

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

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```
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
```