

Grammar:

```
1  // List of Colons
2
3  semi_colon_list
4      : ';' semi_colon_list_tail
5
6  semi_colon_list_tail
7      : semi_colon_list
8      | ε
9
10 ---
11
12 // Assignment Operators
13
14 assignment_operator //Code Gen = first. Add more later
15     : '='
16     | MUL_ASSIGN
17     | DIV_ASSIGN
18     | MOD_ASSIGN
19     | ADD_ASSIGN
20     | SUB_ASSIGN
21     | LEFT_ASSIGN
22     | RIGHT_ASSIGN
23     | AND_ASSIGN
24     | XOR_ASSIGN
25     | OR_ASSIGN
26
27 ---
28
29 //Data Types
30
31 typed_ID
32     : type_specifier ID
33
34 type
35     : CHAR
36     | SHORT
37     | INT
38     | LONG
39     | FLOAT
40     | DOUBLE
41
42 type_specifier //TODO Const, Volatile later
43     : type
44     | SIGNED type
45     | UNSIGNED type
46
```

```
47 ---
48
49 //Type List
50
51 type_specifier_list
52   : type_specifier type_specifier_list_tail
53
54 type_specifier_list_tail
55   :  $\epsilon$ 
56   | ',' type_specifier_list
57
58 ---
59
60 //Parameter List
61
62 parameter_specifier_list
63   : type_specifier ID parameter_specifier_tail
64
65 parameter_specifier_list_tail
66   :  $\epsilon$ 
67   | ',' parameter_specifier_list
68
69 ---
70
71 //Program
72
73 program
74   : body EOF
75
76 ---
77
78 //Body
79
80 body
81   : body_typed_ID
82   | body_direct_declaration
83
84 body_typed_ID
85   : typed_ID_common_prefix body_typed_ID_tail
86
87 body_typed_ID_tail
88   :  $\epsilon$ 
89   : body
90
91 body_direct_declaration
92   : direct_declaration body_direct_declaration_tail
93
```

```
94 body_direct_declaration_tail
95     :  $\epsilon$ 
96     : body
97
98 ---
99
100 //Function Declaration & Direct Variable Declaration
101
102 typed_ID_common_prefix
103     : typed_ID typed_ID_tail
104     | VOID '(' function_prefix
105
106 typed_ID_tail:
107     : '(' function_prefix //Functions
108     | '=' CONSTANT //TODO expression
109
110 function_prefix
111     : type_specifier_list ')' semi_colon_list //Prototype
112     | parameter_specifier_list ')' function_tail
113
114 function_tail
115     : semi_colon_list //Prototype
116     | '{' statement_list '}' //Function Statements
117
118 ---
119
120 //Direct Declaration
121
122 direct_declaration
123     : type_specifier ID semi_colon_list
124     | CHAR ID '[' ']' '=' STRING_LITERAL semi_colon_list
125
126 ---
127
128 //Statement and Statement List
129
130 statement
131     : compound_statement //Sub statements to loops, conditional, and code blocks
132     | expression_statement //Assignment, Boolean, Arithmetic Expressions
133     | selection_statement //IF Statements
134     | iteration_statement //Loops
135     | semi_colon_list // End of statement one or more ;
136     | direct_declaration
137
138 statement_list
139     : statement statement_list_tail
140
```

```
141 statement_list_tail
142   : statement_list
143   | ε
144
145
146 compound_statement
147   : '{' compound_statement_tail
148
149
150 compound_statement_tail
151   : '}' semi_colon_list
152   | statement_list '}' semi_colon_list
153
154
155 expression_statement
156   : semi_colon_list
157   | expression semi_colon_list
158
159 ---
160
161 //Expression and Boolean Expression
162
163 expression
164   : expr
165   | assignment_expression
166
167 expr
168   : bool
169   | bool boolop bool
170
171 bool
172   : rel
173   | rel relop rel
174
175 rel
176   : fact
177   | fact addop fact
178
179 fact
180   : term
181   | term mulop term
182
183 term
184   : (expr)
185   | addop term
186   | ID ID_Tail
187   | CONSTANT
```

```
188
189 ID_Tail
190     : INC_OP //++
191     : DEC_OP //--
192
193 boolop
194     : AND_OP //&&
195     | OR_OP  //||
196     |
197     | &
198
199 mulop
200     : *
201     | /
202
203 addop
204     : +
205     | -
206
207 relop
208     : LE_OP
209     | GE_OP
210     | <
211     | >
212
213
214 assignment_expression
215     : typed_ID assignment_operator assignment_tail semi_colon_list
216
217 assignment_tail
218     : CONSTANT
219     | STRING_LITERAL
220     | expression
221
222 ---
223
224 //Selection Statement - IF
225
226 selection_statement //TODO Case STMT Later
227     | if_stmt
228
229 if_stmt
230     : IF '(' expression ')' statement_list if_stmt_tail
231
232 if_stmt_tail
233     : ε
234     | ELSE statement_list
```

```
235
236 ---
237
238 // Iteration Statement - While and For
239
240 iteration_statement
241   : WHILE '(' expression ')' statement_list
242   | for_stmt
243
244 for_stmt
245   : FOR '(' expression_statement expression_statement for_stmt_tail
246
247 for_stmt_tail
248   : ')' statement_list
249   | expression ')' statement_list
```