**Programming Fundamentals**

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| Lab 12-a | |
| **Topic** | Pointers ,arrays, dynamic memory allocation and regrow |
| **Objective** | To learn the usage of pointers and arrays and dynamic memory allocation. |

**Use Functions for all of your tasks Implement Regrow and Shrink**

**Task 1:**

Write a program in C++ that takes a number from a user and removes it from an array of integers (read from file to dynamic array) and shrink the size of an array.

**Example:**

**Data:** 2 3 15 1 82 8 9 10 21 55 12 14 16 18

**Number to remove:** 55

**Maximum Number:** 2 3 15 1 82 8 9 10 21 12 14 16 18

**Task 2:**

Write a program in C++ that reads data from a file (ask user to enter file name) into the dynamic array. Delete 1-digit numbers and keep only 2- digit numbers from data and shrink the size of array.

**Example:**

**Data:** 2 3 15 1 82 8 9 10 21 55 12 14 16 18

**Two-digit:** 15 82 10 21 55 12 14 16 18

**Task 3:**

Write a program in C++ that removes the odd numbers from an array of integers (read from file to dynamic array). Shrink the size of an array.

**Example:**

**Data:** 2 3 15 1 82 8 9 10 21 55 12 14 16 18

**Updated Data:** 2 82 8 10 12 14 16 18

**Task 4:**

Write a program in C++ that removes the even index numbers from an array of integers (read from file to dynamic array). Shrink the size of an array.

Example:

Data: 2 3 15 1 82 8 9 10 21 55 12 14 16 18

Updated Data: 3 1 8 10 55 14 18

**Task 5:**

Write a program in C++ that reads text (character data) from a file (user defined file name) to dynamic array. Check the character is vowel (a, e, i, o, u) or not. If vowel, remove it from the text and shrink the size of text.

Example:

Original text: abcdefgabcdijkabcd

Modified text: bcdfgbcsjkbcd

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| Lab 12-b | |
| **Topic** | 2d Jagged Arrays |
| **Objective** | To learn the usage of 2d jagged arrays |
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## Task 1

Write a program in C++ that reads a matrix from a file, and displays the matrix in reverse order. First two numbers in a file represents the dimension of a matrix

Example

Data.txt

2 3

1 2 3

4 5 6

Output on console:

## Task 2

Write a program in C++ that reads two matrices from a file and calculates the sum of two matrices.

Example

Data.txt

2 3

1 2 3

4 5 6

2 3

9 7 4

1 2 8

## 

## Task 3

Write a program in C++ that reads a matrix from a file, and displays the diagonal of a matrix.

Example

Data.txt

3 3

1 2 3

4 5 6

7 8 9

Output on console 1 5 9

## Task 4

Write a program in C++, that reads a matrix from a file, and displays the data column wise.

Example

Data.txt

2 3

1 2 3

4 5 6

Output on console:

## 

## Task 5

Write a program in C++ that reads the data from a file and sorts each row of a matrix.

Example

Data.txt

3 4

12 55 7 66

56 4 89 14

33 41 32 53

Original Matrix:

Updated Matrix:

## Task 6

Write a program in C++ that reads full names from a file and asks a user to select any 2 rows. Swap the names at the user selected row numbers. First number in a file tells the number of names in a file.

Example

Data.txt

4

Ali Haider

Ahmad Raza

Bilal Ijaz

Muhammad Rameel

List of Names:

Ali Haider

Ahmad Raza

Bilal Ijaz

Muhammad Rameel

Selected 2nd and 4th rows:

Ali Haider

Muhammad Rameel

Bilal Ijaz

Ahmad Raza

## Task 7

Write a program in C++ that reads list of names from 2 different files and merges first names with last names, and write full names in a new file. Create separate array for full names. Each file contains a number at the start representing list of students a file has.

|  |  |  |
| --- | --- | --- |
| **First Name** | **Last Name** | **Full Name** |
| Ali | Haider | Ali Haider |
| Bilal | Ijaz | Bilal Ijaz |
| Ahmad | Raza | Ahmad Raza |
| Muhammad | Rameel | Muhammad Rameel |

## Task 8

Write a program that reads a data from a file and calculates the sum of data row-wise and column-wise.

Example

Data.txt

2 3

1 2 3

4 5 6

Sum row-wise: 6, 15

Sum column-wise: 5, 7, 9

## Task 9

Write a program in C++ that reads the data from a file and sorts the matrix in ascending or descending order. First number in a file represents the number of rows. Read numbers till -99

Example

Data.txt

3

12 55 7 66 -99

56 4 89 14 -99

33 41 32 53 -99

Original Matrix:

Updated Matrix:

## Task 10

Write a program in C++ that reads the data from a file and rotates the matrix clockwise by 90o.

Example

Data.txt

3

1 2 3 -99

4 5 6 -99

7 8 9 -99

Original Matrix:

Updated Matrix:

## Task 11

Write a program that reads the data from a file and sorts the list of names in ascending order.

Example

Data.txt

4

Rameel

Ahmad

Ali

Bilal

List of names

Rameel

Ahmad

Ali

Bilal

List of Sorted Names

Ahmad

Ali

Bilal

Rameel

## 

## Task 12

Write a program that reads two matrices from a file and calculates the dot product and cross product of two matrices.

Example

Data.txt

2

1 2 3 -99

4 5 6 -99

2

9 7 4 -99

1 2 8 -99

Example (For cross multiplication, take transpose of second matrix)