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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

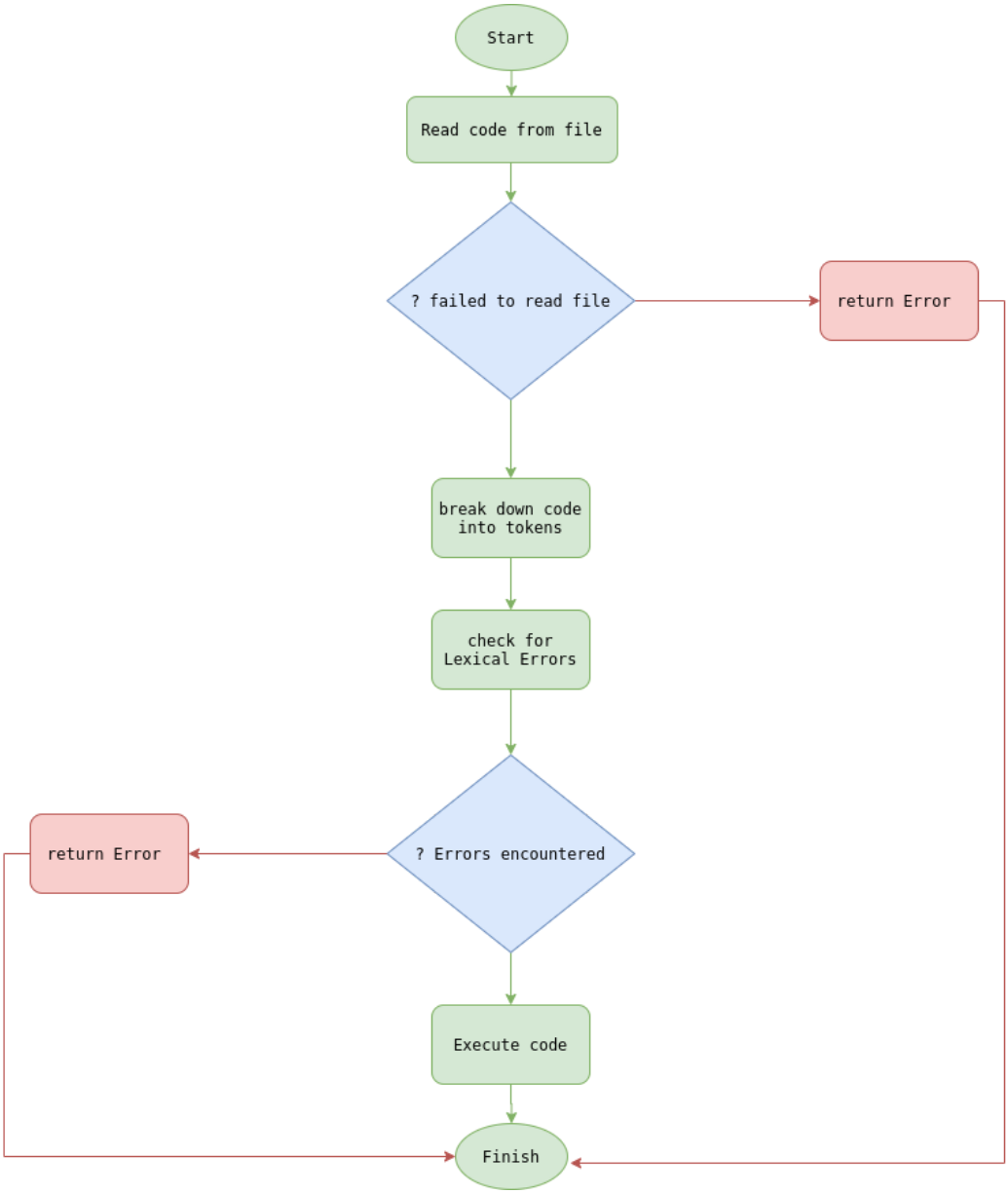
- notify user if the file path does not exist
- all lines in the code should begin with { begin; end; input; display; A; B; C }
- the first line of the code should be a "begin" identifier
- the last line of the code should be an "end" identifier
- { A; B; C } are the only variables allowed in the program
- 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

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


Start
Read code from file
? failed to read file
return Error
break down code into tokens
check for Lexical Errors
? Errors encountered
return Error
Execute code
Finish