

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 | $Identifier_list \rightarrow Identifier_list , Id \mid Id$ |

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| | $Identifier_list \rightarrow Id\ Identifier_list'$ $Identifier_list' \rightarrow , Id\ Identifier_list' \mid \varepsilon$ |
| ✓ 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 |

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| 23 | $if_statement \rightarrow \text{if } Condition_statement \text{ then Statements Ret_statement Else_if_statement Else_statement end}$ |
| 24 | $Else_if_statement \rightarrow \text{elseif } Condition_statement \text{ then Statements Ret_statement Else_statement end} \mid \varepsilon$ |
| 25 | $Else_statement \rightarrow \text{else Statements end} \mid \varepsilon$ |
| 26 | $Repeat_statement \rightarrow \text{repeat Statements until Condition_statement}$ |
| 27 | $Parameter \rightarrow Datatype \text{ identifier} \mid \varepsilon$ |
| 28 | $Parameters \rightarrow Parameters, Parameter \mid Parameter$ $Parameters \rightarrow Parameter Parameters'$ $Parameters' \rightarrow , Parameter Parameters'$ |
| 29 | $Function_declaration \rightarrow Datatype \text{ identifier (Parameters)}$ |
| 30 | $Function_body \rightarrow \{ Statements Return_statement \}$ |
| 31 | $Function_statement \rightarrow Function_declaration Function_body \mid \varepsilon$ |
| 32 | $Function_statements \rightarrow Function_statements Function_statement \mid Function_statement$ $Function_statements \rightarrow Function_statement Function_statements'$ $Function_statements' \rightarrow Function_statement Function_statements' \mid \varepsilon$ |
| 33 | $Main_function \rightarrow Datatype \text{ main()} Function_body$ |
| 34 | $Program \rightarrow Function_statements Main_function$ |