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2015A7PS0088P

Compiler Construction

Grammar:

1. <mainFunction> ===> MAIN SQO SQC <stmtsAndFunctionDefs> END
2. <stmtsAndFuntionDefs> ===> <stmtOrFunctionDef> <stmtAndFunctionDefsOrEmpty>
3. <stmtAndFunctionDefsOrEmpty> ===> <stmtsAndFuntionDefs> | ϵ
4. <stmtOrFunctionDef> ===> <stmt> | <functionDef>
5. <stmt> ===> <declarationStmt> | <assignmentStmt> | <conditionalStmt> | <ioStmt> | <funcStmt>
6. <otherStmts> ===> <stmt> <otherStmts> | ϵ
7. <funcStmt> ===> <funCall> SEMICOLON
8. <declarationStmt> ===> <type> <idList> SEMICOLON
9. <assignmentStmt> ===> ID ASSIGNOP <rightHandSideOfId> SEMICOLON | SQO <idList> SQC ASSIGNOP <rightHandSideOfTuple> SEMICOLON
10. <rightHandSideOfId> ===> <funCall> | <arithmeticExpression> | <stringExpression> | <matrixExpression>
11. <rightHandSideOfTuple> ===> <funCall> | @ID
12. <conditionalStmt> ===> IF <booleanExpression> <stmt> <otherStmts> <elseStmt> ENDIF
13. <elseStmt> ===> ELSE <stmt> <otherStmts> | ϵ
14. <ioStmt> ===> READ OP ID CL SEMICOLON | PRINT OP ID CL SEMICOLON
15. <stringExpression> ===> ID <stringOp> | STR <stringOp>
16. <stringOp> ===> PLUS <stringExpression> | ϵ
17. <matrixExpression> ===> ID <matrixOp> | <matrix> <matrixOp> |
18. <matrixOp> ===> <plusOrMinus> <matrixExpression> | ϵ
19. <matrix> ===> SQP <numberList> <moreMatrixNums> SQC
20. <numberList> ===> NUM <moreNums>
21. <moreNums> ===> COMMA <numberList> | ϵ
22. <moreMatrixNums> ===> SEMICOLON <numberList> <moreMatrixNums> | ϵ
23. <arithmeticExpression> ===> <term> <plusOrMinus> <arithmeticExpression> | <term>
24. <plusOrMinus> ==> PLUS | MINUS
25. <term> ===> <factor> <mulOrDiv> <term> | <factor>
26. <mulOrDiv> ===> MUL | DIV
27. <factor> ===> OP <arithmeticExpression> CL | <var>
28. <booleanExpression> ===> OP <booleanExpression> CL <binaryLogicalOp> OP <booleanExpression> CL | NOT OP <booleanExpression> CL | <var> <relationalOp> <var>
29. <binaryLogicalOp> ===> AND | OR
30. <relationalOp> ===> LT | LE | EQ | GT | GE | NE

31. <functionDef> ===> FUNCTION SQO <parameterList> SQC ASSIGNOP FUNID SQO <parameterList> SQC <stmtsAndFunctionDefs> END
32. <parameterList> ===> <type> ID <remainingList> | ϵ
33. <remainingList> ===> COMMA <type> ID <remainingList> | ϵ
34. <funCall> ===> FUNID OP <funidList> CL
35. <funIdList> ==> <idList> | ϵ
36. <type> ===> INT | REAL | STRING | MATRIX
37. <var> ===> ID | NUM | RNUM | <matrixElement> | @ID
38. <matrixElement> ===> ID SQO NUM COMMA NUM SQC
39. <idList> ===> ID <moreIds>
40. <moreIds> ===> COMMA <idList> | ϵ

Assumptions:

1. Matrix cannot have integers initialized by identifiers.
2. Tuple returned by @ (incase of matrix) is not treated as a matrix.
3. Integer values returned by @(incase of string) , they can be used in arithmetic and boolean expressions.

