Design of Compilers
(Project)

Dr. Wafaa Samy

Project Details:

The aim of this project is to develop the lexical analysis and syntax analysis phases of the compiler for the **C** programming language.

1. Project Team: **5** students.
2. Language Specifications: Identify the basic constructs of the C programming language such as:
    a. **Keywords**
    b. **Variable Identifiers**
    c. **Function Identifiers**
    d. **Data Types**
    e. **Functions**
    f. **Statements:**
        i. Assignment Statement
        ii. Declaration Statement
        iii. Return Statement
        iv. Iterative Statement
        v. Conditional Statements
        vi. Function Call Statement
    g. **Expressions**
        i. Arithmetic
        ii. Boolean
3. Use the **Java** programming language to implement a **lexer** and a **parser** for the **C** programming language by delivering the following phases:
    a. Lexical Analysis (**lexer**): Categorizes the contents of the input source code file as tokens based on the C programming language specifications.
    b. Syntax Analysis (**parser**): Creates a Parse Tree for the tokens returned by the lexer or report if an error is occurred. This phase includes the following sub-tasks:
        i. Adding the Grammar Rules.
        ii. Creating the Symbol Table.
        iii. Adding the Parse Tree.
4. Final Submission: Implement the lexer and parser as one software application with Graphical User Interface (GUI) such that:
    a. Input: source code file written in the C programming language.

   b. Outputs:
      i. Tokens.
      ii. Symbol Table.
      iii. Parse Tree.
      iv. Error in case there is a syntax error in the input source code.

5. Write a documentation for your project including the implementation details, screenshots, and test cases.
6. Provide a short presentation for your project with demo and test cases followed by discussion for each member in the team individually.

Project Requirements:

1. Language Specifications for the C Programming Language.
2. Create the Lexical Analyzer.
3. Add the Grammar Rules.
4. Create the Symbol Table.
5. Add the Parse Tree.

Due Dates:

	Required Task	Details	Week
1	Project Team	Submit the **names of students in each team**.	3
2	Language Specifications	Submit the **language specifications document** of the **C** programming language. • Upload the language specifications document to the LMS system.	4
3	Creating the Lexical Analyzer	Submit the lexical analyzer of the C programming language. • Upload the lexer source code, a demo video with test cases, and the lexer documentation to the LMS system.	6
4	Creating the Syntax Analyzer	Submit the syntax analyzer of the C programming language. • Adding the Grammar Rules. • Creating the Symbol Table. • Adding the Parse Tree. Upload the parser source code, a demo video with test cases, and the parser documentation to the LMS system.	11
5	Final Submission	Upload the following to the LMS: 1. Final source code for the implemented lexer and parser. 2. Final documentation about the lexer and parser. 3. A video to demonstrate your lexer and parser with test cases. 4. The project presentation.	13
6	Discussion	Provide a short presentation for your project with demo and test cases followed by discussion for each member in the team individually.	13