

CSCI 301 - Lecture 30 (!): LL(1) Parsing

input

1_3_+

$S \Rightarrow DNT$

$1NT \quad _3_+$

$1T \quad _3_+$

$1_S \quad 3_+$

$1_DNT \quad 3_+$

$1_3NT \quad _+$

1_3T

$1_3_S \quad +$

$1_3_PS \quad +$

$1_3_+_S \quad ($

$1_3_+ \quad ($

RPN Grammar

$S \rightarrow _S | PS | DNT | \epsilon$

$T \rightarrow _S | PS | \epsilon$

$N \rightarrow DN | \epsilon$

$D \rightarrow 0 | 1 | \dots | 9$

$P \rightarrow + | - | * | /$

$FIRST(A)$ is The symbols and derivation from A can start with.

$$\{x \in \Sigma : A \xRightarrow{*} x \alpha\} \text{ where } \alpha \text{ is an string } \in (\Sigma \cup V)^*$$

Computing $FIRST(x)$: Repeat until convergence

1. If $x \in \Sigma$, then $FIRST(x) = \{x\}$
2. If $x \in V$, and $x \rightarrow Y_1 Y_2 Y_3 \dots Y_k$ (there is a rule) add $FIRST(Y_1)$ to $FIRST(x)$

Nullable

$$X \rightarrow Y_1 Y_2 \dots Y_k$$

if $Y_1 \xRightarrow{*} \epsilon$, add $FIRST(Y_2)$ to $FIRST(x)$

	FIRST	Nullable?
S		Y
T	$\sim, +, -, \epsilon$	Y
N	$0, 1, \dots, 9$	Y
D	$0, 1, \dots, 9$	N
P	$+, -, \epsilon, /$	N

RPN Grammar

$$S \rightarrow _S | PS | DNT | \epsilon$$

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$P \rightarrow + | - | * | /$

FOLLOW:

If $X \Rightarrow^* \epsilon$, then \bar{i}

FOLLOW(X) is the terminals that can come after X in a derivation

Recursive Descent

$S(\text{input}) \Rightarrow$ rest of input

$\underline{D}(\text{input}) \Rightarrow - 1$
 $\quad \quad \quad \textcircled{2} - 1$