

MS2

Task 1:

Tiny Language CFG

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i. Terminals:

1. number
2. stringLine
3. reserved_words
4. comment_statement
5. identifier
6. booleanOp
7. conditionOp
8. assignOp
9. semicolon
10. dot
11. comma
12. leftParanthesis
13. rightParanthesis
14. leftPracket
15. rightPracket
16. equalOp
17. assignmentOp
18. lessThanOp
19. greaterThanOp
20. notEqualOp
21. andOp
22. orOp
23. plusOp
24. minusOp
25. multiplyOp
26. divideOp

ii. Production Rules:

NUMBER	RULE
✓ 1	$Datatype \rightarrow \text{int} \mid \text{float} \mid \text{string}$
2	$Statement \rightarrow Write_statement \mid Read_statement \mid$ $Assignment_statement \mid Declaration_statement \mid If_statement \mid$ $Repeat_statement \mid Function_call$
3 ✓	$Statements \rightarrow Statements Statement \mid Statement$ $Statements' \rightarrow Statement Statements' \mid \varepsilon$
4	$Function_call \rightarrow \text{identifier} (Identifier_list \mid \varepsilon)$
✓ 5	$Term \rightarrow \text{number} \mid \text{identifier} \mid Function_call$
6	$Equ \rightarrow Equ AddOp Equation \mid (Equ AddOp Equation) \mid Equation$ $Equ \rightarrow (Equ AddOp Equation) Equ' \mid Equation Equ'$ $Equ' \rightarrow AddOp Equation Equ' \mid \varepsilon$
7	$Equation \rightarrow Equation MultOp Term \mid (Equation MultOp Term) \mid Term$ $Equation \rightarrow (Equation MultOp Term) Equation' \mid Term Equation'$ $Equation' \rightarrow MultOp Term Equation' \mid \varepsilon$
8	$Expression \rightarrow \text{stringLine} \mid Term \mid Equation$
✓ 9	$Assignment_statement \rightarrow \text{identifier assignmentOp Expression} ;$
✓ 10	$Declaration_statement \rightarrow Datatype Identifier_list ;$
✓ 11	$Identifier_list \rightarrow Identifier_list , Id \mid Id$

	$Identifier_list \rightarrow Id\ Identifier_list'$ $Identifier_list' \rightarrow , Id\ Identifier_list' \mid \varepsilon$
✓ 12	$Id \rightarrow \text{identifier} \mid \text{identifier assignmentOp Expression}$ $Id \rightarrow \text{identifier } Id'$ $Id' \rightarrow \varepsilon \mid \text{assignmentOp Expression}$
✓ 13	$Write_statement \rightarrow \text{write Expression} ; \mid \text{write endl} ;$ $Write_statement \rightarrow \text{write Write_statement}'$ $Write_statement' \rightarrow Expression ; \mid \text{endl} ;$
✓ 14	$Read_statement \rightarrow \text{read identifier} ;$
✓ 15	$Return_statement \rightarrow \text{return Expression} ;$
✓ 16	$Ret_statement \rightarrow Return_statement \mid \varepsilon$
✓ 17	$ConditionOp \rightarrow \text{notEqualOp} \mid \text{equalOp} \mid \text{lessThanOp} \mid$ greaterThanOp
✓ 18	$BooleanOp \rightarrow \text{andOp} \mid \text{orOp}$
✓ 19	$AddOp \rightarrow \text{plusOp} \mid \text{minusOp}$
✓ 20	$MultOp \rightarrow \text{multiplyOp} \mid \text{devideOp}$
✓ 21	$Condition \rightarrow \text{identifier ConditionOp Term}$
✓ 22	$Condition_statement \rightarrow Condition_statement BooleanOp Condition \mid$ $Condition$ $Condition_statement \rightarrow Condition Condition_statement'$ $Condition_statement' \rightarrow BooleanOp Condition Condition_statement' \mid$ ε

23	<i>If_statement</i> → if <i>Condition_statement</i> then <i>Statements</i> <i>Ret_statement Else_if_statement Else_statement end</i>
24	<i>Else_if_statement</i> → elseif <i>Condition_statement</i> then <i>Statements</i> <i>Ret_statement Else_statement end</i> ϵ
25	<i>Else_statement</i> → else <i>Statements end</i> ϵ
26	<i>Repeat_statement</i> → repeat <i>Statements until</i> <i>Condition_statement</i>
27	<i>Parameter</i> → <i>Datatype identifier</i> ϵ
28	<i>Parameters</i> → <i>Parameters, Parameter</i> <i>Parameter</i> <i>Parameters</i> → <i>Parameter Parameters'</i> <i>Parameters'</i> → <i>, Parameter Parameters'</i>
29	<i>Function_declaration</i> → <i>Datatype identifier (Parameters)</i>
30	<i>Function_body</i> → { <i>Statements Return_statement</i> }
31	<i>Function_statement</i> → <i>Function_declaration Function_body</i> ϵ
32	<i>Function_statements</i> → <i>Function_statements Function_statement</i> <i>Function_statement</i> <i>Function_statements</i> → <i>Function_statement Function_statements'</i> <i>Function_statements'</i> → <i>Function_statement Function_statements'</i> ϵ
33	<i>Main_function</i> → <i>Datatype main()</i> <i>Function_body</i>
34	<i>Program</i> → <i>Function_statements Main_function</i>