CSN 261 - Lab Assignment 1

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Computer Science II Year

Problem Statement 1:

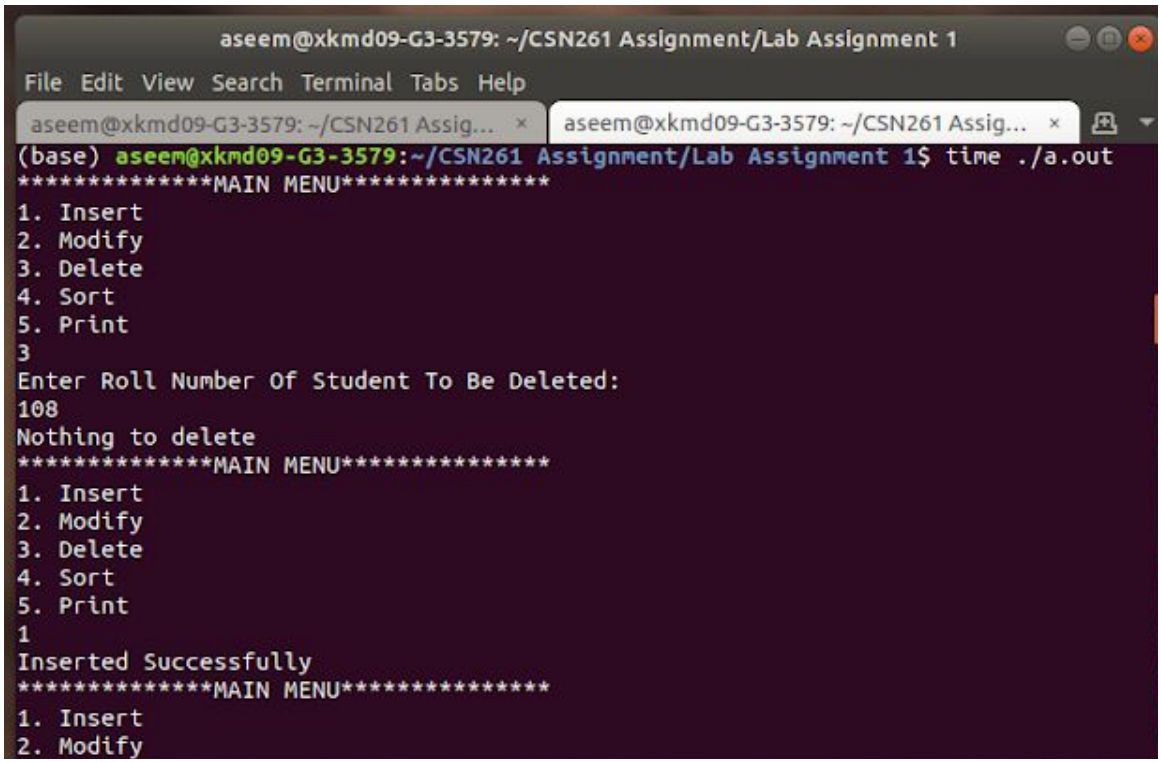
Write a C program to create a student management system, where the students' information are stored in a doubly circular linked list, as shown in Figure 1. The structure of each node from the list is shown in Figure 2. Initially, the circular doubly linked list is empty and the student personal data 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.

