Cairo University
Faculty of Engineering
Computer Department

Simple Programming Language using Lex and Yacc

Number of Students per Group

3-4 Students

Overview

It is required to design and implement a programming language using the Lex and Yacc compiler generating packages.

Requirements

- Design a suitable programming language; you may use an existing one. The important constructs to be considered are:
  - Variables and Constants declaration.
  - Mathematical and logical expressions.
  - Assignment statements.
  - If-then-else statement, while loops, repeat-until loops, for loops, switch statement.
  - **[Optional - 2 marks]** Block structure (nested scopes where variables may be declared at the beginning of blocks).
  - **[Optional - 2 marks]** Functions.
- Design a suitable and extensible format for the symbol table.
- Implement the lexical analyzer using Lex.
- Design suitable action rules to produce the output quadruples and implement your parser using YACC.
- Implement a proper syntax error handler.
- Build a simple semantic analyzer that checks for the following:
  - Variable declaration conflicts. i.e. multiple declarations of the same variable.
  - Improper usage of variables regarding their type.
  - Variables used before being initialized
  - Unused variables.
- Implement a simple GUI to insert the input source code and show the output quadruples, symbol table, and syntax and semantic errors (if exist).

Project Phases

- **Phase I:** In this phase, you're required to deliver your lex and yacc files i.e, your lexer and parser.
- **Phase II:** In this phase, you're required to modify your implementations to include the following:
  - Design a suitable and extensible format for the symbol table.

- Design suitable action rules to produce the output quadruples.
- Implement a proper syntax error handler.
- Build a simple semantic analyzer.

Deliverables

- Source code of your project.
- A Document that contains the following:
  - Project Overview
  - Tools and Technologies used
  - A list of tokens and a description of each
  - A list of the quadruples and a short description of each e.g:

Quadruple	Description
JMP L	Unconditional jump to label l
NEG V1, V2	V2 = -V1

Evaluation Criteria

- The correctness of your output files: quadruples and symbol table.
- Handling syntax and semantic errors.
- Project understanding for the whole team.
- Good documentation.

Notes

- Anything listed as optional will be considered **a bonus.**
- Any semantic checks implemented other than the ones mentioned above will be considered **a bonus [1 mark for each check].**
- The total marks for the project bonus are 2 marks.

Due Dates

- Phase I delivery: 7th May 2022 (online on Google classroom)
- Phase II delivery: 31st May 2022 (online on Google classroom)
- Project Discussion: 2nd June 2022