

```

Program    ::= Decl+
Decl       ::= VariableDecl | FunctionDecl
VariableDecl ::= Variable ;
Variable   ::= Type ident
Type       ::= int | double | bool | string | ident | Type [ ]
FunctionDecl ::= Type ident ( Formals ) Stmt*
              void ident ( Formals ) Stmt*
Formals    ::= Variable+, | ε
Stmt       ::= IfStmt | WhileStmt | ForStmt | ReturnStmt | PrintStmt | Expr ;
IfStmt     ::= if ( Expr ) Stmt {else Stmt}
WhileStmt  ::= while ( Expr ) Stmt
ForStmt     ::= for ( Expr ) ; Expr ; (Expr) Stmt
ReturnStmt ::= return (Expr) ;
PrintStmt  ::= print ( Expr+, ) ;
Expr       ::= LValue = Expr | Constant | LValue | this | ( Expr ) |
              Expr + Expr | Expr - Expr | Expr * Expr | Expr / Expr |
              Expr % Expr | - Expr | Expr < Expr | Expr <= Expr |
              Expr > Expr | Expr >= Expr | Expr == Expr | Expr != Expr |
              Expr && Expr | Expr || Expr | ! Expr | New(ident) |
LValue     ::= ident | Expr.ident | Expr [ Expr ]
Constant   ::= intConstant | doubleConstant | boolConstant |
              stringConstant | null

```

### [Original]

Program → Decl<sup>+</sup>

Decl → VariableDecl | FunctionDecl

VariableDecl → Variable ;

Variable → Type ident

Type → int | double | bool | string | ident | Type [ ]

FunctionDecl → Type ident ( Formals ) Stmt\* | void ident ( Formals ) Stmt\*

Formals → Variable<sup>+</sup>, | ε

Stmt → WhileStmt | ReturnStmt | Expr ;

WhileStmt → while ( Expr ) Stmt

ReturnStmt → return Expr ;

Expr → LValue = Expr | Constant | LValue | this | (Expr) | Expr + Expr | Expr - Expr |  
           Expr \* Expr | Expr / Expr | Expr % Expr | - Expr | Expr < Expr | Expr <= Expr |  
           Expr > Expr | Expr >= Expr | Expr == Expr | Expr != Expr | Expr && Expr |  
           Expr || Expr | : Expr | New (ident)

LValue → ident | Expr.ident | Expr [ Expr ]

Constant → intConstant | doubleConstant | boolConstant | stringConstant | null

## [Propuesta]

Program  $\rightarrow$  Decl Decl+  
Decl+  $\rightarrow$  Decl Decl+ |  $\epsilon$   
Decl  $\rightarrow$  VariableDecl | FunctionDecl  
VariableDecl  $\rightarrow$  Variable ;  
Variable  $\rightarrow$  Type ident  
Type  $\rightarrow$  int Brackets | double Brackets | bool Brackets | string Brackets | ident Brackets  
Brackets  $\rightarrow$  [ ] Brackets |  $\epsilon$   
FunctionType  $\rightarrow$  Type | void

FunctionDecl  $\rightarrow$  FunctionType ident ( Formals ) FunctionStmt  
FunctionStmt  $\rightarrow$  Stmt FunctionStmt |  $\epsilon$   
Formals  $\rightarrow$  VariableList |  $\epsilon$   
VariableList  $\rightarrow$  Variable , VariableList | Variable

Stmt  $\rightarrow$  WhileStmt | ReturnStmt | Expr ;  
WhileStmt  $\rightarrow$  while ( Expr ) Stmt  
ReturnStmt  $\rightarrow$  return ReturnExpr  
ReturnExpr  $\rightarrow$  Expr ; ;

Expr  $\rightarrow$  LValue ExprP | : Expr | Operation  
ExprP  $\rightarrow$  = RValue | := RValue  
LValue  $\rightarrow$  ident LValueP | this.ident  
LValueP  $\rightarrow$  [Expr] | .ident |  $\epsilon$   
RValue  $\rightarrow$  New (ident) | Expr

Constant  $\rightarrow$  intConstant | doubleConstant | boolConstant | stringConstant | null  
BoolSymb  $\rightarrow$  < | <= | > | >=

OpTerm  $\rightarrow$  Constant | LValue | (Operation)  
Operation  $\rightarrow$  - Operation | (Operation) | OP1  
OP1  $\rightarrow$  OpTerm OP1\_2  
OP1\_2  $\rightarrow$  OP1.1 | OP2  
OP1.1  $\rightarrow$  || OP1 | && OP1 | == OP1 | != OP1  
OP2  $\rightarrow$  BoolSymb OP1 | OP3  
OP3  $\rightarrow$  OP3.1 | OP4  
OP3.1  $\rightarrow$  \* OP1 | / OP1 | % OP1  
OP4  $\rightarrow$  + OpTerm OP1 | - OpTerm OP1 |  $\epsilon$