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First Set:

1. <mainFunction> MAIN
2. <stmtsAndFuntionDefs> INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
3. <stmtOrFunctionDef> INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
4. <stmtAndFunctionDefsOrEmpty> INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT, FUNID,FUNCTION,ϵ
5. <stmt> INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID
6. <type> INT,REAL,STRING,MATRIX
7. <funcStmt> FUNID
8. <declarationStmt> INT,REAL,STRING,MATRIX,
9. <assignmentStmt> ID,SQO
10. <conditionalStmt> IF
11. <ioStmt> READ,PRINT
12. <otherStmts> INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,ϵ
13. <funCall> FUNID
14. <functionDef> FUNCTION
15. <parameterList> INT,REAL,STRING,MATRIX
16. <remainingList> COMMA,ϵ
17. <rightHandSideOfId> FUNID,OP,@,ID,NUM,RNUM,STR,SQP
18. <rightHandSideOfTuple> FUNID,@
19. <arithmeticExpression> OP,@,ID,NUM,RNUM
20. <term> OP,@,ID,NUM,RNUM
21. <factor> OP,@,ID,NUM,RNUM
22. <plusOrMinus> PLUS,MINUS
23. <mulOrDiv> MUL,DIV
24. <var> ID,NUM,RNUM,@
25. <matrixElement> ID
26. <stringExpression> ID,STR
27. <stringOp> PLUS
28. <matrixExpression> ID,SQP
29. <matrixOp> PLUS,MINUS
30. <matrix> SQP
31. <numberList> NUM
32. <moreNums> COMMA,ϵ
33. <moreMatrixNums> SEMICOLON,ϵ
34. <rightHandSideOfTuple> FUNID,@
35. <booleanExpression> OP,NOT,ID,NUM,RNUM
36. <binaryLogicalOp> AND,OR
37. <relationalOp> LT,LE,EQ,GT,GE,NE
38. <elseStmt> ELSE,ϵ
39. <funIdList> ID,ϵ
40. <idList> ID
41. <moreIds> COMMA,ϵ

Follow Set:

1. <mainFunction> $
2. <stmtsAndFuntionDefs> END,
3. <stmtOrFunctionDef> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
4. <stmtAndFunctionDefsOrEmpty> END
5. <stmt> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
6. <type> ID
7. <funcStmt> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
8. <declarationStmt> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
9. <assignmentStmt> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
10. <conditionalStmt> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
11. <ioStmt> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
12. <otherStmts> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
13. <funCall> SEMICOLON,END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
14. <functionDef> END,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,FUNCTION
15. <parameterList> SQC,
16. <remainingList> SQC,
17. <rightHandSideOfId> SEMICOLON
18. <rightHandSideOfTuple> SEMICOLON
19. <arithmeticExpression> SEMICOLON,CL
20. <term> SEMICOLON,CL,PLUS,MINUS
21. <factor> MUL,DIV,SEMICOLON,CL,PLUS,MINUS
22. <plusOrMinus> OP,@,ID,NUM,RNUM
23. <mulOrDiv> OP,@,ID,NUM,RNUM
24. <var> LT,LE,EQ,GT,GE,NE,CL,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID,
    MUL,DIV,SEMICOLON,PLUS,MINUS
25. <matrixElement> LT,LE,EQ,GT,GE,NE,CL,INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,
    PRINT,FUNID,MUL,DIV,SEMICOLON,PLUS,MINUS
26. <stringExpression> SEMICOLON,
27. <stringOp> SEMICOLON,
28. <matrixExpression> SEMICOLON
29. <matrixOp> SEMICOLON
30. <matrix> PLUS,MINUS,SEMICOLON
31. <numberList> SEMICOLON,
32. <moreNums> SEMICOLON,
33. <moreMatrixNums> SQC
34. <rightHandSideOfTuple> SEMICOLON
35. <booleanExpression> CL, INT,REAL,STRING,MATRIX,ID,SQO,IF,READ,PRINT,FUNID
36. <binaryLogicalOp> OP
37. <relationalOp> ID,NUM,RNUM,@
38. <elseStmt> ENDIF
39. <funIdList> CL
40. <idList> SQC,SEMICOLON,CL
41. <moreIds> SQC,SEMICOLON,CL