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**Cairo University**

**Faculty of Engineering Credit Hours System**

Languages and Compilers

**New C Compiler**

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## Overview:

The project is a modified version of the C compiler, it take input as from a text file or the GUI and outputs the symbol table and the quadruples. It also has error handling and will show if any syntax error occurred.

## Tools and Technologies used:

We used YACC and Lexer to do the lexical analysis and parsing, for the logic used to implement the tables and quadruples we used C++, we used Make and g++ to compile the C++ files with the lex and YACC, we also have a docker container that has all the required dependencies. For the GUI we used PyQt.

## Tokens:

|  |  |
| --- | --- |
| INTGER\_NUMBER | Integer numbers (0, 1 , 2 etc…) |
| FLOAT\_NUMBER | Floats (1.2,8.4 etc..) |
| STRING\_IDENTIFIER | “any string” |
| CHAR\_IDENTIFIER | ‘c’ |
| TRUEE/ FALSEE | TRUE/FALSE |
| INT FLOAT CHAR STRING BOOL VOID | Int, float, char, string, bool, void (data types) |
| NULLL CONST | null and const |
| INCREMENT DECREMENT | ++ and -- |
| GREATERTHANEQUAL LESSTHANEQUAL GREATERTHAN LESSTHAN NOTEQUAL EQUAL | >=, <=, >, <, !=, == (comparators) |
| AND OR NOT | &&, ||, ! |
| IF ELSE WHILE FOR DO BREAK CONTINUE RETURN SWITCH CASE DEFAULT | if, else, while, for, do while, break, continue, return, switch(), case x:, default: |
| IDENTIFIER | Any identifier string; x, num, val etc… |

## Quadruples:

|  |  |
| --- | --- |
| MOV a x | x = a |
| ADD a b t1  SUB a b t1  MUL a b t1  DIV a b t1  MOD a b t1 | t1 = a + b  t1 = a – b  t1 = a\*b  t1 = a/b  t1 = a%b |
| CMP a b | Compares 2 values, then we use conditional jump after |
| JLE label, JGE label, JNE label, JE label, JLT label, JGT label | Jump less than or equal, Jump Greater than or Equal, Jump not Equal, Jump Equal, Jump Less than, Jump Greater than, after a comparison to a label |
| Label: | A label to jump to |
| Call function | Goes to the function name |
| JMP label | Unconditional jump to line |
| INC x, DEC x | ++x, --x |

## Sample:

Input:

int x = 10;

int y = 20;

if (x > 10) {

    y = 30;

}

else{

    if (x < 10) {

        y = 40;

    }

    else{

        y = 50;

    }

}

Output:

MOV 10 x

MOV 20 y

CMP x 10

JLE Line0

MOV 30 y

JMP Line1

Line0:

CMP x 10

JGE Line2

MOV 40 y

JMP Line3

Line2:

MOV 50 y

Line3:

Line1: