Lab Assignment -1

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Batch: O3

Problem Statement -1:

Write a C program to create a student management system, where the students' information are stored in a doubly circular linked list. Initially, the circular doubly linked list is empty and the student personal data is entered from the filename "StudentData.xlsx" that contains the data of 13 students (name, D.O.B., address and phone no) in tabular form. The StudentData.xlsx file can be converted into a CSV file using Libreoffice or into any other file format readable from your C program. The program should have the following operations: insert, delete, search, modify, sort and print. While inserting, a unique roll number in the linked list is assigned to each student, where the starting roll number should be 101 and the list should always be in sorted according to their roll number (ascending order). However, when a deletion operation is performed, the roll number of the deleted student node is stored in a queue named unusedRollNo. These deleted roll numbers from the unusedRollNo queue will be allotted to the new students on next insertion operations.

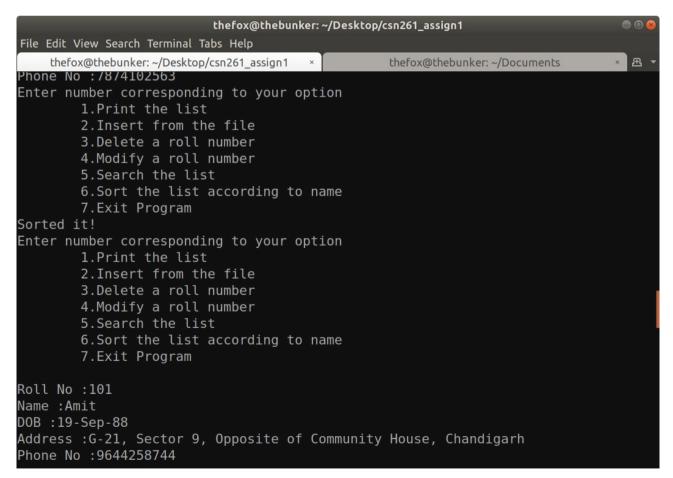
DATA STRUCTURES USED:

- Circular Doubly Linked List
- Queue implemented using a circular array

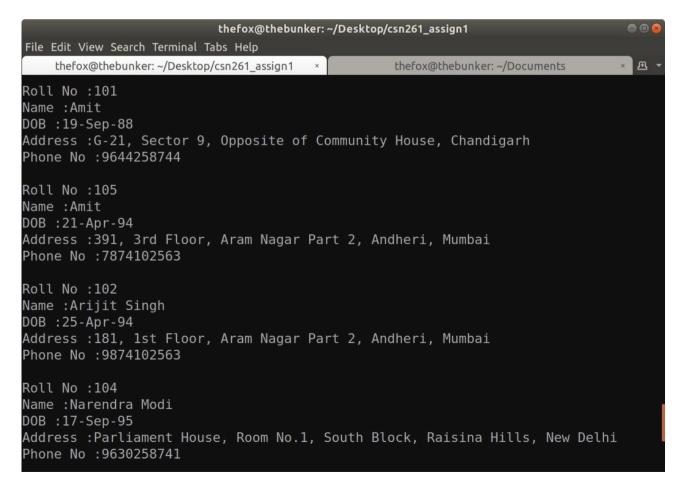
ALGORITHMS USED:

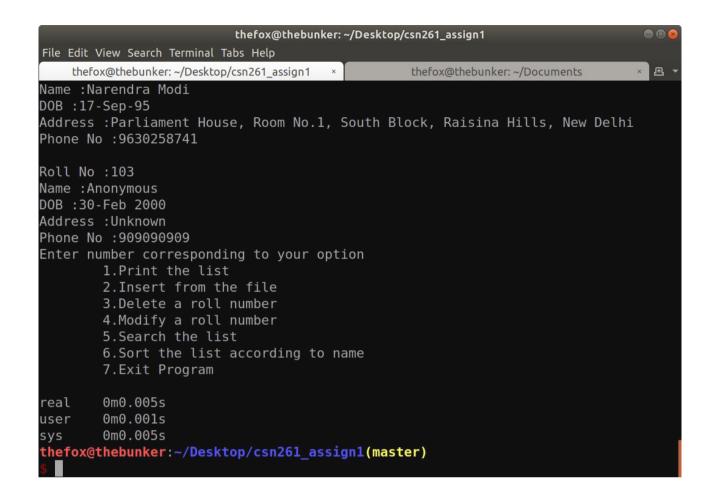
- For sorting the list based on the name field, bubblesort algorithm was used.
- ➤ The searches are based on linear search algorithm.

thefox@thebunker: ~/Desktop/csn261_assign1 File Edit View Search Terminal Tabs Help thefox@thebunker: ~/Desktop/csn261_assign1 × × 🕕 🤻 thefox@thebunker: ~/Documents Roll No :101 Name : Amit DOB: 19-Sep-88 Address :G-21, Sector 9, Opposite of Community House, Chandigarh Phone No :9644258744 Roll No :102 Name :Arijit Singh DOB: 25-Apr-94 Address :181, 1st Floor, Aram Nagar Part 2, Andheri, Mumbai Phone No :9874102563 Roll No :103 Name :Rakesh Kumar Bhadauria DOB: 15-Jun-93 Address :Vice Chief of the Air Staff, Air Headquarters, New Delhi Phone No : 7896325014 Roll No :104 Name :Narendra Modi DOB :17-Sep-95 Address :Parliament House, Room No.1, South Block, Raisina Hills, New Delhi Phone No :9630258741



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Problem Statement -2:

Write a C Program for resizeable deque using dynamic memory allocation, where a deque can perform the insertion and deletion operations at its both ends. The capacity of the deque depends on the number of elements currently stored in it, according to the following two rules:

- If an element is being inserted into a deque, when it is already full, then its capacity is doubled of its current size.
- After removing an element from a deque, if the number of elements are equal to half of the capacity of the deque, then its capacity is made half of its current size. The program should have the following three functions: insert(), delete() and print(). The function print() should display the current size of the deque (capacity of deque) in terms of number of bytes.

