الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يونيبرسيتي إسلام انتارابغسا مليسيا
Garden of Knowledge and Virtue

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LAB EXERCISE - 1

COMPUTER ARCHITECTURE & ASSEMBLY LANGUAGE

Course: CSC-3402, Sec: 02

Lecturer: Dr. HAFIZAH BINTI MANSOR

Submitted by:

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Lab 1 Questions:

Using MARS simulator to simulate and debug your source code, create a program (using MIPS instruction set) to have the following features:

1. Print out a message string with a welcome message "Welcome to Lab 1 exercise. Please enter your name "
2. Get an input from user to enter his/her name
3. Print out a message string with a hello message and followed by the user's name (e.g. "Hello Adam")
4. Manipulate the user's name to output an encrypted user name with a 7 place displacement (i.e. A=H, d=k, a=h, m=t)
5. Print out the encrypted user name with a short message ("Hi Adam, your encrypted user name is Hkht")
6. End the code
7. Optimise the code using procedures whenever possible.

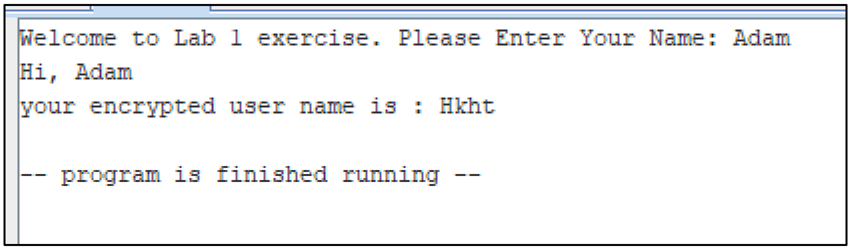
Source Code:

```
# Name: Hasan Tanveer Mahmood
# Matric no: 1725413
# CSC 3402, Sec: 2
.data

        WelcomeMsg: .asciiz "Welcome to Lab 1 exercise. Please Enter Your Name: "
        HelloMsg:  .asciiz  "Hi, "
        name:  .space 10
       EncryptMsg: .asciiz "your encrypted user name is : "

.text
        main:

        # Print out a message string with a welcome message.
        li $v0,4
        la $a0, WelcomeMsg
        syscall

        # Get an input from user to enter his/her name
        la $a0,name
        la $a1,10
```

```
      li $v0,8
      syscall
      la $t0,($a0) # stored name in the  register t0
      li $t1,0     # string length

 # Print out a message string with a hello message and followed by the user's name
      li $v0, 4                               # load immediate and prepare to print.
      la $a0, HelloMsg                        # load address of HelloMsg
      syscall
      li $v0, 4
      la $a0, name
      syscall

 # Print out the encrypted user name with a short message
      li $v0, 4
      la $a0, EncryptMsg
      syscall

  # Encryption
      Encrypt:
      lb $t4, 0($t0)                # The first character of the name is read
      beq $t6,10,end                          # Terminate program on the \n
      beqz $t4,end                            # Terminate Program when the end of the string is reached
      jal islower

  # Check if the character is lower case
      Encrypt2:
      beq $v0,1,EncryptLower
      beq $v0,0,EncryptUpper
      move $a0, $t4

   # Function for printing Encrypted charecter
      PrintEncryptChar:
      li $v0,11            # load immidiate for printing the encrypted charecter
      syscall
      add $t0,$t0,1    # Point to the next charecter
      add $t1,$t1,1
      j Encrypt


    # End the code
      end:
       li $v0,10
       syscall

   # Funtion for encrypting the name's charecter.
      islower:
      bgt $t4,122,NotlowerOrupper
```

```
        blt $t4,97,CheckCase
        li $v0,1
        jr $ra                    # return back to the return address
        NotlowerOrupper:
        li $v0,2                 # store value 2 in register VO if the character is not lower or upper
        j Encrypt2               # move back

      # Here program will check if the case of charecter is upper or any other
        CheckCase:
        blt $t4,65,NotlowerOrupper            # if the character is not upper or lower
        bgt $t4,91,NotlowerOrupper            # if character is not upper or lower
        li $v0,0                              # store value 0 in register V0 if the character is upper
case
        j Encrypt2

      # Manipulate the user's name lowercases to output an encrypted user name with a 7 place
displacement
        EncryptLower:
        li $t5,26
        sub $t4,$t4,97
        add $t4, $t4, 7
        div $t4,$t5
        mfhi $a0
        addi $a0,$a0,97

        j PrintEncryptChar

     # Manipulate the user's name uppercases to output an encrypted user name with a 7 place
displacement
        EncryptUpper:
        li $t5,26
        sub $t4,$t4,65
        add $t4, $t4, 7
        div $t4,$t5
        mfhi $a0
        addi $a0,$a0,65
        j PrintEncryptChar
```

Screen Capture of the Out Put:



```
Welcome to Lab 1 exercise. Please Enter Your Name: Adam
Hi, Adam
your encrypted user name is : Hkht

-- program is finished running --
```