GROUP 20

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Grammar Rules

1. program ⇒ otherFunctions mainFunction
2. mainFunction ⇒TK_MAIN stmts TK_END
3. otherFunctions⇒ function otherFunctions
4. otherFunctions ⇒eps
5. function ⇒ TK_FUNID input_par output_par TK_SEM stmts TK_END
6. input_par ⇒TK_INPUT TK_PARAMETER TK_LIST TK_SQL parameter_list TK_SQR
7. output_par ⇒ TK_OUTPUT TK_PARAMETER TK_LIST TK_SQL parameter_list TK_SQR
8. output_par ⇒ eps
9. parameter_list ⇒ dataType TK_ID remaining_list
10. dataType ⇒ primitiveDatatype
11. dataType ⇒ constructedDatatype
12. primitiveDatatype ⇒ TK_INT
13. primitiveDatatype ⇒ TK_REAL
14. constructedDatatype ⇒ TK_RECORD TK_RECORDID
15. remaining_list ⇒TK_COMMA parameter_list
16. remaining_list⇒ eps
17. stmts ⇒ typeDefinitions declarations otherStmts returnStmt
18. typeDefinitions ⇒ typeDefinition typeDefinitions
19. typeDefinitions ⇒ eps
20. typeDefinition ⇒ TK_RECORD TK_RECORDID fieldDefinitions TK_ENDRECORD TK_SEM
21. fieldDefinitions ⇒ fieldDefinition fieldDefinition moreFields
22. fieldDefinition ⇒TK_TYPE primitiveDatatype TK_COLON TK_FIELDID TK_SEM
23. moreFields ⇒ fieldDefinition moreFields
24. moreFields ⇒ eps
25. declarations ⇒ declaration declarations
26. declarations ⇒ eps

27. declaration ⇒TK_TYPE dataType TK_COLON TK_ID global_or_not TK_SEM
28. global_or_not ⇒ TK_COLON TK_GLOBAL
29. Global_or_not ⇒ eps
30. otherStmts ⇒ stmt otherStmts
31. otherStmts ⇒ eps
32. stmt ⇒ assignmentStmt
33. stmt ⇒ iterativeStmt
34. stmt ⇒conditionalStmt
35. stmt ⇒ ioStmt
36. stmt ⇒funCallStmt
37. assignmentStmt⇒singleOrRecId TK_ASSIGNOP arithmeticExpression TK_SEM
38. singleOrRecId ⇒ TK_ID new_24
39. New_24 ⇒ eps
40. new_24 ⇒ TK_DOT TK_FIELDID
41. funCallStmt ⇒outputParameters TK_CALL TK_FUNID TK_WITH TK_PARAMETERS inputParameters TK_SEM1
42. outputParameters ⇒ TK_SQL idList TK_SQR TK_ASSIGNOP
43. outputParameters ⇒ eps
44. inputParameters ⇒ TK_SQL idList TK_SQR
45. iterativeStmt ⇒ TK_WHILE TK_OP booleanExpression TK_CL stmt otherStmts TK_ENDWHILE
46. conditionalStmt ⇒ TK_IF TK_OP booleanExpression TK_CL TK_THEN stmt otherStmts elsePart
47. elsePart ⇒ TK_ELSE stmt otherStmts TK_ENDIF
48. elsePart ⇒ TK_ENDIF
49. ioStmt ⇒ TK_READ TK_OP singleOrRecId TK_CL TK_SEM
50. ioStmt ⇒ TK_WRITE TK_OP allVar TK_CL TK_SEM
51. allVar ⇒ singleOrRecId
52. allVar ⇒ TK_NUM
53. allVar ⇒ TK_RNUM
54. arithmeticExpression ⇒ term expPrime
55. expPrime ⇒ lowPrecedenceOperators term expPrime
56. expPrime ⇒ eps
57. term ⇒ factor termPrime
58. termPrime ⇒ highPrecedenceOperator factor termPrime
59. termPrime ⇒ eps
60. factor ⇒ TK_OP arithmeticExpression TK_CL
61. factor ⇒ allVar
62. factor => TK_MINUS factor
63. highPrecedenceOperator ⇒ TK_MUL
64. highPrecedenceOperator ⇒ TK_DIV
65. lowPrecedenceOperators ⇒ TK_PLUS
66. lowPrecedenceOperators ⇒ TK_MINUS

