CSE247 - Design of Compilers

Table of contents

1.0 Terminals

- int, float, string: Datatype keywords
- read, write :I/O keywords
- repeat, until: Loop keywords
- if, elseif, else, then, end: Conditional keywords
- return: Return keyword
- main: Main function keyword
- endl: End-line keyword for output
- identifier: Variable or function names (starts with letter, followed by letters/digits)
- number: Integer or floating-point literal
- string_literal: Sequence of characters enclosed in double quotes (")
- +, -: Addition operators
- *,/ : Multiplication operators
- :=: Assignment operator
- <, >, =, <>: Condition operators
- &&, ||: Boolean operators
- (,): Parentheses
- {, }: Curly braces (for function body)
- , : Comma separator
- ; : Semicolon statement terminator

2.0 Production Rules

1. Program → Function_List_Opt Main_Function

2. Function_List_Opt → Function_Statement Function_List_Opt | ε

3. Function_Statement → Function_Declaration Function_Body

4. Main_Function → Datatype main () Function_Body

5. Function_Declaration → Datatype identifier (Parameter_List_Opt)

6. Parameter_List_Opt → Parameter_List | ε

    1. Parameter_List → Parameter Param_Tail

    2. Param_Tail → ,Parameter Param_Tail | ε

    3. Parameter → Datatype identifier

7. Function_Body → {Statement_List Return_Statement }

8. Statement_List → Statement Statement_List | ε

9. Statement →
   | Declaration_Statement
   | Assignment_Statement
   | Read_Statement
   | Write_Statement
   | If_Statement
   | Repeat_Statement
   | Function_Call

10. Declaration_Statement → Datatype Declaration_Identifiers ;

    1. Declaration_Identifiers → Decl_Item Decl_Tail

    2. Decl_Tail → ,Decl_Item Decl_Tail | ε

    3. Decl_Item → identifier Decl_Assign_Opt

    4. Decl_Assign_Opt →: = Expression | ε

11. Assignment_Statement → identifier: = Expression;

12. Read_Statement → read identifier;

13. Write_Statement → write Expression | endl;

14. If_Statement → if Condition_Statement then Statement_List Optional_Else_Ifs Optional_Else end

15. Optional_Else_Ifs → elseif Condition_Statement then Statement_List Optional_Else_Ifs | ε

16. Optional_Else → else Statement_List | ε

17. Condition_Statement → Condition Cond_Tail

    1. Cond_Tail → Boolean_Operator Condition Cond_Tail | ε

    2. Condition → Expression Condition_Operator Expression

18. Repeat_Statement → repeat Statement_List until Condition_Statement

19. Return_Statement → return Expression;

20. Function_Call → identifier (Argument_List_Opt)

    1. Argument_List_Opt → Argument_List | ε

    2. Argument_List → Expression Arg_Tail

    3. Arg_Tail → , Expression Arg_Tail | ε

21. Expression → Term Expr_Tail

22. Expr_Tail → AddOp Term Expr_Tail | ε

23. Term → Factor Term_Tail

24. Term_Tail → MultOp Factor Term_Tail | ε

25. Factor → (Expression) | number | string_literal | Identifier_Factor

26. Identifier_Factor → identifier Factor_Tail

27. Factor_Tail → (Argument_List_Opt) | ε

28. AddOp → + | -

29. MultOp → * | /

30. Condition_Operator → < | > | = | <>

31. Boolean_Operator → && | ||

32. Datatype → int | float | string