Department of Information Systems and Technologies

CTIS151 – Introduction to Programming

SPRING 2023- 2024

Lab Guide #16

OBJECTIVES : One-Dim Arrays input + output parameters and Two-Dim Arrays

Instructor : Burcu LIMAN
Assistants : Sıla YAPICI, Engin Z. KIRAÇBEDEL

Q1.

Write a C program that reads film information (**ids-**unique, **ratings** and **types**) from the **films.txt** into three parallel arrays with the maximum size of **30**. The program displays the information for all films, reads a film id to search the film and displays the film info or an appropriate message.

Write the following functions;

- **`readFromFile:`** takes the file pointer and three parallel arrays (ids array, ratings array, types array) as parameters, reads the filmId, rate and type information from the file into three parallel arrays. The function returns the number of films.
- **`displayFilm:`** takes the **filmId, type** and **rate** as input parameters and displays the information as in the example run. (Type of the film; A: Action, R: Romance, W: Western)
- **`display:`** takes the ids array, ratings array, types array, and the number of films as input parameters, displays the information for all films as in the example run calling the function **`displayFilm`**
- **`searchFilm:`** takes the one-dimensional film Id array, its size and a film Id to search the film in the array. If the film id exists, the function returns the position of the film, else returns **-1**.

Project Name: LG16_Q1
File Name: Q1.cpp

Example Run:

```
There are 11 films in the array

Film ID  Rate   Type
*******  ****   ******
   1524   9.6   Action
   5214   8.7   Romance
   9852   8.7   Western
   2765   6.5   Romance
   4577   7.8   Action
   4226   9.8   Romance
   9821   6.9   Action
   5271   8.9   Romance
   9328   6.5   Western
   1973   8.2   Action
   7198   9.7   Romance
Enter a film id to search (negative id to stop): 9854
The searched film id 9854 is NOT found

Enter a film id to search (negative id to stop): 9999
The searched film id 9999 is NOT found

Enter a film id to search (negative id to stop): 4577
   4577   7.8   Action

Enter a film id to search (negative id to stop): 9328
   9328   6.5   Western

Enter a film id to search (negative id to stop): -1
```

films.txt

```
1524 9.6 A
5214 8.7 R
9852 8.7 W
2765 6.5 R
4577 7.8 A
4226 9.8 R
9821 6.9 A
5271 8.9 R
9328 6.5 W
1973 8.2 A
7198 9.7 R
```

Q2.
Write a program that reads information about a group of game players' from the text file **players.txt** and stores the data in four arrays. The data structure within the file is as , id – gender – age – highest score.

The program displays a menu and then displays **the list of players with their scores** or **the average highest score** or **the information of a specific player** according to the user's choice.

Write the following functions;

- **dispMenu:** displays a menu with the following items, and then, asks for the user to input their choice, whilst also doing validation where necessary:

    1. Display Highest Scores
    2. Display Average of Highest Scores
    3. Display Player Info
    4. Exit

Project Name: LG16_Q2
File Name: Q2.cpp

- **displayHighest:** displays the ID numbers with their highest scores.
- **displayAverages:** displays the average highest score for male players, female players, and then, for all players.
- **findPlayer:** searches for a specified player and returns the index of the player. If unknown ID is given then it should return **-1**.

Example Run:

```
1. Display Highest Scores
2. Display Average of Highest Scores
3. Display Player info
4. Exit
Enter your choice: 9
Wrong choice! Enter again: 0
Wrong choice! Enter again: 1

ID     Highest Score
****    **************
1000         180
1001          70
1002         220
1003         110
1004         230
1005         230
1006         140
1007          90
1008          50
1009         120
1010         100
1011         190
1012         160
1013          30
1014         100
1015         120
1016         180
1017         200
1018         200
1019         180
1020         190
```

players.txt

```
1000 F 25 180
1001 M 29 70
1002 M 17 220
1003 F 34 110
1004 M 19 230
1005 F 15 230
1006 F 22 140
1007 F 21 90
1008 M 20 50
1009 M 37 120
1010 F 21 100
1011 M 23 190
1012 M 31 160
1013 F 13 30
1014 M 22 100
1015 F 18 120
1016 M 16 180
1017 F 19 200
1018 M 23 200
1019 M 25 180
1020 F 41 190
```

```
1. Display Highest Scores
2. Display Average of Highest Scores
3. Display Player info
4. Exit
Enter your choice: 2
Average highest score for male Players is  : 154
Average highest score for female Players is: 139
Average highest score for all Players is   : 147

1. Display Highest Scores
2. Display Average of Highest Scores
3. Display Player info
4. Exit
Enter your choice: 3
Enter Player ID: 333
Player not found!

1. Display Highest Scores
2. Display Average of Highest Scores
3. Display Player info
4. Exit
Enter your choice: 3
Enter Player ID: 1010
Player Info
ID : 1010
Age: 21
Gender: F
Highest Score: 100

1. Display Highest Scores
2. Display Average of Highest Scores
3. Display Player info
4. Exit
Enter your choice: 4
```

Additional Questions

AQ1.

You are required to prepare a report for the average sales and employee bonus payments for a company. Each month employees receive a bonus that varies depending on the profit for the month and their length of service. The sales manager calculates the bonus seperately and enters it with the salesperson's total sales for the month. Your program will calculate and display the average sales amount and the average bonus amount.

Write the following functions;

- **`readFromFile:`** takes the file pointer as input parameter, reads the sales amount and bonus amount for each customer and stores them in two arrays. The function returns the arrays and the number of salesperson.
- **`findAvg:`** takes an integer array and the number of elements in the array as parameters, calculates and returns the average of the values in the array.
- **`displayReport:`** takes the sales array, bonus array and the number of salesperson as input parameters, displays the sale and bonus amount for all employees as in the example run. The function should display the average sales amount and the bonus amount.

Write a C program to read the sales and bonus information from the file **payments.txt** into two parallel arrays with the maximum size **20**, calculate their averages and display a report on the screen.

Example Run:

```
SALESPERSON  SALES    BONUS
***********  *******  *****
       1     58535     3585
       2     32700     2450
       3     66700     4350
       4     25600     2565
       5     12535     1500
       6     27500     2655
**************************
    Avg:  37261.67  2850.83
```

payments.txt

```
58535 3585
32700 2450
66700 4350
25600 2565
12535 1500
27500 2655
```

AQ2. Two positive integers are considered to be *relatively prime* if **there exists no integer greater than 1 that divides them both.** Write a C program that reads the pairs of numbers from an input file named **"nums1.txt"** or **"nums2.txt"** and stores them in two parallel arrays, checks whether the pairs are relatively prime or not, and displays the ones that are relatively prime on the screen. If there are no relatively prime numbers in the arrays display an appropriate message.

Write the following functions;

- **`readFromFile:`** takes the input file pointer and two integer arrays as parameters, reads the pairs of numbers from the file and stores them in two parallel arrays. The function returns the actual number of elements in the arrays.
- **`isRelPrime:`** takes two numbers as its parameters, and returns 1 if the given numbers are relatively prime; otherwise returns 0.
- **`findRelPrimes:`** takes two parallel arrays and their size as input parameters, finds the relatively primes numbers and stores their indexes in another integer array. The function returns the new array and the number of relatively primes.

Example Run(using nums1.txt):

```
There are 3 relatively prime numbers in the arrays

    7    17
   13     7
   15     8
```

nums1.txt

```
9 3
7 17
24 15
13 7
8 18
15 8
```

Example Run(using nums2.txt):

```
There are no relatively prime numbers in the arrays!
```

nums2.txt

```
8 18
25 35
14 21
45 9
24 66
```