FORMAN CHRISTIAN COLLEGE
(A CHARTERED UNIVERSITY)

Computer Organization and Assembly Language – COMP 300 B

Spring 21

Lab - 04

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You should attach the lab / assignment handout as second page of this report.

From third page onwards following headings should be included:

- **Introduction**
  - **Should carry information of all major library functions.**
- **Your logic / algorithm in simple English. Bullet points are appreciated.**
- **Your code**
- **Screen shots of at least three outputs of your code with appropriate inputs.**
- **References**

INTRODUCTION

- li – Load immediate. → It is used to set the register to the immediate value we enter.

Ex:

```
li    $v0,1
```
This sets the register $v0, to 1

- la – Load address → It is used to set the register to the contents of another register or to an immediate value we enter.

Ex:

```
la    $a0,$t0
```
This loads the contents of $t0 onto $a0

- lw - Load Word → Set a register to contents of effective memory word address,

Ex:

```
lw   $a0,input
```

This loads the address of the .word input, we created in the data segment.

- .asciiz → Store the string in the Data segment and add null terminator. Used in the program to store strings.

Ex:

```
x:   .asciiz " Enter a value for x: "
```

In the data segment, this string is stored in x.

- .word → Store the listed value(s) as 32 bit words on word boundary

Ex:

c: .word 3

In the data segment, 3 is stored in c.

- .space → Reserve the next specified number of bytes in Data segment. It is used in the program to assign specific space for the input user will enter.

Ex:

input1: .space 8

In the data segment, assigns space to the input.

- move → Move the contents of one register to another

Ex:

move $t0,$t1

Contents of $t1 are moved to $t0

- mul → Used to multiply the values in 2 registers and store it in a register

Ex:

mul $t0, $t1, $t2

$t1 and $t2 are multiplied and answer is stored in $t0

- add → Used to add the values in 2 registers and store it in a register

Ex:

add $t0, $t1, $t2

$t1 and $t2 are added and answer is stored in $to

- Service numbers used are,
  - 1 → print integer — $a0 = integer to print
  - 4 → print string — $a0 = address of null-terminated string to print
  - 5 → read integer — $v0 contains integer read
  - 8 → read string — $a0 = address of input buffer
$a1 = maximum number of characters to read
  - 10 → exit (terminate execution)

LOGIC

Task1:

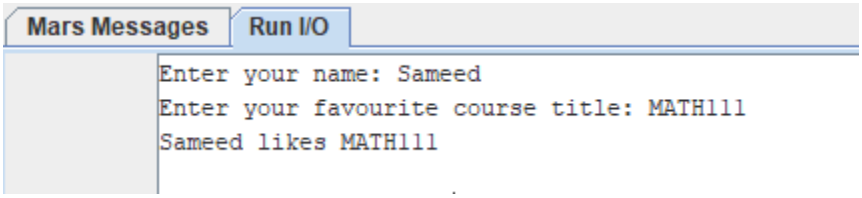
- Created input statements for name and course. And stored the strings, " like " and "\n" respectively
- Created input and inputsize variables, to store the name and course input.
- First prompted user to enter their name and stored it in the variable input1
- Then prompted to enter their favourite course and stored it in input2.
- Printed the nextline variable where necessary to move the proceeding string to the next line.
- Once I had both the name and course title. I simply printed their name, then the " like ", string mentioned earlier. and then their course title.

Task2:

- Created variables for a, b and c as 5, 2 and 3, respectively.
- Created an input statement for x and a final answer statement.
- First prompted the user to enter a value for x.
- Then moved the value of x, a, b and c to separate registers.
- Performed the arithmetic operations. Calulating x^2, then $ax^{2.}$
- Calculated, bx. Then, $ax^2 + bx$
- Finally calculated, $ax^2 + bx + c$. Storing the final answer in the register I'll refer to as Y.
- Printed the final answer statement and then the final answer, Y. Which was just calculated.
- Finally ending the program properly.

SAMPLE OUTPUTS

TASK 1:



TASK 2:

```
Enter a value for x: 1
The result of the quadratic equation is = 10
-- program is finished running --
```

```
Enter a value for x: 5
The result of the quadratic equation is = 138
-- program is finished running --
```

```
Enter a value for x: 10
The result of the quadratic equation is = 523
-- program is finished running --
```

CODE

```
.data
        #       Input statements for users name & course
        name: .asciiz "Enter your name: "
        course: .asciiz "Enter your favourite course title: "
        like: .asciiz " likes "
        nextline:       .asciiz   "\n"

        input1: .space 8                        #       User name input
        input2: .space 9                        #       User fav course input
        inputsize1: .word 7                             #       Name input size
        inputsize2:     .word 8                 #       Course title input size

.text
Task1:
        #       User is asked to input name
        li      $v0,4
        la      $a0,name
        syscall

        #       The input is stored in the variable input1
        li      $v0,8
        la      $a0,input1
        lw      $a1,inputsize1
        syscall

        #       Goes to next line
        li      $v0,4
        la      $a0,nextline
        syscall
```

```
#       User is asked to input name
li      $v0,4
la      $a0,course
syscall

#       The input is stored in the variable input2
li      $v0,8
la      $a0,input2
lw      $a1,inputsize2
syscall

#       Goes to next line
li      $v0,4
la      $a0,nextline
syscall

#       Prints the users name
li      $v0,4
la $a0,input1
syscall

#       Prints "like" inbetween the name and course
li      $v0,4
la      $a0,like
syscall

#       Prints the course title
li      $v0,4
la      $a0,input2
```

```
        syscall



.data
        #       Created vairbles for each integer
        a:      .word 5
        b:      .word 2
        c:      .word 3
        x:      .asciiz "\n\nEnter a value for x: "                     #       User
input for X
        ans:    .asciiz "The result of the quadratic equation is = "    #       Answer statement

.text
Task2:

        #       Asks user to input an integer, x
        li      $v0,4
        la      $a0,x
        syscall

        #       x is stored in $v0 and then moved to $t3
        li      $v0,5
        syscall
        move    $t3,$v0

        #       The initially created variables are moved to reigtsers
        lw      $t0,a
        lw      $t1,b
        lw      $t2,c
```

```
        #       Arithmetic operations are performed

        mul     $t4,$t3,$t3             #       x^2 is computed
        mul $t5,$t4,$t0         #       x^2 * a is computed and stored in $t5

        mul     $t6,$t1,$t3             #       x * b is computed and stored in $t6

        add     $t7,$t6,$t5             #       (x^2 * a) + (x * b) is computed and stored in $t7
        add     $t8,$t7,$t2             #       (x^2 * a) + (x * b) + c , is computed and stored in $t8. i.e
y

        #       Answer statement is printed
        li      $v0,4
        la      $a0,ans
        syscall

        #       Final answer is printed
        li      $v0,1
        move    $a0,$t8
        syscall

        #       Program ends properly
        li $v0,10
        syscall
```