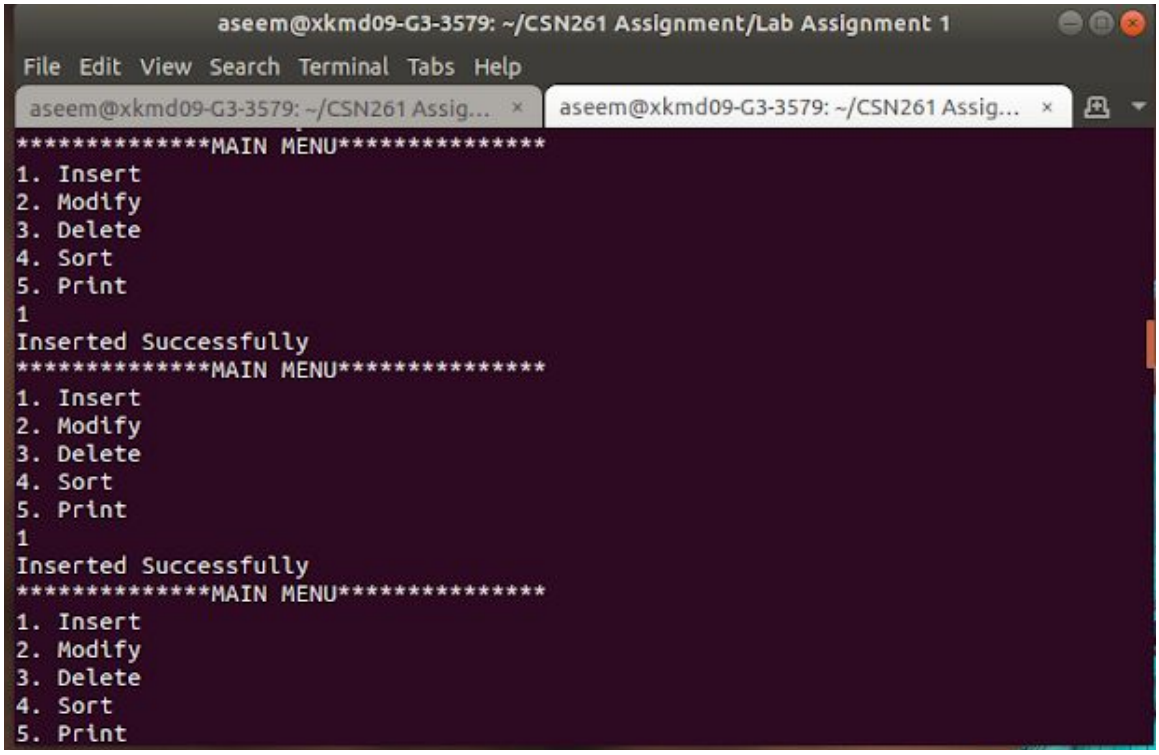
Data Structures Used

- Doubly Circular Linked List

Algorithms Implemented

- Searches are based on linear search algorithms
- The name and roll number sort is based on bubble sort algorithm
- Used fgets to read the data from the list


