Syntax

- Variable *shadowing* is **not** allowed. Having a variable with the same name in an inner scope is invalid, unless the variable is first declared in the inner scope.
- You must terminate a statement with a semicolon, *unless* that statement **ends** with a scope.
- Single line comments are denoted by '//' and Multi-line comments are denoted with '/* */'
- You must say **please** or **PLEASE** enough to satisfy the compiler.

Keywords

- 'space' → int_lit with value 32 (ASCII code for space)
- 'newline' → int_lit with value 10 (ASCII code for \n)
- 'true' → int_lit with value 1
- 'false' → int_lit with value 0
- 🙏 → please

Producers

$$
\begin{aligned}
[\text{Program}] &\rightarrow [\text{Statement}]^* \\
[\text{Statement}] &\rightarrow \begin{cases} \text{please} \\ \text{PLEASE} \\ \text{exit}([\text{Expr}]); \\ [\text{PrintStmt}] \\ [\text{SetStmt}] \\ [\text{ResetStmt}] \\ \text{if}([\text{Expr}])[\text{Scope}][\text{AfterIf}] \\ \text{while}([\text{Expr}])[\text{Scope}] \\ \text{for}([\text{SetStmtID}]; [\text{Expr}]; [\text{ResetStmt}])[\text{Scope}] \\ [\text{Scope}] \end{cases} \\
[\text{SetStmt}] &\rightarrow \begin{cases} [\text{SetStmtID}] \\ [\text{SetListID}] \end{cases} \\
[\text{PrintStmt}] &\rightarrow \begin{cases} \text{print}([\text{Expr}],^* [\text{Expr}]^*); \\ \text{printn}([\text{Expr}],^* [\text{Expr}]^*); \end{cases} \\
[\text{SetStmtID}] &\rightarrow \text{set } [\text{ID}] = [\text{Expr}]; \\
[\text{SetListID}] &\rightarrow \text{set } [\text{ListID}] = [\text{List}];
\end{aligned}
$$

$$
\begin{aligned}
[\text{ResetStmt}] &\rightarrow \begin{cases}
\text{reset } [\text{ID}] = [\text{Expr}]; \\
\text{reset } [\text{ID}] + = [\text{Expr}]; \\
\text{reset } [\text{ID}] - = [\text{Expr}]; \\
\text{reset } [\text{ID}] * = [\text{Expr}]; \\
\text{reset } [\text{ID}] / = [\text{Expr}]; \\
\text{reset } [\text{ID}] \% = [\text{Expr}];
\end{cases} \\
[\text{Scope}] &\rightarrow \{[\text{Stmt}]^*\} \\
[\text{AfterIf}] &\rightarrow \begin{cases}
\text{elsif}([\text{Expr}])[\text{Scope}][\text{AfterIf}] \\
\text{else}([\text{Expr}])[\text{Scope}] \\
\epsilon
\end{cases} \\
[\text{Expr}] &\rightarrow \begin{cases}
[\text{Term}] \\
[\text{BinaryExpr}]
\end{cases} \\
[\text{Term}] &\rightarrow \begin{cases}
\text{int\_lit} \\
\text{ID} \\
([\text{Expr}]) \\
\text{len } ([\text{List}]) \\
\text{'char'}
\end{cases} \\
[\text{ID}] &\rightarrow \begin{cases}
\text{id\_lit} \\
[\text{ListLocation}]
\end{cases} \\
[\text{ListLocation}] &\rightarrow \text{id\_lit}[\ [\text{Expr}]\ ] \\
[\text{ListID}] &\rightarrow \text{id\_lit} \\
[\text{List}] &\rightarrow \begin{cases}
[\text{ListInit}] \\
[\text{ListNotInit}]
\end{cases} \\
[\text{ListInit}] &\rightarrow \begin{cases}
\{[\text{Expr}], [\text{Expr}], \cdots\} \\
\text{"char*"}
\end{cases} \\
[\text{ListNotInit}] &\rightarrow \begin{cases}
[\ [\text{Expr}]\ ] \\
[\ [\text{Expr}], [\text{Expr}]\ ] \\
[\ [\text{Expr}]..[\text{Expr}]\ ] \\
\text{str}([\text{Expr}])
\end{cases}
\end{aligned}
$$

$$
[\text{BinaryExpr}] \rightarrow \begin{cases}
[\text{Expr}] \times [\text{Expr}] & precedence = 2 \\
[\text{Expr}] \div [\text{Expr}] & precedence = 2 \\
[\text{Expr}] \,\%\, [\text{Expr}] & precedence = 2 \\
[\text{Expr}] + [\text{Expr}] & precedence = 1 \\
[\text{Expr}] - [\text{Expr}] & precedence = 1 \\
[Expr] \leq [Expr] & precedence = 0 \\
[Expr] \geq [Expr] & precedence = 0 \\
[Expr] < [Expr] & precedence = 0 \\
[Expr] > [Expr] & precedence = 0 \\
[Expr][Expr] & precedence = 0 \\
[Expr] \; != [Expr] & precedence = 0
\end{cases}
$$

Terminals

$$
\begin{aligned}
\text{int\_lit} &\rightarrow [\text{0-9}]^* \\
\text{char} &\rightarrow (\text{int})[\text{0-9a-zA-Z}]^1 \\
\text{id\_lit} &\rightarrow [\text{a-zA-Z}][\text{0-9a-zA-Z\_}]^*
\end{aligned}
$$