Lexical Analyzer Implementation Documentation

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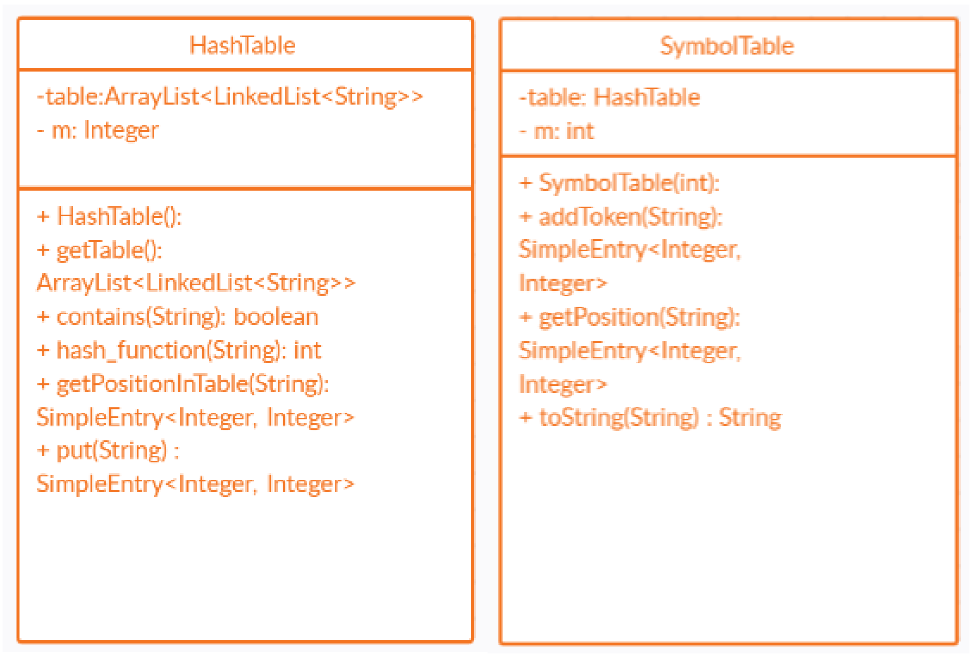
Link to Github: https://github.com/916-Sandor-Alexandra/LFTC/

Symbol Table:

The data structure chosen for the implementation is a **Hash Table**.

The hash table is represented as an array of linked lists and in this manner any collisions are handled by separate chaining. For hash code computation, I have used polynomial rolling hash function.


HashTable
-table:ArrayList<LinkedList<String>>
- m: Integer
+ HashTable():
+ getTable(): ArrayList<LinkedList<String>>
+ contains(String): boolean
+ hash_function(String): int
+ getPositionInTable(String): SimpleEntry<Integer, Integer>
+ put(String) : SimpleEntry<Integer, Integer>
SymbolTable
-table: HashTable
- m: int
+ SymbolTable(int):
+ addToken(String): SimpleEntry<Integer, Integer>
+ getPosition(String): SimpleEntry<Integer, Integer>
+ toString(String) : String

Lexical Analyzer:

- Input: **pr1.in**, **pr2.in**, **pr3.in**, **pr3err.in, token.in** (the 4 programs from Lab1b)
- Output: **PIF.out**, **symtab.out** (text files) + message in the console ("Lexically correct"/ "Lexical error" + details)

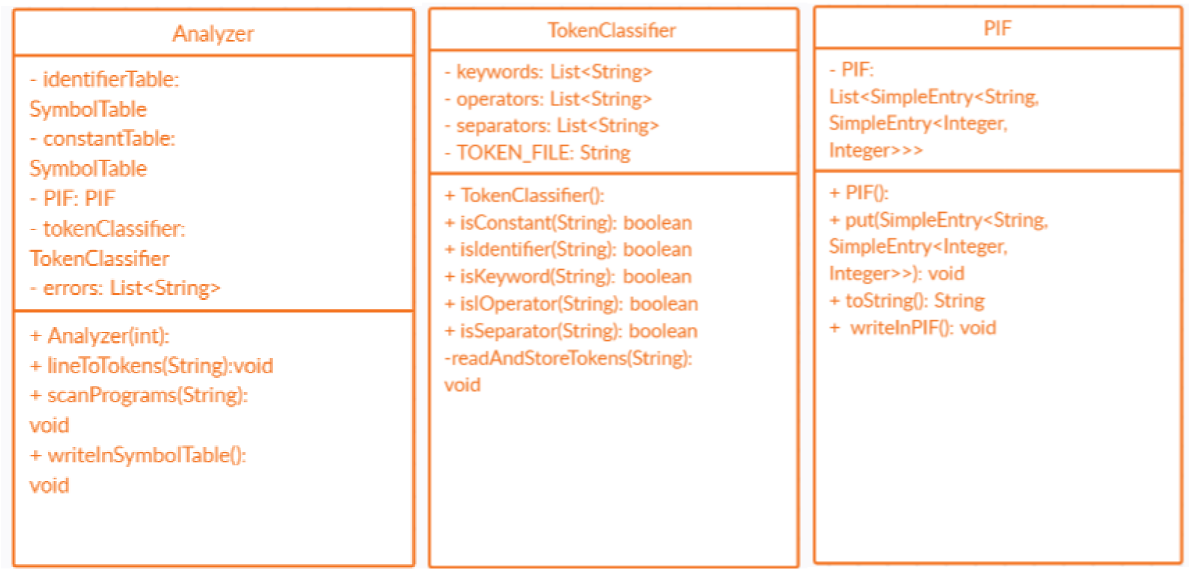
The scanner contains two instances of Symbol Table, one for the constants and one for the identifiers.

Token Classifier:

This is a tool in the scanner used to split the defined keywords, operators and separators in the token.in file in 3 corresponding arrays and check if a received input is a valid token.

PIF (Program Internal Form):

The PIF is defined by a list of a pairs. A pair consists of a string (token) and an entry that represents the position in the symbol table if the token is an identifier or a constant or a (-1, -1) mapping if the token is not in the Symbol Table i.e. it is a keyword/operator/separator.


Analyzer
- identifierTable: SymbolTable
- constantTable: SymbolTable
- PIF: PIF
- tokenClassifier: TokenClassifier
- errors: List<String>
+ Analyzer(int):
+ lineToTokens(String):void
+ scanPrograms(String): void
+ writeInSymbolTable(): void
TokenClassifier
- keywords: List<String>
- operators: List<String>
- separators: List<String>
- TOKEN_FILE: String
+ TokenClassifier():
+ isConstant(String): boolean
+ isIdentifier(String): boolean
+ isKeyword(String): boolean
+ isOperator(String): boolean
+ isSeparator(String): boolean
-readAndStoreTokens(String): void
PIF
- PIF: List<SimpleEntry<String, SimpleEntry<Integer, Integer>>>
+ PIF():
+ put(SimpleEntry<String, SimpleEntry<Integer, Integer>>): void
+ toString(): String
+ writeInPIF(): void