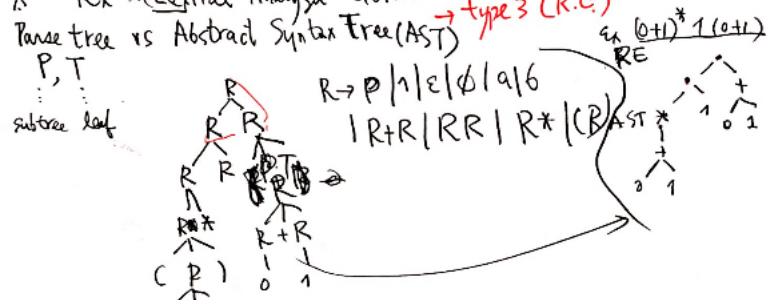


10/26(4) Rewriting Systems, Ambiguity of CFG, and Left Parser (= Greener and verify Parser)

5.3 Application of Context-free Grammar

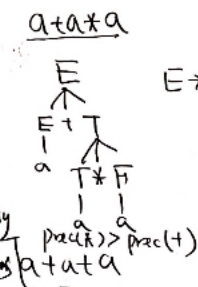
- 5.3.1 Parser
- 5.3.2 YACC - (Yet Another Compiler-Compiler) → Parser Generator
- Python ply
- LEX - (Logical Analyzer Generator) → type 2 (CFG)
- type 3 (R.E.)



unambiguous grammar

$E \rightarrow E+T | T * F | a | (E)$
 $T \rightarrow T * F | a | (E)$
 $F \rightarrow a | (E)$

precedence, associativity

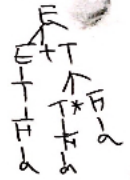
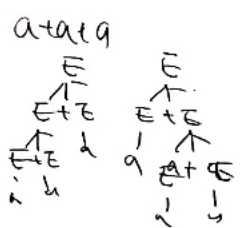
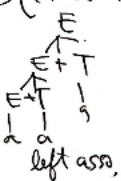


$E \rightarrow E+E | E * E | a | (E)$ - ambiguous grammar

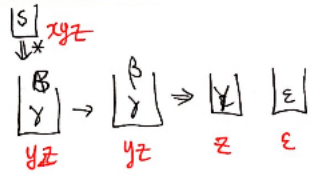
UAB G with unit producting

$E \rightarrow E+T | T$
 $T \rightarrow T * F | F$
 $F \rightarrow a | (E)$

$a + a * a$



5.2 Parse Tree



$$S \xRightarrow{\lambda_{lm}} xBY \xRightarrow{\beta_{lp}} x\beta Y \xRightarrow{\lambda_{lm}} xy\beta \xRightarrow{\lambda_{lm}} xyz = T^* \dots \text{leftmost derivation}$$

$$(S, xyz) \xRightarrow{\lambda} (BY, yz) \xRightarrow{\beta} (Y, z) \xRightarrow{\lambda} (\epsilon, \epsilon) \dots \text{left parser}$$

$$S \xRightarrow{\lambda_{lm}} xBY \xRightarrow{\beta_{lp}} x\beta Y \xRightarrow{\lambda_{lm}} xy\beta \xRightarrow{\lambda_{lm}} xyz \in T^*$$

Configuration pair

$$(\text{stack contents, remained input string}) \in (NUT)^* \times T^*$$

$$E \rightarrow E+T \mid T^*F \mid a \mid (E)$$

$$T \rightarrow T^*F \mid a \mid (E)$$

$$F \rightarrow a \mid (E)$$

$$E \xRightarrow{\lambda_{lm}} E+T \xRightarrow{E \rightarrow E+T} (E+T, a+axa) \xRightarrow{\lambda_{lm}} (a+T, a+axa) \xRightarrow{E \rightarrow T^*F} (T, a+axa) \xRightarrow{\lambda_{lm}} (T, a+axa)$$

guess E as E+T guess E as a verify a ∈ T verify +

$$T \xRightarrow{\lambda_{lm}} T^*F \xRightarrow{T \rightarrow T^*F} (T^*F, axa) \xRightarrow{\lambda_{lm}} (F, a) \xRightarrow{F \rightarrow a} (a, a) \xRightarrow{\lambda_{lm}} (a, a)$$

guess T as T^*F guess T as a verify (F, a) verify + guess T as a verify a

\Rightarrow : guess and verify parser or left parser

- [Guess A as a, $A \rightarrow a \in P$
- [Verify a, $a \in T$