Project Idea

Create a programming language and compiler. Below are some formal grammar rules and syntax for the language, E++.

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.

Producers

$$[\text{Program}] \to [\text{Statement}]^*$$

$$[\text{Statement}] \to \begin{cases} \text{please} \\ \text{PLEASE} \\ \text{exit([Expr]);} \\ \text{print([Expr],}^{*}\text{ [Expr]}^{*}\text{);} \\ \text{println([Expr],}^{*}\text{ [Expr]}^{*}\text{);} \\ \text{set ID} = \text{[Expr];} \\ \text{reset ID} = \text{[Expr];} \\ \text{if([Expr])[Scope][AfterIf]} \\ \text{while([Expr])[Scope]} \\ \text{[Scope]} \end{cases}$$

$$[\text{Scope}] \to \{[\text{Stmt}]^*\}$$

$$[\text{AfterIf}] \to \begin{cases} \text{elsif([Expr])[Scope][AfterIf]} \\ \text{else([Expr])[Scope]} \\ \epsilon \end{cases}$$

$$[\text{Expr}] \to \begin{cases} [\text{Term}] \\ [\text{BinaryExpr}] \end{cases}$$

$$[\text{Term}] \to \begin{cases} \text{int\_lit} \\ \text{ID} \\ \text{([Expr])} \\ \text{'char'} \end{cases}$$

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

Terminals

$$\begin{aligned} \text{int\_lit} &\rightarrow \text{[0-9]}^* \\ \text{char} &\rightarrow \text{(int)[0-9a-zA-Z]} \\ \text{ID} &\rightarrow \text{[a-zA-Z][a-zA-Z0-9]}^* \end{aligned}$$