

## Compiler Construction Project

You have to make a calculator with 7 operations (add(+), sub(-), mult(\*), div(/), pow( $\rightarrow$ ), assign( $\leftarrow$ ), PRINT). The tokens would be 7 ops with , (comma (,)), open parentheses ((), close parentheses()), ID and NUM (Integer). The precedence of ops is given below:

PRINT <.  $\leftarrow$  <. - <. + <. / <. \* <.  $\rightarrow$

The associativity of the operators is given below:

- .> -

+ .> +

/ .> /

\* .> \*

$\rightarrow$  <.  $\rightarrow$

ID could be any identifier (for simplicity you can consider it as 1 character long). NUM is restricted to Integer but Float values would be welcomed. The ops defined the same way normal algebra defines. Error messages would be:

- (I) No val assigned to <ID> (in case ID does have any initialization);
- (ii) ID is succeeded by ID, expecting operators (if an ID followed by an ID without op in middle);
- (iii) Unbalanced Parentheses (if parentheses do not balanced); No value assigned to ID (if ID is uninitialized)
- (iv) Starting with OP, expecting ID or NUM (if expression starts with Ops)
- (v) Op is followed by OP, ID or NUM expected (if two Ops side by side)
- (vi) Unexpected Command (unlisted operation)

Output message would be:

- (I) PRINTING <ID>? <NUM> (in case of PRINT op) and
- (ii) SUCCESS (any other valid op).

Examples:

X + 4

NO VAL ASSIGN TO X

SQRT 9

UNEXPECTED COMMAND

HELLO CLASS

UNEXPECTED COMMAND

X  $\leftarrow$  10

SUCCESS

X + 10  
SUCCESS

PRINT X  
PRINTING X 20

PRINT Y ← X  
SUCCESS  
PRINTING Y 20

X + Y  
SUCCESS

PRINT X + 2 → 4  
SUCCESS  
SUCCESS  
PRINTING X 36

SUB Y, \$  
UNEXPECTED COMMAND

PRINT ::))))  
UNEXPECTED COMMAND

PRINT 100  
PRINTING 100

((1 + 2))(  
UNBALANCED PARENTHESES

X Y + X  
ID IS SUCCEDED BY ID, OP IS EXPECTED

Y ++ X + X  
OP IS FOLLOWED BY OP, ID OR NUM IS EXPECTED

+ X + X  
STARTING WITH OP, ID OR NUM IS EXPECTED

Instruction:

1. You can use any language you want but need to show individually grammar, scanner and parser parts.
2. Submit at the last class and show the demo.

Marks:

Total: 100