

BITS 1123

COMPUTER ORGANIZATION AND ARCHITECTURE

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Group Project

INSTRUCTIONS

- (i). This project must be done in a group of **three to four** students.
 - Each student has been randomly assigned to a group
 - **Students are not allowed to exchange group**
- (ii). Each group is required to do the following:
 1. Choose one of the five following C++ programs and convert the program into a complete assembly program using MIPS. The selection is based on **First Come First Serve**
 2. The MIPS program must have the same output as the original C++ program
 3. The assembly program must be tested using MARS simulator
- (iii). Each group is required to present their project on **Week 14**
- (iv). Each group is also required to submit a project report which consists of the followng:
 - Brief introduction to the project
 - Source code (including comments)
 - Sample output
- (v). The MIPS program **MUST NOT** be the same with other groups either in same or different lab sessions who are doing the same C++ programs. Marks will be deducted to all groups who have the same MIPS source.
- (vi). The due date for the submission of the MIPS source code and the project report will be set by the lecturer

Program Calculator

```
Welcome to sorting calculator!
Please enter 10 random numbers. 10
6
5
10
11
15
1
1
3
4
5
Sorting your inputs...
Numbers in ascending order
1      1      3      4      5      5      6      10      11      15
Total sum of your input: 61
The largest number in your input 15
```

Figure 1: The example of the program output

Program Holiday

```
Welcome to Happy Tour Agency
We have a special rate for 3 days and 2 nights at Langkawi Island,
Pangkor Island, and Tioman Island
Full cost for 3 days for an adult are as follows:
Destination Flight(2 ways) Hotel(3 days)
Langkawi RM 120.00 RM 260.00
Pangkor RM 90.00 RM 330.00
Tioman RM 150.00 RM 390.00
50% discount for each child

Please enter the number of adults that are going: 2
Please enter the number of children that are going: 3
Please enter your destination :
[L] Langkawi
[P] Pangkor
[T] Tioman
t
The total cost for your vacation: 1890
```

Figure 2: The example of the program output

Program Pyramid

```
Welcome to print pyramid program!  
This program prints a pyramid shape based on a screen  
based on the height given by the user  
Please enter the height of the pyramid (between 1 until 25): 27  
Please enter another height (must be between 1 and 25): 15
```

```

          **
        *****
      *********
    ***********
   ****
  ***
 *

```

Figure 3: The example of the program output

Program GPA

This program only accepts grade A, B, C, D and F

```
Welcome to GPA calculator

Please enter number of subjects: 4
Enter the credit hour for subject 1
3
Enter the grade for subject 1
a
Enter the credit hour for subject 2
2
Enter the grade for subject 2
c
Enter the credit hour for subject 3
3
Enter the grade for subject 3
b
Enter the credit hour for subject 4
2
Enter the grade for subject 4
a
Your current GPA is 3.3
```

Figure 4: The example of the program output

Program Loop

```
Welcome to largest and smallest numbers program!
This program will keep track which value is the smallest and which is the largest
Enter a integer (Enter 0 value to stop):10
10 is the first value and therefore the smallest and largest integer so far.
6
6 the smallest integer so far
11
11 the largest integer so far
4
4 the smallest integer so far
5
5
6
6
3
3 the smallest integer so far
15
15 the largest integer so far
0

Smallest integer: 3
largest integer: 15
Program ends. Thank you
```

Figure 5: The example of the program output

Program Tax

```
This is a program to calculate federal tax.
Standard exemption for married people is RM5000, single people is RM1000
5% from gross incode is used in pension plan.

Please enter the following information.
Marital status – please enter 's' for single, 'm' for married: m

Please enter number of children under the age of 18: 5
Please enter your salary or combined salary: RM20000

Your personal exemption (RM150 x number of person in the household): RM1050

Your taxable income is: RM12950
Your tax is 15% of your taxable income.
Your calculated federal tax is RM1942.5
```

Figure 6: The example of the program output

Program Matrices

```
Enter the number of rows for matrix (maximum of 10): 5
Enter the number of columns for matrix (maximum of 10): 11
Error! the maximum rows and columns must be 10.
Enter the number of rows for matrix (maximum of 10): 5
Enter the number of columns for matrix (maximum of 10): 6

Enter elements of matrix:
Enter element 11 : 1
Enter element 12 : 4
Enter element 13 : 3
Enter element 14 : 2
Enter element 15 : 4
Enter element 16 : 5
Enter element 21 : 1
Enter element 22 : 2
Enter element 23 : 3
Enter element 24 : 1
Enter element 25 : 1
Enter element 26 : 7
Enter element 31 : 8
Enter element 32 : 5
Enter element 33 : 6
Enter element 34 : 7
Enter element 35 : 4
Enter element 36 : 2
Enter element 41 : 1
Enter element 42 : 5
Enter element 43 : 7
Enter element 44 : 9
Enter element 45 : 0
Enter element 46 : 4
Enter element 51 : 7
Enter element 52 : 4
Enter element 53 : 2
Enter element 54 : 5
Enter element 55 : 7
Enter element 56 : 2

Your matrix:
1 4 3 2 4 5
1 2 3 1 1 7
8 5 6 7 4 2
1 5 7 9 0 4
7 4 2 5 7 2

Sum of all the elements: 119
```

Figure 7: The example of the program output