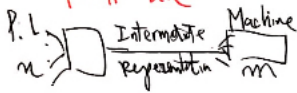
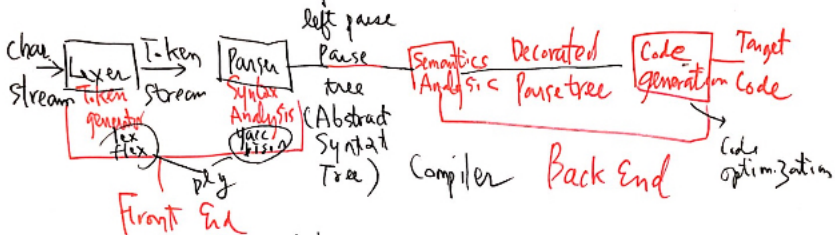


Pushdown Automata

leftmost derivation \leftrightarrow parse tree

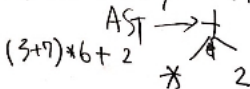
$$S \xRightarrow{\pi} x, x \in T^*, \pi \in P^* \leftrightarrow \text{Parse tree}$$



$n \times m$ compiler

n -Front end + m Back end

AST in tex & yacc TP 3p



Ambiguous (infix binary expression) grammar

$$E \rightarrow E + E \mid E * E \mid a \mid (E)$$

[prec (*) > prec (+)]
[leftassoc +, *]

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

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

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

$$L = \{ a^n b^m c^m d^m \mid n, m \geq 1 \} \cup \{ a^n b^m c^n d^n \mid n, m \geq 1 \}$$

$$S \rightarrow AB \mid C$$

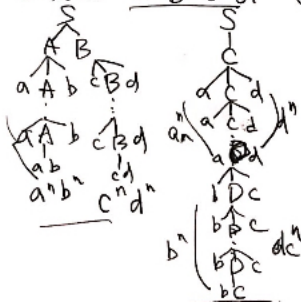
$$A \rightarrow aAb \mid ab$$

$$B \rightarrow cBd \mid cd$$

$$C \rightarrow aCd \mid aDd$$

$$D \rightarrow bDc \mid bc$$

Consider $a^n b^m c^n d^n \in L$

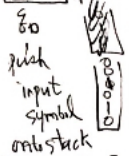


Palindrome

$$L_{ww^R} = \{ w w^R \mid w \in \{a, b\}^* \}$$

$P \rightarrow \epsilon \mid 0 \mid 1 \mid 0 P 0 \mid 1 P 1 \dots$ - fa + stack

010100001010



if empty stack \rightarrow gets final state
 compare with input symbol in end of input string

PDA $P = (Q, T, P, \delta, q_0, Z, F)$

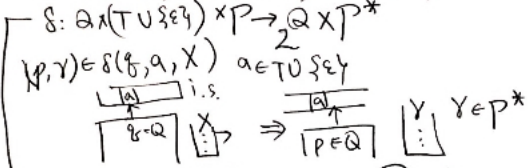
Gamma (gamma γ)

$Q = \{q_0, q_1, q_2, q_3\}$, $T = \{0, 1\}$, $P = \{0, 1\}$, Z_0

$$P^* = \bigcup_{i=0}^{\infty} P^i$$

$$= P^0 \cup P^1 \cup P^2 \cup \dots$$

$\forall \epsilon \in P^i \quad P^i P^j = P^{i+j}$



$\delta: Q \times (T^*) \times P^* \rightarrow Q \times (T^*) \times P^*$

$(p, xy, \gamma) \in \delta(p, x, \alpha) \quad p, q \in Q, x, y \in T^*, \alpha, \gamma \in P^*$

input string is read only. (no write)

