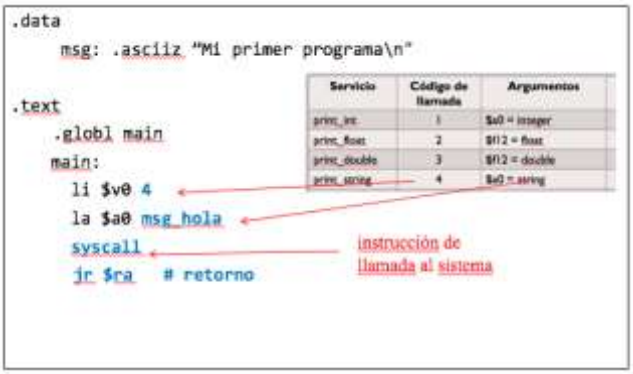
Lab assignment 1
Assembly programming
Exercises

The objective of this session is to get familiarized with the QtSpim simulator, which is a simulator that allows to run programs that use the MIPS32 assembler. During the first session, the simulator will be used to execute the programs proposed below. In Aula Global, diverse information about this simulator is available.

Exercise 1. Edit and execute the following program in the QtSpim simulator (it is available in Aula Global):

```
.data
       msg: .asciiz "Hello Word!"

.text

.globl main

main:

     li $v0, 4
     la $a0, msg
     syscall

     jr $ra
```



Exercise 2. Given the following program written in a high level language

```
int a = 6;
int b = 7;
int c = 3;
int d;

d = (a+b) * (a+b);
```

Code a fragment of code in MIPS 32 assembly that allows to evaluate the previous expression. The result must be stored in the $ t5 register.

Exercise 3. Write a program in MIPS 32 assembly to calculate the sum of the first 100 natural numbers. The program should put the result in the register $ v0.

Exercise 4. Write a program that reads two whole numbers A and B and indicate if one of them is a multiple of the other.

Exercise 5. Write an assembly program in MIPS32 that reads an N number and displays the following on the command terminal of the simulator:

```
1
1 2
1 2 3
1 2 3 4
…..
1 2 3 4 5 …. N
```

Exercise 6. Write an assembly program that reads two whole numbers. The program must display the largest one.

Exercise 7. Write a MIPS assembly program that reads a number and indicates whether the number is odd or even.

Exercise 8. Given the following program fragment

```
.data
            a: .word 5
            b: .word 10
.text
            li    $t0  1
            lw    $t1, a
            lw    $t2, b
  label1:   bgt   $t0,  $t1,   label2
            addi  $t2, $t2, 2
            addi  $t0, $t0, 1
            b     label1
  label2:   sw    $t0, a
            sw $  t2,  b
```

Show the value of the registers $ t0, $ t1 and $ t2 and the memory positions a and b at the end of program execution

Exercise 9. Write a program using the MIPS R2000 assembly, which computes the sum of the squares of a series of numbers entered by keyboard. To do this, the program will first ask for the amount of numbers to read. Then, it will read these numbers, make the related sums and finally display the result.