COE 301/ ICS 233, Term 161

Computer Architecture & Assembly Language

Programming Assignment#2
Due date: Saturday, Nov. 5, 2016

Q.1. Write a MIPS assembly language program that implements the following:

(i) A procedure, PrintA, that prints the content of an array of integers in a two-dimensional format (row-wise) leaving a space between elements. Assume that the procedure receives as parameters the address of the array in register $a0, the number of rows in register $a1, and the number of columns in register $a2.

(ii) A procedure, RSum, that computes the sum of a given row. Assume that the procedure receives as parameters the address of the array in register $a0, the number of columns in register $a1, and the index of the row to be summed in register $a2. The procedure should return the sum of the row in register $v0.

(iii) A procedure, CSum, that computes the sum of a given column. Assume that the procedure receives as parameters the address of the array in register $a0, the number of rows in register $a1, the number of columns in register $a2, and the index of the column to be summed in register $a3. The procedure should return the sum of the column in register $v0.

(iv) A procedure, ArrayRowSum, that displays the sums of all rows in the array based on using RSum procedure. Assume that the procedure receives as parameters the address of the array in register $a0, the number of rows in register $a1, and the number of columns in register $a2.

(v) A procedure, ArrayColSum, that displays the sums of all columns in the array based on using CSum procedure. Assume that the procedure receives as parameters the address of the array in register $a0, the number of rows in register $a1, and the number of columns in register $a2.

(vi) Ask the user to enter number of rows, R, and number of columns, C, and read it.

(vii) Ask the user to enter an RxC matrix of integers and read it.

(viii) Print a menu from which the user can select one of the following options:

1. Print the Entered Array
2. Print Sum of a Row
3. Print Sum of a Column
4. Print Rows Sum
5. Print Columns Sum
6. Exit the program

A sample execution of the program is shown below:

Enter number of rows:2
Enter number of columns:3
Enter an array of 2x3 integers:
1
2
3
4
5
6

Select one of the following functions:

1. Print the Entered Array
2. Print Sum of a Row
3. Print Sum of a Column
4. Print Rows Sum
5. Print Columns Sum
6. Exit the program

If the user selects the first option, then the following should be displayed:

Array of 2x3 integers is:
1 2 3
4 5 6

If the user selects the second option, then the following should be displayed:

Enter the row number: 0
Sum of row number 0 is:6

If the user selects the third option, then the following should be displayed:

Enter the column number: 1
Sum of column number 1 is:7

If the user selects the fourth option, then the following should be displayed:

Array rows sum are:
Sum of row 0: 6
Sum of row 1: 15

If the user selects the fifth option, then the following should be displayed:

Array columns sum are:
Sum of column 0: 5

Sum of column 1: 7
Sum of column 1: 9

If any of the entered row numbers or column numbers are out of range, your program should display an error message and asks the user to reenter the required information.

This assignment can be done by a group of two students. Every group of two students submit only one solution. The solution should be well organized and your program should be well documented. Submit a soft copy of your solution in a zip file. The name of the zip file should be your ID with the new format (i.e. 200157690). Your solution should be submitted in a word or pdf file that contains the following items:

i) *Your name and ID*

ii) *Assignment number*

iii) *Problem statement*

iv) *Your solution along with the code*

v) *Discussion of what worked and what did not work in your program. Include snapshots that demonstrate the working parts of your program. If things did not work and you attempted to solve them, mention that and write about the difficulty that you have faced.*

vi) *In addition to including your code as part of the solution document, include also the code as a separate file so that the grader can run it and test it for correctness.*