67. booleanExpression ⇒ TK_OP booleanExpression TK_CL logicalOp TK_OP booleanExpression TK_CL
68. booleanExpression ⇒ allVar relationalOp allVar
69. booleanExpression ⇒ TK_NOT TK_OP booleanExpression TK_CL
70. logicalOp ⇒ TK_AND
71. logicalOp ⇒ TK_OR
72. relationalOp ⇒ TK_LT
73. relationalOp ⇒ TK_LE
74. relationalOp ⇒ TK_EQ
75. relationalOp ⇒ TK_GT
76. relationalOp ⇒ TK_GE
77. relationalOp ⇒ TK_NE
78. returnStmt ⇒ TK_RETURN optionalReturn TK_SEM
79. optionalReturn ⇒ TK_SQL idList TK_SQR
80. optionalReturn ⇒ eps
81. idList ⇒ TK_ID more_ids
82. more_ids ⇒ TK_COMMA idList
83. more_ids ⇒ eps

Semantic Rules for AST

1. program.children =makeNode(Otherfunctions.children,functions.addr),free(Otherfunctions)
2. mainFunction.children = stmts.addr
3. otherFunctions.children = makeNode(function.addr,otherfunctions.children),free(otherFunctions)
4. otherFunctions.children = NULL,free(OtherFunctions.children)
5. function.children = makeNode(TK_FUNID.addr, input_par.addr, output_par.addr, stmts.addr)
6. input_par.children = parameter_list.children,free(parameter_list)
7. output_par.children = parameter_list.children,free(parameter_list)
8. output_par.children = NULL
9. parameter_list.children = makeNode(dataType.addr, TK_ID.addr, remaining_list.children),free(dataType),free(remaining_list)
10. <dataType>.addr = <primitiveDatatype>.addr free(primitiveDatatype), datatype.children=NULL
11. <dataType>.addr = <ConstructedDatatype>.addr free(ConstructedDatatype),datatype.children=NULL
12. primitiveDatatype.addr = TK_INT.addr
13. primitiveDatatype.addr = TK_REAL.addr
14. constructedDatatype.addr = TK_RECORDID.addr
15. <remaining_list>.children=parameter_list.children free(parameter_list)
16. remaining_list.children = NULL
17. Stmts.children = makeNode(<typeDefinitions>.addr, <declarations>.addr, <otherStmts>.children, <returnStmt>.addr) free(otherStmts)
18. <typeDefinitions>.children = makeNode(<typeDefinition>.addr, typeDefinitions1>.children) free(<typeDefinitions1>)
19. <typeDefinitions>.children=NULL
20. <typeDefinition>.children = makeNode(TK_RECORDID.addr, <fieldDefinitions>.children) free(fieldDefinitions)
21. <fieldDefinitions>.children = makeNode(<fieldDefinition1>.addr, <fieldDefinition2>.addr, <moreFields>.children) free(morefields)
22. <fieldDefinition>.children = makeNode(<primitiveDatatype>.addr, TK_FIELDID.addr) free(<primitiveDatatype>)
23. <moreFields>.children = makeNode(<fieldDefinition>.addr,<moreFields1>.children) free(morefields1)
24. moreFields.children = NULL
25. Declarations.children= makeNode(<declaration>.addr, declarations1.children) ,free(declarations1)

