Department of Information Systems and Technologies

CTIS 152 – Data Structures and Algorithms

Summer 2020 - 2021

Lab Guide #4 – Week 2 – 2

OBJECTIVE: Two-Dimensional Arrays with Pointers and Dynamic Memory Allocation

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Q1a. Write a C program that reads the staff information from the text file named **"staff.txt"**. Then, finds and displays the total sales amount and the staff of the day according to the sales like in the example run.

Write the following functions;

- **readFile** that reads the staff information into two separate one dimensional parallel arrays from the text file and returns the actual size of the arrays.
- **display** that displays the content of the arrays.
- **findTotalMaxSales** that finds and returns the total sale amount and the index of the maximum sale in the array to specify the staff of the day.

Example Run:

```
The Sales Of the Day
********************
  111     581.67 TL
  222     250.90 TL
  333     684.95 TL
  444     499.90 TL
  555     845.95 TL
  666     120.58 TL
  777     954.68 TL
  888      75.90 TL
  999     358.60 TL

The Total Sale Amount : 4373.13 TL

The Staff Of The Day : 777 with the price 954.68 TL
```

staff.txt

```
111 581.67
222 250.90
333 684.95
444 499.90
555 845.95
666 120.58
777 954.68
888 75.90
999 358.60
```

Project Name: LG4_Q1a
File Name: Q1a.cpp

b. Modify the Q1a;

Gets the number of staff to be read from the text file from the user.
Keeps these information into the **dynamically** created one dimensional arrays.

Example Run:

```
Enter the number of staff : 5

The Sales Of the Day
********************
  111     581.67 TL
  222     250.90 TL
  333     684.95 TL
  444     499.90 TL
  555     845.95 TL

The Total Sale Amount : 2863.37 TL

The Staff Of The Day : 555 with the price 845.95 TL
```

Project Name: LG4_Q1b
File Name: Q1b.cpp

c. Modify the Q1b;

Gets a sale criteria from the user until the -1 is entered.
Then, displays the staff information having sale higher than the criteria

Example Run:

```
Enter the sale criteria : 250.0

Enter the number of staff : 3

The Sales Of the Day
********************
  111     581.67 TL
  222     250.90 TL
  333     684.95 TL

The Total Sale Amount : 1517.52 TL

The Staff Of The Day : 333 with the price 684.95 TL

-------------------------------------------------

Enter the sale criteria : 480.0

Enter the number of staff : 5

The Sales Of the Day
********************
  111     581.67 TL
  333     684.95 TL
  444     499.90 TL
  555     845.95 TL
  777     954.68 TL

The Total Sale Amount : 3567.15 TL

The Staff Of The Day : 777 with the price 954.68 TL

-------------------------------------------------

Enter the sale criteria : -1
```

Project Name: LG4_Q1c
File Name: Q1c.cpp

Q2. Write a C program that reads the numbers from the text file a named **"numbers.txt"** according to the dimension given by the user. Then, it creates the two dimensional array **dynamically** to keep these numbers, gets a specific column number and displays the elements of that column in the array as shown in the example run. Don't forget to do validation for the column number.

NOTE: There are two ways to solve this question. Solve both of them.

Hint: You may use the function rewind (file pointer) to set the file position to the beginning of the file.

Example Run:

```
Enter the dimension (<=0 to STOP): 6
Enter the column number to display : 2
  12
  70
  40
  21
   7
  10

Enter the dimension (<=0 to STOP): 3
Enter the column number to display : 4
There is NO column with the number 4!!

Enter the column number to display : 3
There is NO column with the number 3!!

Enter the column number to display : 1
   3
   7
   5

Enter the dimension (<=0 to STOP): -1
```

numbers.txt

4	3	12	15	7	10
39	5	70	5	50	1
10	3	40	75	90	41
35	12	21	47	31	48
15	43	7	20	5	2
90	41	10	22	38	85
15	36	5	3	57	8
11	1	54	38	17	29
45	35	18	1	2	4
18	17	10	4	9	11
51	78	12	36	48	69
15	79	25	15	71	50
18	68	17	61	25	17
2	85	96	17	54	81
32	3	15	17	5	5
6	8	11	25	8	42

Project Name: LG4_Q2
File Name: Q2.cpp

Additional Question

In Karadeniz region there are a lot of tea gardens. Because the **RHS Tea** company and **World Bank** supports the farmers;

- The **RHS Tea** company buys the tea plants from the farmers paying **0.90** TL/kg.
- The World Bank pays **%20** of the **RHS Tea** company's payment for each farmer.
- Each farmer makes **3** harvesting (hasat) and sells the tea plants, but there is a maximum quota (**375** kg.) for each harvesting.
- Write the function **read** that takes the file pointer and the farmer array as input parameters, reads all the information from the file into the array, returns the actual number of farmers and the array.
- Write the function **calculate** that takes the *farmer array*, *farmer no* to calculate the payments as input parameters. The function calculates and returns the *total tea weight*, and the *payments of World Bank* and *RHS tea company* for the specified farmer.

Write a main program that will read the information from the file **tea.txt** into *the two-dimensional integer array* named farmer with **maximum size 20**. Then the program will read the farmer no to calculate the payments, and display the information on the screen. (*Do NOT forget to make data validation for the farmer no*)

Example Run #1 :

```
There are 10 farmers
Please enter the farmer no: -1
Please enter the farmer no: 0
Please enter the farmer no: 11
Please enter the farmer no: 2

Your total tea weight: 650 kg
The Support from WorldBank is: 117.00 TL
The Payment from RHS Tea Company is   : 585.00 TL
```

tea.txt

```
275 385 750
200 100 350
650 450 205
78  456 125
365 452 147
658 222 145
653 457 223
124 451 68
65  458 121
654 741 214
```

Example Run #2 :

```
There are 10 farmers
Please enter the farmer no: 10

Your tea weight is 654 kg
Sorry! The maksimum QUOTA for each harvesting is: 375

Your tea weight is 741 kg
Sorry! The maksimum QUOTA for each harvesting is: 375

Your total tea weight: 964 kg
The Support from WorldBank is: 173.52 TL
The Payment from RHS Tea Company is   : 867.60 TL
```

Project Name: LG4_AQ
File Name: AQ.cpp