COMPILER CONSTRUCTION (CS F363)

GROUP NUMBER 8

Shubham Lather
2016A7PS0006P

Devyash Parihar
2016A7PS0066P

Rahul Khandelwal
2016A7PS0128P

Aniruddha Karve
2016A7PS0042P

MODIFIED GRAMMAR

(<program> is the starting symbol of grammar)

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
39. <singleOrRecId> ⇒ TK_RECORDID TK_DOT TK_FIELDID
40. <funCallStmt> ⇒ <outputParameters> TK_CALL TK_FUNID TK_WITH TK_PARAMETERS <inputParameters>
41. <outputParameters> ⇒ TK_SQL <idList> TK_SQR TK_ASSIGNOP
42. <outputParameters> ⇒ eps
43. <inputParameters> ⇒ TK_SQL <idList> TK_SQR
44. <iterativeStmt> ⇒ TK_WHILE TK_OP <booleanExpression> TK_CL <stmt> <otherStmts> TK_ENDWHILE
45. <conditionalStmt> ⇒ TK_IF TK_OP <booleanExpression> TK_CL TK_THEN <stmt> <otherStmts> <elseStmt>
46. <elseStmt> ⇒ TK_ELSE <stmt> <otherStmts> TK_ENDIF
47. <elseStmt> ⇒ TK_ENDIF
48. <ioStmt> ⇒ TK_READ TK_OP <singleOrRecId> TK_CL TK_SEM
49. <ioStmt> ⇒ TK_WRITE TK_OP <allVar> TK_CL TK_SEM
50. <allVar> ⇒ <var>
51. <allVar> ⇒ TK_RECORDID

52. <arithmeticExpression> ⇒ <expr> <seq>
53. <seq> ⇒ <lp> <expr> <seq>
54. <seq> ⇒ eps
55. <expr> ⇒ <element> <order>
56. <order> ⇒ <hp> <element> <order>
57. <order> ⇒ eps
58. <lp> ⇒ TK_PLUS
59. <lp> ⇒ TK_MINUS
60. <hp> ⇒ TK_MUL
61. <hp> ⇒ TK_DIV
62. <element> ⇒ TK_OP <arithmeticExpression> TK_CL
63. <element> ⇒ <entire>
64. <entire> ⇒ TK_ID
65. <entire> ⇒ TK_NUM
66. <entire> ⇒ TK_RNUM
67. <entire> ⇒ TK_RECORDID <alter>
68. <alter> ⇒ eps
69. <alter> ⇒ TK_DOT TK_FIELDID
70. <booleanExpression> ⇒ TK_OP <booleanExpression> TK_CL
    <logicalOp> TK_OP <booleanExpression> TK_CL
71. <booleanExpression> ⇒ <var> <relationalOp> <var>
72. <booleanExpression> ⇒ TK_NOT <booleanExpression>
73. <var> ⇒ TK_ID
74. <var> ⇒ TK_NUM
75. <var> ⇒ TK_RNUM

76. <logicalOp> ⇒ TK_AND
77. <logicalOp> ⇒ TK_OR
78. <relationalOp> ⇒ TK_LT
79. <relationalOp> ⇒ TK_LE
80. <relationalOp> ⇒ TK_EQ
81. <relationalOp> ⇒ TK_GT
82. <relationalOp> ⇒ TK_GE
83. <relationalOp> ⇒ TK_NE
84. <returnStmt> ⇒ TK_RETURN <optionalReturn> TK_SEM
85. <optionalReturn> ⇒ TK_SQL <idList> TK_SQR
86. <optionalReturn> ⇒ eps
87. <idList> ⇒ TK_ID <more_ids>
88. <more_ids> ⇒ TK_COMMA <idList>
89. <more_ids> ⇒ eps

SEMANTIC RULES

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1. program.adr = newNode(program, otherFunctions.adr, mainFunction.adr)
2. mainFunction.adr = stmts.adr, free(stmts)
3. otherFunctions.adr = newNode(otherFunctions, function.adr, otherFunctions.adr)
4. otherFunctions.adr = NULL
5. function.adr = newNode(function, TK_FUNID.adr, input_par.adr, output_par.adr, stmts.adr)

6. input_par.adr = parameter_list.adr, free(parameter_list)
7. output_par.adr = parameter_list.adr, free(parameter_list)
8. output_par.adr = NULL
9. parameter_list.adr = newNode(parameter_list, dataType.adr, TK_ID.adr, remaining_list.adr)
10. dataType.adr = primitiveDatatype.adr, free(primitiveDatatype)
11. dataType.adr = constructedDatatype.adr, free(constructedDatatype)
12. primitiveDatatype.adr = TK_INT.adr
13. primitiveDatatype.adr = TK_REAL.adr
14. constructedDatatype.adr =TK_RECORDID.adr
15. remaining_list.adr = parameter_list.adr,free(parameter_list.adr)
16. remaining_list.adr = NULL
17. Stmts.adr = newNode(stmts, typeDefinitions.adr, declarations.adr, otherStmts.adr, returnStmt.adr)
18. typeDefinitions.adr = newNode(typeDefinitions, typeDefinition.adr, typeDefinitions.adr)
19. typeDefinitions.adr = NULL
20. typeDefinition.adr = newNode(typeDefinition, TK_RECORDID.adr, fieldDefinitions.adr)
21. fieldDefinitions.adr = newNode(fieldDefinitions,fieldDefinition.adr, fieldDefinition.adr,moreFields.adr)
22. fieldDefinition.adr = newNode(fieldDefinition,primitiveDatatype.adr, TK_FIELDID.adr)
23. moreFields.adr=newNode(moreFields,fieldDefinition.adr,moreFields.adr)
24. moreFields.adr=NULL