aseem@xkmd09-G3-3579: ~/CSN261 Assignment/Lab Assignment 1
File Edit View Search Terminal Tabs Help
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
(base) aseem@xkmd09-G3-3579:~/CSN261 Assignment/Lab Assignment 1$ time ./a.out
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
3
Enter Roll Number Of Student To Be Deleted:
108
Nothing to delete
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
1
Inserted Successfully
**********MAIN MENU**********
1. Insert
2. Modify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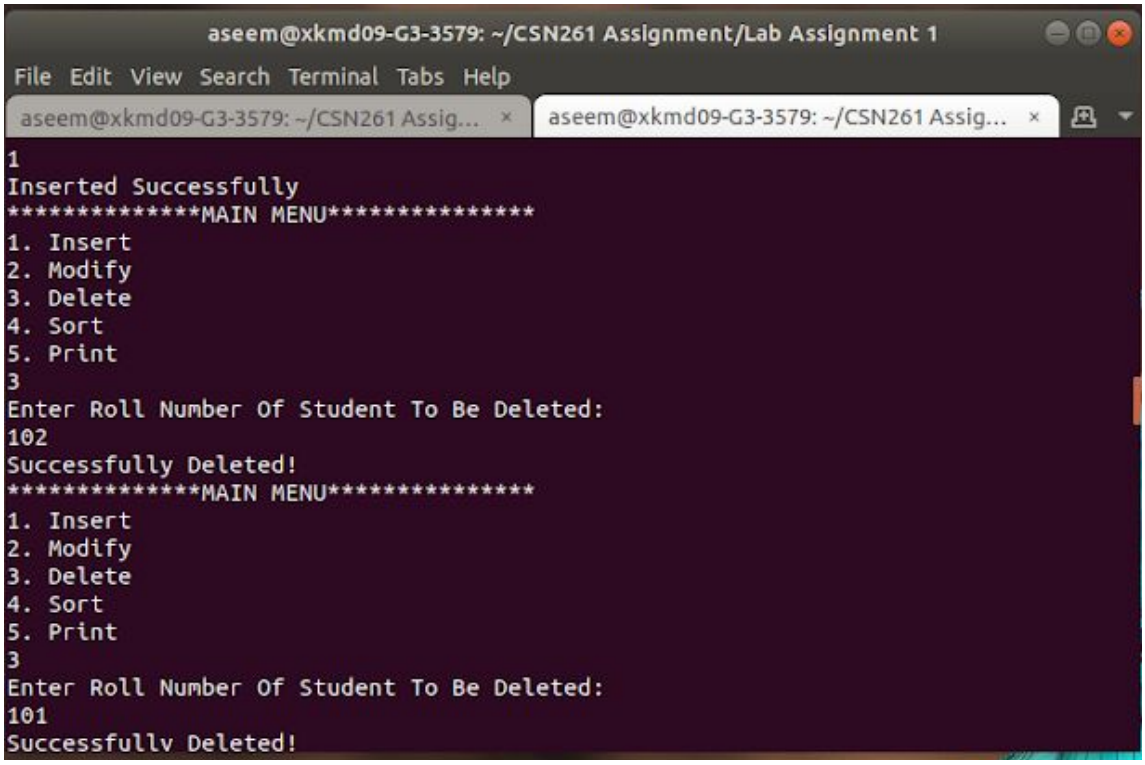
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
1
Inserted Successfully
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
1
Inserted Successfully
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print


