

Κωσταντίνος Γαρυφαλιός

AM: 1115201000029

Εργασία 1 - Γραμματική Calculator

Αρχική Γραμματική:

$\text{exp} \rightarrow \text{num} \mid \text{exp op exp} \mid (\text{exp})$

$\text{op} \rightarrow + \mid - \mid * \mid /$

$\text{num} \rightarrow 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9$

Προσδίνω Προτεραιότητες στα Πράξεις:

$\text{exp} \rightarrow \text{exp} + \text{term}$

$\mid \text{exp} - \text{term}$

$\mid \text{term}$

$\text{term} \rightarrow \text{term} * \text{factor}$

$\mid \text{term} / \text{factor}$

$\mid \text{factor}$

$\text{factor} \rightarrow \text{num}$

$\mid (\text{exp})$

$\text{num} \rightarrow 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9$

~~Again~~ ~~Left~~ ~~recursion~~

Again Left recursion:

$\text{exp} \rightarrow \text{term exp2}$

$\text{exp2} \rightarrow + \text{term exp2}$

$\quad | - \text{term exp2}$

$\quad | \epsilon$

$\text{term} \rightarrow \text{factor term2}$

$\text{term2} \rightarrow * \text{factor term2}$

$\quad | / \text{factor term2}$

$\quad | \epsilon$

$\text{factor} \rightarrow \text{num}$

$\quad | (\text{exp})$

$\text{num} \rightarrow 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9$

First Sets:

$\text{First}(\text{exp}) = \text{First}(\text{term}) = \text{First}(\text{factor}) = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, '('\}$

$\text{First}(\text{exp2}) = \{+, -, \epsilon\}$

$\text{First}(\text{term2}) = \{*, /, \epsilon\}$

$\text{First}(\text{factor}) = \text{First}(\text{Num}) \cup \{(\} = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, '('\}$

Follow Sets

$\text{Follow}(\text{exp}) = \{), \text{EOF}\}$

$\text{Follow}(\text{exp2}) = \text{Follow}(\text{exp}) = \{), \text{EOF}\}$

$\text{Follow}(\text{term}) = \text{First}(\text{exp2}) = \{+, -, \epsilon\} = \{+, -, \text{Follow}(\text{exp2})\} = \{+, -,), \text{EOF}\}$

$\text{Follow}(\text{term2}) = \text{Follow}(\text{term}) = \{+, -,), \text{EOF}\}$

$\text{Follow}(\text{factor}) = \text{First}(\text{term2}) = \{*, /, \epsilon\} = \{*, /, \text{Follow}(\text{term2})\} = \{*, /, +, -,), \text{EOF}\}$

$\text{Follow}(\text{num}) = \text{Follow}(\text{factor}) = \{*, /, +, -,), \text{EOF}\}$

First + Sets:

$$\text{First} + (\text{exp}) = \text{First}(\text{term}) = \text{First}(\text{factor}) = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, C\}$$

$$\text{First} + (\text{exp2}) = \{+, -, \epsilon\} = \{+, -, \text{Follow}(\text{exp2})\} = \{+, -,), \text{EOF}\} \cup \{\epsilon\} = \{+, -, \epsilon,)\} \cup \{\text{EOF}\}$$

$$\text{First} + (\text{term}) = \text{First}(\text{factor}) = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, C\}$$

$$\begin{aligned} \text{First} + (\text{term2}) &= \text{First}(\ast) \cup \text{First}(/) \cup \text{First}(\epsilon) \cup \text{Follow}(\text{term}) \\ &= \{\ast, /, \epsilon\} \cup \{+, -,), \text{EOF}\} = \{\ast, /, +, -, \epsilon,)\} \cup \{\text{EOF}\} \end{aligned}$$

$$\text{First} + (\text{factor}) = \text{First}(\text{factor}) = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, C\}$$

$$\text{First} + (\text{num}) = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

Parsing Table (Lookahead)

	$+, -$	$\ast, /$	$($	$)$	$0, \dots, 9$	$\$$
exp	error	error	termexp2	error	termexp2	error
exp2	termexp2	error	error	ϵ	error	ϵ
term	error	error	factor term2	error	factor term2	error
term2	ϵ	factor term2	error	ϵ	error	ϵ
factor	error	error	exp	error	num	error
num	error	error	error	error	do nothing	error