Department of Computer Science
2nd Year Bachelor's Degree
Computer Architecture

Lab Series N°1

Objectives :
After completing this lab, you will:

- Get familiar with the MARS simulator
- Learn how to assemble, run, and debug a MIPS program

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1. Test a simple MIPS program. Consider the following program shown below:

   a) Type the program shown in the Figure above.

   b) Find out how to show and hide line numbers.

   c) Assemble and run the program.

   d) What output does the program produce? and where does it appear?

2. Explore the MARS simulator:

   a) Enter the code for this program

```
# Sum of three integers
# Objective: Computes the sum of three integers.
#     Input: Requests three numbers.
#    Output: Outputs the sum.
##################### Data segment ####################
.data
prompt:    .asciiz    "Please enter three numbers: \n"
sum_msg: .asciiz    "The sum is: "
##################### Code segment ####################
.text
.globl main
main:
```

```
la   $a0,prompt          # display prompt string
li   $v0,4
syscall
li   $v0,5          # read 1st integer into $t0
syscall
move  $t0,$v0
 li   $v0,5          # read 2nd integer into $t1
syscall
move  $t1,$v0
li   $v0,5          # read 3rd integer into $t2
syscall
move  $t2,$v0
addu  $t0,$t0,$t1        # accumulate the sum
addu  $t0,$t0,$t2
la   $a0,sum_msg        # write sum message
li   $v0,4
syscall
move  $a0,$t0 # output sum
li   $v0,1
syscall
li   $v0,10        # exit
syscall
```

b) Identify the locations and values of the initialized data.

c) Run the program at a speed of 3 instructions per second or less.

d) Single-step through the program and watch how register and memory values change.

e) Observe the output of the program in the *Run I/O* display window.