Department of Computer Engineering
Department of Software Engineering
CENG113 / SENG113 - Computer Programming 1
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Lab Guide #11 – Week 12

OBJECTIVE : - Two dimensional arrays

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1. Write a C program that will initialize the 3 x 5 integer array with the values:

2	12	1	3	65
45	7	11	66	98
8	22	48	18	5

Program should display all of the elements on the screen as in the example run.

Example Run:
```
5 98 65 3 66 18 48 11 1 12 7 22 8 45 2
```

2. Write a C program that will initialize a 3 x 5 integer array with the values **DO NOT initialize at the declaration statement** by using loops:

2	8	14	20	26
4	10	16	22	28
6	12	18	24	30

Program should display all of the elements on the screen as in the following example runs.

Example Run A:
```
30 28 26
24 22 20
18 16 14
12 10  8
6  4  2
```

Example Run B:
```
30 24 18 12  6
28 22 16 10  4
26 20 14  8  2
```

3. Write a C program that creates a square matrix 3X3 and first of all set major diagonal elements to 1. Then set minor diagonal elements of that matrix to 1. Display as the example run.

Example Run:
```
MAJOR DIAGONAL
  1  0  0
  0  1  0
  0  0  1
```

```
MAJOR AND MINOR DIAGONAL
  1  0  1
  0  1  0
  1  0  1
```

4. Write a C program that reads letters from a text file into a two-dim array. In each column of the array, there is an English word. For example, the word “house” is written in the first column and “choir” is written in the last column. The program will input a number and copy the corresponding word from the two-dim array into a one-dim array. Then the program will display the contents of the one-dim array.

words.txt
```
h t d t c s r j s l c c
o r e a l h i u l a a h
u a e b a e v d a b b o
s i r l s e e g s o l i
e n s e s p r e h r e r
```

Example Run:
Which word do you want to display?
1
The word is house.

Example Run:
Which word do you want to display?
7
The word is river.

5. Write a C program that reads IDs and 5 quiz grades of several students from **grades.txt;** finds and displays the average of each quiz. Also find the average of each student and write the ID and the average of each student to a new file named **average.txt**.

grades.txt:

Stu_ID	Quiz1	Quiz2	Quiz3	Quiz4	Quiz5
11	45.5	80.5	82	95	55
22	60	50	70	75	55.5
33	40	30.5	10	45	60
44	0	5	10.5	2	10
55	90	85	100	90	93
66	35	89	47.5	94	74
77	20.5	14	12	50	65
88	85	69	74	83	91.5
99	74	45	89	46	38
12	59.5	54	69	87	83

average.txt contains:

```
11  71.6
22  62.1
33  37.1
44   5.5
55  91.6
66  67.9
77  32.3
88  80.5
99  58.4
12  70.5
```

Output should be:

```
Quiz Number      Average
   1               50.95
   2               52.20
   3               56.40
   4               66.70
   5               62.50
```

6.

a) Write a function that finds the average of **each row** of a two-dim array, stores the averages into a **one dim array**.

b) Write a function that finds the average of **each column** of a two-dim array, stores the averages into a **one dim array**.

Write a C program that reads IDs and 7 quiz grades of 10 students from **grades.txt;** finds and displays the average of each student **part b**. Also displays the ID and the average of each student using the function in **part a**. Then display the ids of students whose average is greater than the input grade.

Example Run:

```
STUDENT ID QUIZ AVERAGE
111             68.1
222             60.5
333             36.1
444             14.2
555             89.0
666             63.9
777             38.2
888             85.9
999             59.7
123            66.7
```

```
QUIZ NUMBER AVERAGE
   1             51.0
   2            52.2
   3            56.4
   4            67.2
   5            62.5
   6            67.3
   7            51.2

Enter a grade: 60
The students who are above 60.00 are:
111
222
555
666
888
123
```

7.

PART A:

Write a C program that reads double numbers from a text file named **matrix.txt** into a two-dim array with the size **7x4** and displays the contents of the array.

matrix.txt
19.8 34.6 7.6 11.2
45.7 24.1 43.1 5.6
6.8 9.0 22.3 1.2
22.4 84.5 76.2 12.1
77.6 54.3 43.7 98.0
45.7 76.3 45.3 5.1
1.5 8.9 12.6 13.7

Example Run:

```
The contents of the array is:
  19.8  34.6   7.6  11.2
  45.7  24.1  43.1   5.6
   6.8   9.0  22.3   1.2
  22.4  84.5  76.2  12.1
  77.6  54.3  43.7  98.0
  45.7  76.3  45.3   5.1
   1.5   8.9  12.6  13.7
```

PART B:

After you finish Part A, ask the user to enter two row indexes to swap and validate the input (must be between 0 and 7). Then, swap these rows of the array. (**Hint:** Use a one-dim temprorary array to do the swap operation.)

Example Run:

```
The contents of the array is:
  19.8  34.6   7.6  11.2
  45.7  24.1  43.1   5.6
   6.8   9.0  22.3   1.2
  22.4  84.5  76.2  12.1
  77.6  54.3  43.7  98.0
  45.7  76.3  45.3   5.1
   1.5   8.9  12.6  13.7

Enter two row indexes to swap: 1 9
Enter two row indexes to swap: -1 4
Enter two row indexes to swap: 0 2

The contents of the array AFTER the swap operation:
   6.8   9.0  22.3   1.2
  45.7  24.1  43.1   5.6
  19.8  34.6   7.6  11.2
  22.4  84.5  76.2  12.1
  77.6  54.3  43.7  98.0
  45.7  76.3  45.3   5.1
   1.5   8.9  12.6  13.7
```