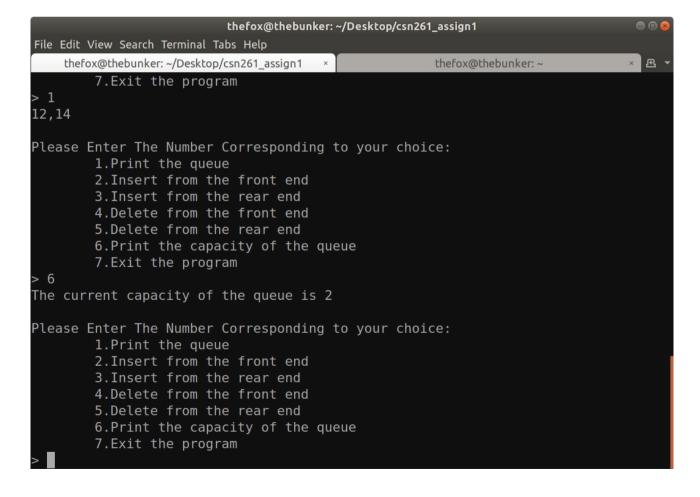
DATA STRUCTURES USED:

- Dynamic Array
- > Deque

ALGORITHMS USED:

- ➤ For front end data is copied using memmove and data is copied to or removed from the 0th index
- For rear end data is simply added to next index
- ➤ For resizing realloc is used to double the capacity

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Please Enter The Number Corresponding to your choice:
        1.Print the queue
        2.Insert from the front end
        3.Insert from the rear end
        4.Delete from the front end
        5.Delete from the rear end
        6.Print the capacity of the queue
        7.Exit the program
Enter the number to be inserted
> 12
Please Enter The Number Corresponding to your choice:
        1.Print the queue
        2.Insert from the front end
        3.Insert from the rear end
        4.Delete from the front end
        5.Delete from the rear end
        6.Print the capacity of the queue
        7.Exit the program
Enter the non-negative number to be inserted
> 14
```



```
Enter the number to be inserted
> 122
Please Enter The Number Corresponding to your choice:
        1.Print the queue
        2.Insert from the front end
       3. Insert from the rear end
        4. Delete from the front end
       5.Delete from the rear end
       6.Print the capacity of the queue
    7.Exit the program
> 1
122, 12, 14
Please Enter The Number Corresponding to your choice:
       1.Print the queue
       2.Insert from the front end
    3.Insert from the rear end
       4.Delete from the front end
       5.Delete from the rear end
       6.Print the capacity of the queue
     61_7.Exit the program
> 5
Removed 14 from the queue
```

```
12345, 1234, 122, 12345678, 123456789
Please Enter The Number Corresponding to your choice:
        1. Print the queue
        2. Insert from the front end
        3. Insert from the rear end
        4. Delete from the front end
        5.Delete from the rear end
        6. Print the capacity of the queue
        7. Exit the program
> 6
The current capacity of the queue is 8
Please Enter The Number Corresponding to your choice:
        1.Print the queue
        2. Insert from the front end
        3.Insert from the rear end
        4.Delete from the front end
        5.Delete from the rear end
   csn261_6.Print the capacity of the queue
    <sup>sign2</sup> 7.Exit the program
```

Problem Statement -3:

Given three 2D arrays (for red, green and blue color pixels) of a digital image. For a particular image pixel, the color shade of that pixel is Red if the pixel value at that position of the matrix corresponding to RED is greater than that of GREEN and BLUE. Same goes for GREEN and BLUE shades also. Write a C program that can perform following operations on the given image file:

- Remove all Red shades.
- Remove all Green shades.
- Remove all Blue shades.
- RedOnly: Preserve any red shades in the image, but remove all green and blue.
- GreenOnly: Preserve any green shades in the image, but remove all red and blue.
- BlueOnly: Preserve any blue shades in the image, but remove all red and green.

Write a function pixelValue() that has x and y as two parameters and displays the current pixel (RED, GREEN and BLUE) values of the input image at the point with coordinates (x, y), where x and y are the row and column numbers in that image file, respectively.

DATA STRUCTURES USED:

Dynamic Array

ALGORITHMS USED:

- Use of fscanf to read the pixel values
- \triangleright Use of O(n²) algorithm for all functions to traverse through the arrays

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  ./q3
What do you want to do?
        1.Remove all Red shades
        2. Remove all Blue shades
        3. Remove all Green shades
        4.Red Only
        5.Green Only
        6.Blue Only
Now we can print the pixel values at a point
Enter 1 to print pixelvalues or any other to exit
Enter x coordinate
123
Enter y coordinate
1234
Red: 0
Green: 86
Blue 67
Enter 1 to print pixelvalues or any other to exit
thefox@thebunker:~/Desktop/csn261 assign1(master)
```

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thefox@thebunker:~/Desktop/csn261_assign1(master)
 ./q3
What do you want to do?
        1.Remove all Red shades
        2.Remove all Blue shades
        3. Remove all Green shades
        4.Red Only
        5.Green Only
        6.Blue Only
Now we can print the pixel values at a point
Enter 1 to print pixelvalues or any other to exit
Enter x coordinate
650
Enter y coordinate
1200
Red: 46
Green: 0
Blue 0
Enter 1 to print pixelvalues or any other to exit
thefox@thebunker:~/Desktop/csn261 assign1(master)
```