Operator precedence parsing

Operator precedence grammar is kinds of shift reduce parsing method. It is applied to a small class of operator grammars.

A grammar is said to be operator precedence grammar if it has two properties:

- No R.H.S. of any production has a∈.
- No two non-terminals are adjacent.

Operator precedence can only established between the terminals of the grammar. It ignores the non-terminal.

There are the three operator precedence relations:

a ⋗ b means that terminal "a" has the higher precedence than terminal "b".

a ⋖ b means that terminal "a" has the lower precedence than terminal "b".

a ≐ b means that the terminal "a" and "b" both have same precedence.

Precedence table:

	+	*	(	)	id	$
+	⋗	⋖	⋖	⋗	⋖	⋗
*	⋗	⋗	⋖	⋗	⋖	⋗
(	⋖	⋖	⋖	≐	⋖	X
)	⋗	⋗	X	⋗	X	⋗
id	⋗	⋗	X	⋗	X	⋗
$	⋖	⋖	⋖	X	⋖	X

Parsing Action

- Both end of the given input string, add the $ symbol.
- Now scan the input string from left right until the ⋗ is encountered.
- Scan towards left over all the equal precedence until the first left most ⋖ is encountered.
- Everything between left most ⋖ and right most ⋗ is a handle.
- $ on $ means parsing is successful.

Example

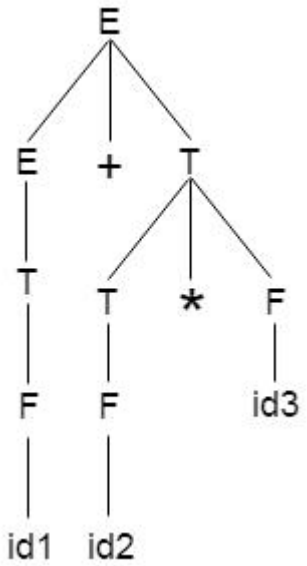
Grammar:

1. E → E+T/T
2. T → T*F/F
3. F → id

Given string:

1. w = id + id * id

Let us consider a parse tree for it as follows:



On the basis of above tree, we can design following operator precedence table:

	E	T	F	id	+	*	$
E	X	X	X	X	≐	X	⋗
T	X	X	X	X	⋗	≐	⋗
F	X	X	X	X	⋗	⋗	⋗
id	X	X	X	X	⋗	⋗	⋗
+	X	≐	⋖	⋖	X	X	X
*	X	X	≐	⋖	X	X	X
$	⋖	⋖	⋖	⋖	X	X	X

Now let us process the string with the help of the above precedence table:

$ ⋖ id1 ⋗ + id2 * id3 $

$ ⋖ F ⋗ + id2 * id3 $

$ ⋖ T ⋗ + id2 * id3 $

$ ⋖ E ≐ + ⋖ id2 ⋗ * id3 $

$ ⋖ E ≐ + ⋖ F ⋗ * id3 $

$ ⋖ E ≐ + ⋖ T ≐ * ⋖ id3 ⋗ $

$ ⋖ E ≐ + ⋖ T ≐ * ≐ F ⋗ $

$ ⋖ E ≐ + ≐ T ⋗ $

$ ⋖ E ≐ + ≐ T ⋗ $

$ ⋖ E ⋗ $

Accept.