26. declarations.children = NULL

27. Declaration.children = makeNode(dataType.addr, TK_ID.addr, global_or_not.children),free(datatype,global_or_not)
28. global_or_not.addr = TK_GLOBAL.addr
29. global_or_not.addr = NULL
30. OtherStmts.children = makeNode(stmt.addr, otherstmts1.children),free(stmt,other_stmt)
31. otherStmts.children = NULL
32. stmt.addr = assignmentStmt.addr
33. stmt.addr = iterativeStmt.addr
34. stmt.addr = conditionalStmt.addr
35. stmt.addr = ioStmt.addr
36. stmt.addr = funCallStmt.addr
37. AssignmentStmt.children = makeNode(SingleOrRecId.addr, arithmeticExpression.addr)
38. singleOrRecId.children = makeNode(TK_ID.addr, new_24.children),free(new_24)
39. new_24.children = NULL
40. new_24.addr = TK_FIELDID.addr
41. FunCallStmt.children = makeNode(outputParameters.addr, TK_FUNID.addr, inputParameters.addr)
42. OutputParameters.children = makeNode(idList.children) ,free(idlist)
43. outputParameters.children = NULL
44. InputParameters.children = idlist.children, free(idlist)
45. IterativeStmt.children = makeNode(booleanExpression.addr,stmt.addr, otherStmts.children),free(stmt) free(booleanexpression),free(otherStmts)
46. Conditionalstmt.children = makeNode(booleanExpression.addr,stmt.addr, otherStmts.children,otherStmts.addr),free(stmt), free(booleanexpression),free(otherStmts)
47. elsePart.children = makeNode(stmt.addr, otherstmts.children), free(stmt,otherstmts)
48. elsePart.children = NULL,free(elsePart.children)
49. Iostmt.children = makeNode(read.addr, singleOrRecId.addr)
50. Iostmt.children = makeNode(write.addr, allvar.addr)
51. allVar.addr = singleOrRecId.addr
52. allVar.addr = TK_NUM.addr
53. allVar.addr = TK_RNUM.addr
54. arithmeticExpression.addr = expPrime.syn
55. expPrime.syn = expPrime.syn
56. expPrime.syn=expPrime.inh
57. term.addr = termPrime.syn
58. termPrime.syn = termPrime.syn
59. termPrime.syn = termPrime.inh
60. Factor.addr = arithmeticExpression.addr,free(arithmeticExp)
61. Factor.addr = allVar.addr,free(allVar)

62. Factor.addr=TK_MINUS.addr,tk_minus.children = factor1.addr ,free(factor1)
63. highPrecedenceOperator.addr = TK_MUL.addr
64. highPrecedenceOperator.addr = TK_DIV.addr
65. lowPrecedenceOperators.addr = TK_PLUS.addr
66. lowPrecedenceOperators.addr = TK_MINUS.addr
67. booleanExpression.addr= logicalOp.addr, logicalOp.addr.children = makeNode(booleanExpression1.addr, booleanExpression2.addr) ,free(logicalOp,bExp1,bExp2)
68. booleanExpression.addr =relationalOp.addr,relationalOp.addr.children = makeNode(allvar1.addr,allvar2.addr),free(Allvar1,2) ,free(relationalop)
69. BooleanExpression.addr=tk_not.addr,tk_not.children= (booleanExpression1.addr) free(booleanExpression1)
70. logicalOp.addr = TK_AND.addr
71. logicalOp.addr = TK_OR.addr
72. relationalOp.addr = TK_LT.addr
73. relationalOp.addr = TK_LE.addr
74. relationalOp.addr = TK_EQ.addr
75. relationalOp.addr = TK_GT.addr
76. relationalOp.addr = TK_GE.addr
77. relationalOp.addr = TK_NE.addr
78. ReturnStmt.children = optionalReturn.children ,free(optionalreturn)
79. OptionalReturn.children=idlist.children , free(idlist)
80. optionalReturn.children = NULL
81. Idlist.children = makeNode(TK_ID.addr, moreid.children), free(moreid)
82. Moreids.children=idlist.children ,free(idlist)
83. More_ids.children = NULL