**Syntax Directed Translation Design**

**Grammar and Semantic Rule**

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| **Non-Terminals** | **Terminals** |
| S | program (keyword) |
| BEGIN\_BLOCK | begin (keyword) |
| BEGIN\_STMT | end (keyword) |
| STMT | int (keyword) |
| DECLARATION | identifier |
| OPREATOR | number\_literal |
| OP\_STMT | operators (=, \*) |
| FACTOR | separator (;, , ) |
| PRINT\_CONTENT | string\_literal |
| PRINT\_STMT |  |

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| --- | --- |
| **Production** | **Semantic rules** |
| S -> BEGIN\_BLOCK  BEGIN\_STMT | Initialize Symbol Table |
| BEGIN\_BLOCK -> program id | BEGIN\_BLOCK.program = id.lexval |
| BEGIN\_STMT -> begin STMT\* end | BEGIN\_STMT.program = begin.lexval + STMT.program + end.lexval |
| STMT -> DECLARATION | STMT.inh = DECLARATION.inh |
| STMT -> PRINT\_STMT | STMT.inh = PRINT\_STMT.val |
| DECLARATION -> int OPERATOR ; | DECLARATION.inh = int.lexval  addType(DECLARATION.inh, OPERATOR.val) |
| DECLARATION -> OPERATOR , | addType(DECLARATION.inh, OPERATOR.val) |
| OPERATOR -> id = OP\_STMT | OPERATOR.inh = OP\_STMT.inh  addToSymbolTable(id.lexval, OPERATOR.inh) |
| OPERATOR -> id | OPERATOR.val = id.lexval  addToSymbolTable(id.lexval, null) |
| OP\_STMT -> FACTOR | OP\_STMT.val = FACTOR.val |
| OP\_STMT -> OP\_STMT \* FACTOR | OP\_STMT.val = OP\_STMT.val \* FACTOR.val  (compute calculations from inherited values) |
| FACTOR -> number\_literal | FACTOR.val = number\_literal.lexval(converted into type) |
| FACTOR -> id | FACTOR.val = id.lexval |
| PRINT\_CONTENT -> string\_literal | PRINT\_CONTENT.val = string\_literal.lexval |
| PRINT\_CONTENT -> id | PRINT\_CONTENT.val = id.val |
| PRINT\_STMT -> print\_line ( PRINT\_CONTENT ) ; | Print output (PRINT\_CONTENT.val) |

**Explanation of the Source Code**

Initialization of Symbol List “var”

A screen shot of a computer program

Description automatically generated

At starting terminal S

A computer screen shot of a program code

Description automatically generated

At BEGIN\_BLOCK



At DECLARATION, adding inherited values to symbol table

A computer screen shot of text

Description automatically generated

AT OP\_STMT, getting and updating inherited values in symbol table

A computer screen shot of a program code

Description automatically generated

Logic for calculating value from inheritance

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Description automatically generated

AT PRINT\_STMT, printing output of relevant values in symbol table



**Simple Flowchart**

**A diagram of a system

Description automatically generated**