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Name of project: DEVELOPING A COMPILER

Abstract

The project was to develop a compiler which should allow the user to enter the file name of a source code following a specific list of grammar, then to detect errors and give error messages, and run the user's program if there is no grammar error.

Tech Stack

Backend: C++ Programming Language

Libraries used:

- `iostream` - C++ library
- `fstream` - used to read from files (we'll be reading line by line)
- `string` - all tokens are represented as strings
- `queue` - to store the tokens extracted from the program code
- `set` - to store the keywords allowed in the language syntax

Program Functionalities

Classes:

- `Token` - defines the token data type (value and token type)
- `Lexer` - to break down the lines of code into tokens

Functions:

- `AddToken` - helper function to adds a token to the queue
- `ShowTokens` - displays the tokens
- `GetCodeFromFile` - reads the file line by line and adds the lines into a string
 - returns *false* if no errors were found reading from the file
- `GetTokenFromCode` - breaks down the lines of code into tokens
- `LexicalErrors` - checks for syntax errors in the code before executing it.
 - returns *true* if errors are detected else, returns *false*
- `CompileCode` - compiles the given code if and only if there are no errors found

Error Checking

- notify user if the file path does not exist
- all lines in the code should begin with { begin; end; input; display; A; B; C }
- the first line of the code should be a "begin" identifier
- the last line of the code should be an "end" identifier
- { A; B; C } are the only variables allowed in the program
- a semicolon should be at the end of each line of code
- "display" can only display a variable or a string
- if a given file does not exist, return an error
- integers cannot be divided by zero

Language definition: Syntax

```
<program> -> begin <stmt_list> end
<stmt_list> -> <stmt>; | <stmt>; <stmt_list>
<stmt> - > <var>=<expression> | input <var> | display <var> | display "string" |
<var> -> A | B | C
<expression> -> <var> + <var> | <var>-<var> | <var>*<var> | <var>/<var> | <var>
```

Sample Program

```
begin
display "Group 3 Compiler Code";
input A;
input B;
C = A + B;
display C;
end
```

