



Ambiguous Grammar

CSE420 : COMPILER DESIGN

WEEK 3 LECTURE 2

PART 1

“It is not possible to produce a set of rules purporting to describe what a man should do in every conceivable set of circumstances.”

- ALAN TURING, COMPUTING MACHINERY AND INTELLIGENCE

Definition of Ambiguous Grammar

- Grammars are divided into two parts based on the number of derived trees
 1. Ambiguous
 2. Unambiguous

“A grammar can have more than one parse tree generating a given string of terminals. Such a grammar is said to be ambiguous” [Compilers: Principle Techniques, and Tools; 2nd Edition]

Definition (Contd.)

Ambiguous Grammars produce either one or more or all of the below:

- More than one Parse Tree
- More than one Derivation Tree
- More than one Syntax Tree
- More than one Leftmost Derivation
- More than one Rightmost Derivation

Definition(Contd.)

Example:

Grammar: $E \rightarrow E + E \mid E * E \mid id$

[Compilers: Principle Techniques, and Tools; 2nd Edition page 203]

Sentence : $id + id * id$

Left Derivation 1 :

$E \rightarrow E + E$

$E \rightarrow id + E$

$E \rightarrow id + E * E$

$E \rightarrow id + id * E$

$E \rightarrow id + id * id$

Left Derivation 2:

$E \rightarrow E * E$

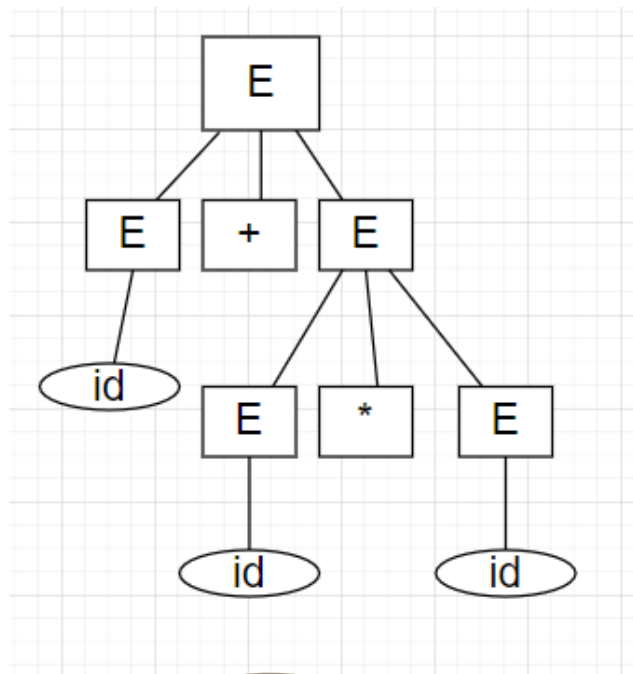
$E \rightarrow E + E * E$

$E \rightarrow id + E * E$

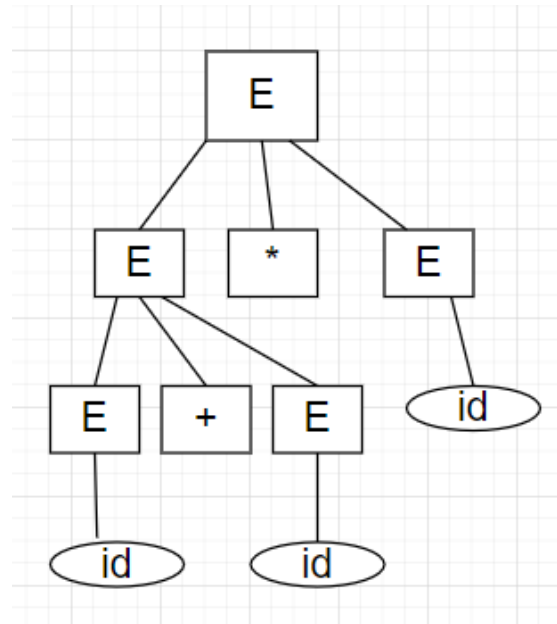
$E \rightarrow id + id * E$

$E \rightarrow id + id * id$

Definition(Contd.)



Parse
Tree 1



Parse
Tree 2

Practice Problem

Try the same with

1. Rightmost Derivation
2. Syntax Tree