

Program $\rightarrow \epsilon \mid$ Program Function

Function \rightarrow function ident SEMICOLON begin_params Declaration end_params begin_locals
Declaration end_locals begin_body Statements end_body
 \mid function ident error begin_params Declaration end_params begin_locals Declaration
end_locals begin_body Statements end_body

Declaration $\rightarrow \epsilon \mid$ Declaration DeclarationDef SEMICOLON \mid Declaration DeclarationDef error

DeclarationDef \rightarrow identifier colon integer
 \mid identifier colon array L_SQUARE_BRACKET number R_SQUARE_BRACKET of integer
 \mid identifier error integer
 \mid identifier error ARRAY L_SQUARE_BRACKET number R_SQUARE_BRACKET
of integer

Identifier \rightarrow ident \mid identifier COMMA ident \mid identifier error ident

Statement \rightarrow StatementDef SEMICOLON
 \mid Statement StatementDef SEMICOLON
 \mid StatementDef error
 \mid Statement StatementDef error

StatementDef \rightarrow Var ASSIGN Expression
 \mid if Bool-Exp then Statement endif
 \mid if Bool-Exp then Statement else Statement endif
 \mid while Bool_Exp beginloop Statement endloop
 \mid do beginloop Statement end loop while Bool-Exp
 \mid read Var_loop
 \mid write Var_loop
 \mid break
 \mid return Expression
 \mid Var error Expression

Var_loop \rightarrow Var
 \mid Var_loop COMMA Var

Var \rightarrow identifier
 \mid identifier L_SQUARE_BRACKET Expression R_SQUARE_BRACKET

Bool-Exp \rightarrow Relation-And-Expr
 \mid Bool-Exp or Relation-And-Expr

Relation-And-Expr \rightarrow Relation-Expr
 \mid Relation-And-Expr and Relation-Expr

Relation-Expr -> Expression Comp Expression

- | not Expression Comp Expression
- | true
- | not true
- | false
- | not false
- | L_PAREN Bool-Expr R_PAREN
- | not L_PAREN Bool-Expr R_PAREN
- | Expression error Expression
- | not Expression error Expression

Comp -> EQ

- | NEQ
- | LT
- | GT
- | LTE
- | GTE

Expression -> Multiplicative-Expr

- | Expression ADD Multiplicative-Expr
- | Expression SUB Multiplicative-Expr

Multiplicative-Expr -> Term

- | Multiplicative-Expr MULT Term
- | Multiplicative-Expr DIV Term
- | Multiplicative-Expr MOD Term

Term -> Var

- | SUB Var
- | number
- | SUB number
- | L_PAREN Expression R_PAREN
- | SUB L_PAREN Expression R_PAREN
- | identifier L_PAREN Expression R_PAREN
- | identifier L_PAREN R_PAREN

Expression-loop -> Expression

- | Expression-loop COMMA Expression
- | Expression-loop error Expression