### SPL 语法定义:

```
program: program head routine DOT
program head: PROGRAM ID SEMI
routine: routine head routine body
sub routine: routine head routine body
routine head: label part const part type part var part routine part
label part:
const part : CONST const expr list |
const expr list: const expr list NAME EQUAL const value SEMI
             NAME EQUAL const value SEMI
const value: INTEGER | REAL | CHAR | STRING | SYS CON
type_part: TYPE type_decl list | E
type_decl_list : type_decl_list type_definition | type_definition
type definition: NAME EQUAL type decl SEMI
type decl: simple type decl | array type decl | record type decl
simple type decl: SYS TYPE | NAME | LP name list RP
               const value DOTDOT const value
               MINUS const value DOTDOT const value
               MINUS const value DOTDOT MINUS const value
               | NAME DOTDOT NAME
array type decl: ARRAY LB simple type decl RB
                                                 OF type decl
record type decl: RECORD field decl list END
field decl list: field decl list field decl | field decl
field decl: name list COLON type decl SEMI
name list: name list COMMA ID | ID
var part : VAR var decl list | ε
var decl list: var decl list var decl | var decl
var decl: name list COLON type decl SEMI
routine part: routine part function decl | routine part procedure decl
          function decl | procedure decl | E
function decl: function head SEMI sub routine SEMI
function head: FUNCTION NAME parameters COLON simple type decl
procedure decl: procedure head SEMI sub routine SEMI
procedure head: PROCEDURE NAME parameters
parameters: LP para decl list RP
para decl list: para decl list SEMI para type list para type list
para type list: var para list COLON simple type decl
           val para list COLON simple type decl
var para list: VAR name list
val para list: name list
```

```
routine body: compound stmt
compound stmt: BEGIN stmt list END
stmt list : stmt list stmt SEMI | \epsilon
stmt: INTEGER COLON non label stmt | non label stmt
non label stmt: assign stmt | proc stmt | compound stmt | if stmt | repeat stmt | while stmt
            | for stmt | case stmt | goto stmt
assign stmt: ID ASSIGN expression
         ID LB expression RB ASSIGN expression
         ID DOT ID ASSIGN expression
proc stmt: ID
        | ID LP args_list RP
        | SYS_PROC
        | SYS PROC LP expression_list RP
        | READ LP factor RP
if stmt: IF expression THEN stmt else clause
else clause: ELSE stmt | ε
repeat stmt: REPEAT stmt list UNTIL expression
while stmt: WHILE expression DO stmt
for_stmt: FOR ID ASSIGN expression direction expression DO stmt
direction: TO | DOWNTO
case stmt: CASE expression OF case expr list END
case expr list: case expr list case expr | case expr
case expr: const value COLON stmt SEMI
        | ID COLON stmt SEMI
goto stmt: GOTO INTEGER
expression list: expression list COMMA expression | expression
expression: expression GE expr | expression GT expr | expression LE expr
        expression LT expr | expression EQUAL expr
        | expression UNEQUAL expr | expr
expr: expr PLUS term | expr MINUS term | expr OR term | term
term: term MUL factor | term DIV factor | term MOD factor
      term AND factor | factor
factor: NAME | NAME LP args list RP | SYS FUNCT |
     SYS FUNCT LP args list RP | const value | LP expression RP
     NOT factor | MINUS factor | ID LB expression RB
     ID DOT ID
args list: args list COMMA expression | expression
```

## SPL 词法规则

ID: [a-zA-Z][\_a-zA-Z0-9]\*

NAME为关键字、SYS CON、SYS\_FUNCT 、SYS\_PROC、SYS\_TYPE之外的ID。

#### 运算符、界符定义:

-21.14 - 21.147-22 -				
LP: "("	PLUS: "+"			
RP: ")"	MINUS: "-"			
LB: "["	GE: ">="			
RB: "]"	GT: ">"			
DOT: "•"	LE: "<="			
COMMA: ","	LT: " <"			
COLON: ":"	EQUAL: "="			
MUL: "*"	ASSIGN: ":="			
DIV: "/"	MOD: "MOD"			
UNEQUAL: "<>"	DOTDOT: ""			
NOT: "NOT"	SEMI: ";"			

系统函数、过程、常数、类型等单词:

SYS CON: "false", "maxint", "true"

SYS FUNCT: "abs", "chr", "odd", "ord", "pred", "sqr", "sqrt", "succ"

SYS\_PROC: "write", "writeln"

SYS\_TYPE: "boolean", "char", "integer", "real"

READ: "read"

INTEGER:整数常数值 REAL:实数常数值

CHAR: 字符常数值,用单引号括起来,如'a', 'A'<'a'。

#### Keyword list:

"a	ınd",	"array",	"begin",	"case",	"const",
"d	liv",	"do",	"downto",	"else",	"end",
"f	or",	"function",	"goto",	"if",	
"m	nod",	"not",	"of",	"or",	"packed",
"procedure", "program", "record", "repeat",					
"t	hen",	"to",	"type",	"until",	"var",
"w	hile"				

(红色的加删除线的可不实现)

# SPL 语义规则:

- 1. 函数参数前面加var的表示该参数值可变可回传,即引用传递。
- 2. Function名称也是该函数返回的变量