

60-140
Introduction to Algorithms and Programming I
Dr. Christie Ezeife
Lab. Exercises #8 (Lab Date: Week 10 of Classes)

Objectives are to:

1. Practise on the use of nested looping with functions and arrays in problem solving as taught in chapters 7 and 8. Also, practise on the use of flowcharts.
2. In particular, to learn how to specify array parameters in function prototypes, function calls and function definitions. Also, to learn how to specify array parameters as call-by-value and as call-by-reference parameters.
3. Continue to practise for quiz #2 if not yet written.

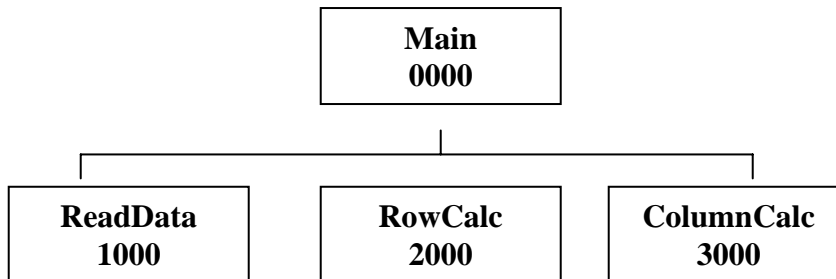
Que. 1. Assume you have the following table of scores,

90	80	75	98	100	91
50	65	70	80	90	67
69	77	68	71	50	55

write a program using top-down design to read this table, print the average and maximum value of each row and column.

Hints on how to solve

Solve using the following structure chart.



- Use the ReadData function to read the two dimensional array table.
 - Use the RowCalc function to navigate the rows and obtain the minimum element, total and average of each row.
 - Use the ColCalc function to navigate the columns and obtain the minimum element, total and average of each column.
- ii. Parts of bigger programs like this can first be tested, made to work before completing the rest of the program. Thus, you can first complete the ReadData to ensure that data are being read well first. To learn that the function ReadData is working, you also need to include instructions for printing read data. The following program template provides

the complete ReadData function and the instructions to print the data and you are expected to modify it to complete the solution.

```
#include <stdio.h>
/* declare the function prototypes */
void ReadData(int [][][6], int, int);

int main(void)
{
    const int numrow = 3, numcol = 6;
    int score [numrow][numcol], r, c;
    ReadData(score, numrow, numcol);

    /* Now print the table array */
    for (r=0; r < numrow; r++)
    {
        for (c=0; c < numcol; c++)
        {
            printf("%d ", score[r][c]);
        }
        printf("\n");
    }
    return 0;
} /* end of the main driver */

/* Next, we present the function definition for ReadData */
void ReadData(int score[][][6], int numrow, int numcol)
{
    int r,c;
    for (r = 0; r < numrow; r++)
        for (c = 0; c < numcol; c++)
            scanf("%d", &score[r][c]);
} /* end of function ReadData */
```

- i. Now, complete the solution to the problem above by including the function prototypes for the other two functions RowCalc and ColumnCalc. Then, make proper function calls to these functions in the main driver and provide the function definitions for the functions following the ReadData function definition.

Que. 2. (Optional) Define a problem of your own that involves loops and solve the same way as in question 1.