25. declarations.adr=newNode(declarations,declaration.adr,declarations.adr)
26. declarations.adr=NULL
27. declaration.adr =newNode(declaration, dataType.adr, TK_ID.adr, global_or_not.adr)
28. global_or_not.adr=NULL
29. otherStmts.adr=newNode(otherStmts, stmt.adr,otherStmts.adr)
30. otherStmts.adr=NULL
31. stmt.adr=assignmentStmt.adr,free(assignmentStmt.adr)
32. stmt.adr=iterartiveStmt.adr,free(iterativeStmt.adr)
33. stmt.adr=conditionalStmt.adr,free(conditionalStmt.adr)
34. stmt.adr=ioStmt.adr,free(ioStmt.adr)
35. stmt.adr=funCallStmt.adr,free(funCallStmt.adr)
36. assignmentStmt.adr=newNode(assignmentStmt,singleOrRecId.adr,TK_ASSIGNOP.adr, arithmeticExpression.adr)
37. singleOrRecId.adr=TK_ID.adr
38. singleOrRecId.adr=newNode(singleOrRecId,TK_RECORDID.adr,TK_DOT.adr,TK_FIELDID.adr)
39. funCallStmt.adr=newNode(funCallStmt,outputParameters.adr,TK_FUNID.adr,inputParameters.adr)
40. outputParameters.adr=newNode(outputParameters.adr,idList.adr,TK_ASSIGNOP.adr)
41. outputParameters.adr=NULL
42. inputParameters.adr=idList.adr,free(idList.adr)
43. iterativeStmt.adr=newNode(iterativeStmt,booleanExpression.adr,stmt.adr,otherStmts.adr)

44. conditionalStmt.adr=newNode(conditionalStmt,booleanExpression.adr,stmt.adr,otherStmts.adr,elseStmt.adr)
45. elseStmt.adr=newNode(elseStmt,stmt.adr,otherStmts.adr)
46. elseStmt.adr=NULL
47. ioStmt.adr=newNode(ioStmt,TK_READ.adr,singleOrRecId.adr)
48. ioStmt.adr=newNode(ioStmt,TK_WRITE.adr,allVar.adr)
49. allVar.adr=var.adr,free(var.adr)
50. allVar.adr=TK_RECORDID.adr
51. arithmeticExpression.adr=newNode(arithmeticExpression,expr.adr,seq.adr)
52. seq.adr=newNode(seq,lp.adr,expr.adr,seq.adr)
53. seq.adr=NULL
54. expr.adr=newNode(expr,element.adr,order.adr)
55. order.adr=newNode(order,hp.adr,element.adr,order.adr)
56. order.adr=NULL
57. lp.adr=TK_PLUS.adr
58. lp.adr=TK_MINUS.adr
59. hp.adr=TK_MUL.adr
60. hp.adr=TK_DIV.adr
61. element.adr=arithmeticExpression.adr,free(arithmeticExpression.adr)
62. element.adr=entire.adr,free(entire.adr)
63. entire.adr=TK_ID.adr
64. entire.adr=TK_NUM.adr
65. entire.adr=TK_RNUM.adr
66. entire.adr=newNode(entire,TK_RECORDID.adr,alter.adr)
67. alter.adr=NULL

68. alter.adr=newNode(alter,TK_DOT.adr,TK_FIELDID.adr)
69. booleanExpression.adr=newNode(booleanExpression,booleanExpression.adr , logicalOp.adr,booleanExpression.adr)
70. booleanExpression.adr=newNode(booleanExpression,var.adr,relationalOp.a dr,var.adr)
71. booleanExpression.adr=newNode(booleanExpression,TK_NOT.adr,boolean Expression.adr)
72. var.adr=TK_ID.adr
73. var.adr=TK_NUM.adr
74. var.adr=TK_RNUM.adr
75. logicalOp.adr=TK_AND.adr
76. logicalOp.adr=TK_OR.adr
77. relationalOp.adr=TK_LT.adr
78. relationalOp.adr=TK_LE.adr
79. relationalOp.adr=TK_EQ.adr
80. relationalOp.adr=TK_GT.adr
81. relationalOp.adr=TK_GE.adr
82. relationalOp.adr=TK_NE.adr
83. returnStmt.adr=optionalReturn.adr,free(optionalReturn.adr)
84. optionalReturn.adr=idList.adr,free(idList.adr)
85. optionalReturn.adr=NULL
86. idList.adr=newNode(idList,TK_ID.adr,more_ids.adr)
87. more_ids.adr=idList.adr,free(idList.adr)
88. more_ids.adr=NULL