Gebze Techical University
Department of Computer Engineering
CSE 241/505
Object Oriented Programming
Fall 2016
Homework # 1
Your First C++ Program
Due date Oct 9ᵗʰ 2016

You will write a C++ program that will simulate a very simple CPU. Your CPU has only 5 registers (R1, R2, R3, R4, R5) and no other memory. Your CPU has a small set of instructions as decribed below.

Move instructions
MOV reg, reg
MOV reg, constant
For example MOV R1, R2 copies the value of register 1 to register 2
and MOV R1, 100 puts the value of 100 to register 1

Addition and Subtraction insructions
ADD reg, reg
ADD reg, constant
SUB reg, reg
SUB reg, constant
For example, ADD R1, R2 adds the value of register 2 to register 1
and ADD R1, 100 adds the value of 100 to register 1

Jump instruction
JMP reg, lineAdress
JMP lineAddress
For example, JMP R1, 32 jumps to line 32 of the program if the value of R1 is zero. JMP 23 jumps to line 23 directly.

Print instructions
PRN reg
PRN constant
For example, PRN R3 will print the value of register 3 to the screen, after each print a new line should be inserted.

Other instructions
HLT
halts the program and prints on the screen the contents of all registers.

Following is a program file that prints numers from 10 down to 0 to the screen

```
MOV R1, 10      ; line 1, load value 10 to the register 1
PRN R1          ; line 2, print register 1
SUB R1, 1       ; line 3, decrement R1
JMP R1, 6       ; line 4, if R1 is 0 then go to line 6
JMP 2           ; line 5, go to line 2
HLT             ; finish the program
```

As seen above, you may have comments after each instruction after the ; sign. Each line of your program file shoud contain a single instruction, so the line numbers will correspond to the instruction numbers.

Your program will run using the command line parameters. The format for the command line parameters is as follows
yourProg filename option
yourProg is the name of your executable file, file name is the text file that contains your simple CPU instructions, option a number and the defines the how your program runs as follows
   • if option is 0, your program will run and finish by executing each instructions
   • if option is 1, your program will execute each instruction after displaying the instruction first. It also will print the contents of all the registers such as
            MOV R1, 10 – R1=10, R2=0, R3=0, R4=0, R5=0

Important Notes:
   • Write a CPU program that adds the squares of integers between 1 and 10. The result should be printed on the screen. Include your CPU program with your submission.
   • Your program should hand error cases such as syntax errors in the input files. You should print an error message on the screen and halt the program if you detect an error in the input.
   • With your submission, include the results of a few runs of your program with different programs and run opitons.
   • Do not use any functions from the standard C library (like **printf**), you will use << and >> operators to print and write strings.
   • You will use C++ string class to manuplate your strings.
   •
   • Your program should have only functions and no classes.
   • Do not forget to indent your code and provide comments.
   • You should submit your work to the moodle page. You should strictly follow the submission instructions which will be available shortly.