COMP 451

FORMAN CHRISTIAN COLLEGE

(A CHARTERED UNIVERSITY)

COMPILER CONSTRUCTION

Programming Assignment 2

It's an open books and open notes assignment. Use of Internet is allowed. This assignment can be done in groups. A group of maximum two students is allowed. You CANNOT share your code with any other group. Any such attempt will be dealt with seriously.

Grading Criteria

Working Code: 80%

Properly formatted Report: 20%

Important: You need to submit a well formatted and well written report for this assignment. The report should carry following sections:

- Introduction about the problem in hand especially well written information about the preprocessor and its functions.
- Your code followed by a detailed description explaining how you built up the logic of the program. Additional functionalities and / or exclusions (if any) should be stated with separate heading in bold face font.
- Code description should be accompanied by the screen shots of your output with at least three separate (not large) programs.
- Start early. **NO** additional time in any case what so ever will be granted.
- Viva will be conducted for this assignment, as well as previous assignment/s. Date will be announced later in class.

Hard Deadline: Report along with the code file/s should be submitted on Moodle course page on or before Thursday Dec 22, 2022 before 11:59 pm.

Make sure to create a zip file of your submission and give it a name using given format:

COMP451_A_RollNumber_Assgn-2

Submissions through email will NOT be considered for grading.

Assignment Task [80 Marks]

In this task we will write an assembler. Your program should accept a text file from command line. The file should carry a valid and correct MIPS assembly program. For this assignment we assume that we have a limited number of MIPS assembly instructions. These instructions are:

- add
- and
- or
- andi
- ori
- addi
- sw
- lw
- slt

You may need to refer to the Internet to get yourself acquainted with the instruction formats of MIPS assembly language.

For your convenience, few links are given below:

https://www.dcc.fc.up.pt/~ricroc/aulas/1920/ac/apontamentos/P04_encoding_mips_instructions.pdf

https://max.cs.kzoo.edu/cs230/Resources/MIPS/MachineXL/InstructionFormats.html

https://www.eecs.harvard.edu/~cs161/notes/mips-part-I.pdf

https://www.dcc.fc.up.pt/~ricroc/aulas/1920/ac/apontamentos/P04_encoding_mips_instructions.pdf

Your task is to write a program in C that accepts a text file containing few lines (minimum three) of MIPS assembly program using the above instruction set. (It does not matter whether or not the program makes some useful output).

Your program should then read the file line by line and decode the instruction into its equivalent machine code.

Note that you are not supposed to generate the output of the program. Your only intention is to generate the equivalent machine program.

Note: We can provide any tailor made program (using above instruction set only) to test your code.

The output of the program should be as shown:

Sample Run 1

```
$ gcc assgn2.c -o assgn
$./assgn inputFile

Assembly language program:
add   $9,$10,$11
add   $12,$9,$10
and   $13,$10,$12
It should then display the machine code of each instruction individually in
binary format.
(Tentative) Machine Code:
00000001010010110100100000100000
00000001001010100110000000100000
00000001001011000110100000100100
```

Sample Run 2

```
$ gcc assgn2.c -o assgn
$./assgn inputFile

Assembly language program:
add   $t1,$t2,$t3
sw    $t1,($t2)
addi  $t4,$t1,4
lw    $t3,16($t2)
and   $t5,$t2,$t4

(Tentative) Machine Code:
00000001010010110100100000100000
10101101010010010000000000000000
00100001001011000000000000000100
10001101010010110000000000010000
00000001010011000110100000100100
```