $S = ((a + b))$
 $S = c(a + b)$
 $S = (c) + (b)$
 $S = b++$

} $S \in L(G)?$

Grammars in Action

- The empty symbol: ϵ
- The only non-terminal that does not have a rule defining it.
- That is the ϵ symbol derives nothing.

<empty>

- Consider the grammar:

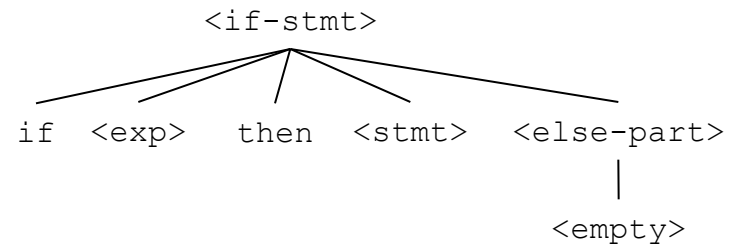
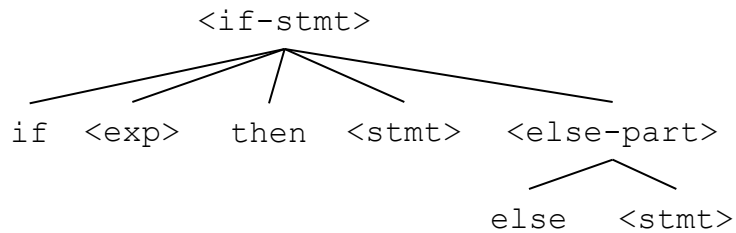
$G:$ $\langle A \rangle^* ::= a \langle B \rangle \mid a$
 $\langle B \rangle ::= b \langle B \rangle \mid b$

$G':$ $\langle A \rangle^* ::= a \langle B \rangle$
 $\langle B \rangle ::= b \langle B \rangle \mid \langle \text{empty} \rangle$

Grammars in Action

Consider the following grammar fragment:

```
<if-stmt> ::= if <exp> then <stmt> <else-part>  
<else-part> ::= else <stmt> | <empty>  
<exp> ::= ...  
<stmt> ::= ...
```



Grammars in Action

- 2.1 a) Let $L(G)$ be the language of all string consisting of zero or more a 's.
- 2.1 i) Let $L(G)$ be the set of strings consisting of one or more a 's with a comma between each a and the next.
- 2.1 d) Let $L(G)$ be the set of all strings consisting of one or more digits $0 - 9$.

Assignments

- Assignment #4