aseem@xkmd09-G3-3579: ~/CSN261 Assignment/Lab Assignment 1
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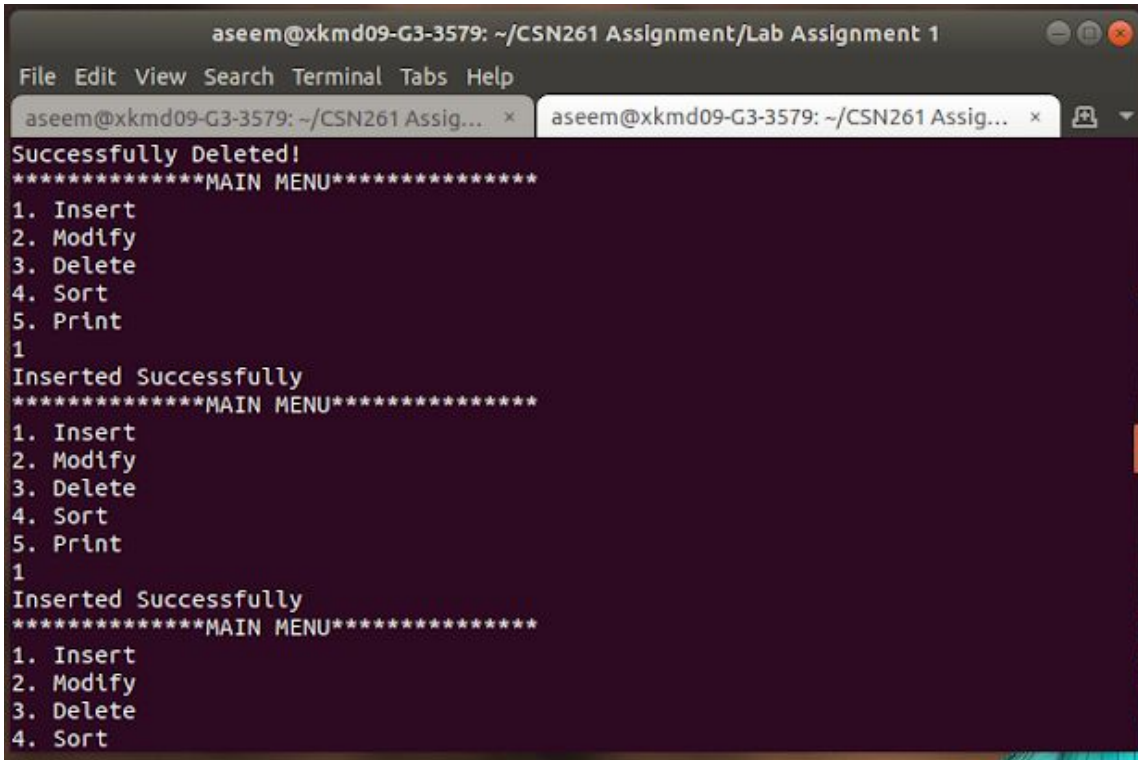
1
Inserted Successfully
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
3
Enter Roll Number Of Student To Be Deleted:
102
Successfully Deleted!
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
3
Enter Roll Number Of Student To Be Deleted:
101
Successfully Deleted!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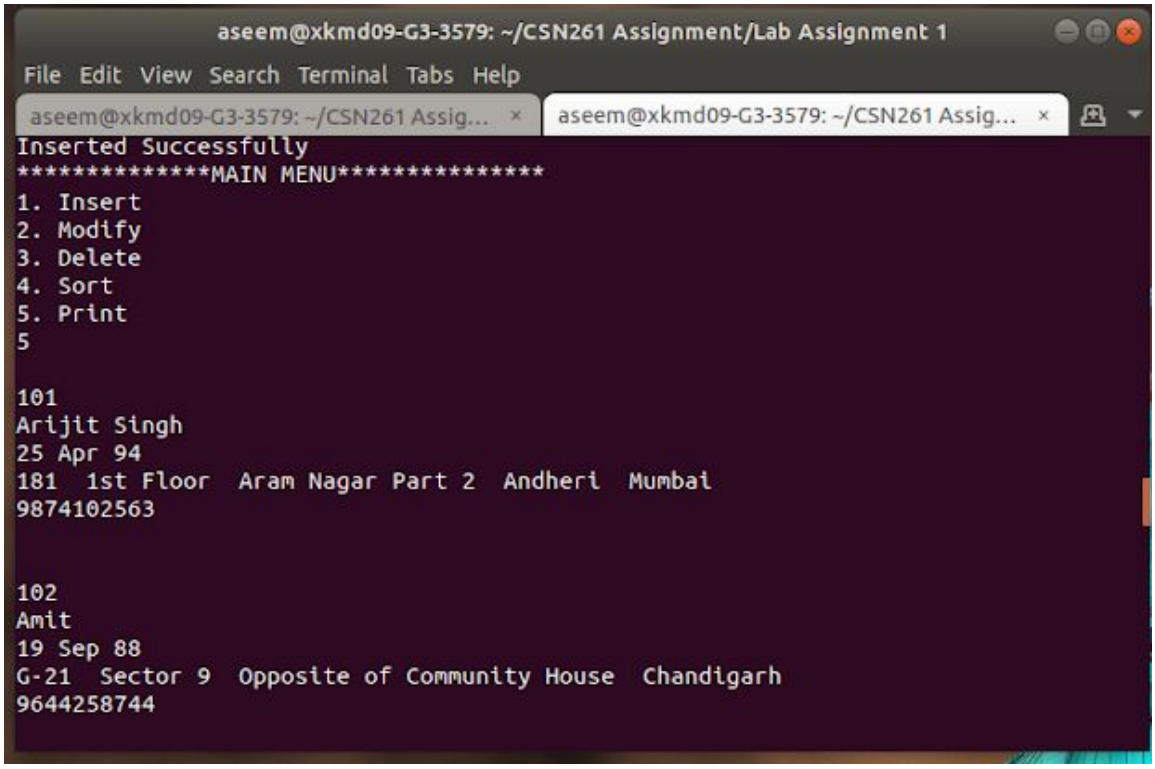
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
Successfully Deleted!
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
1
Inserted Successfully
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
1
Inserted Successfully
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort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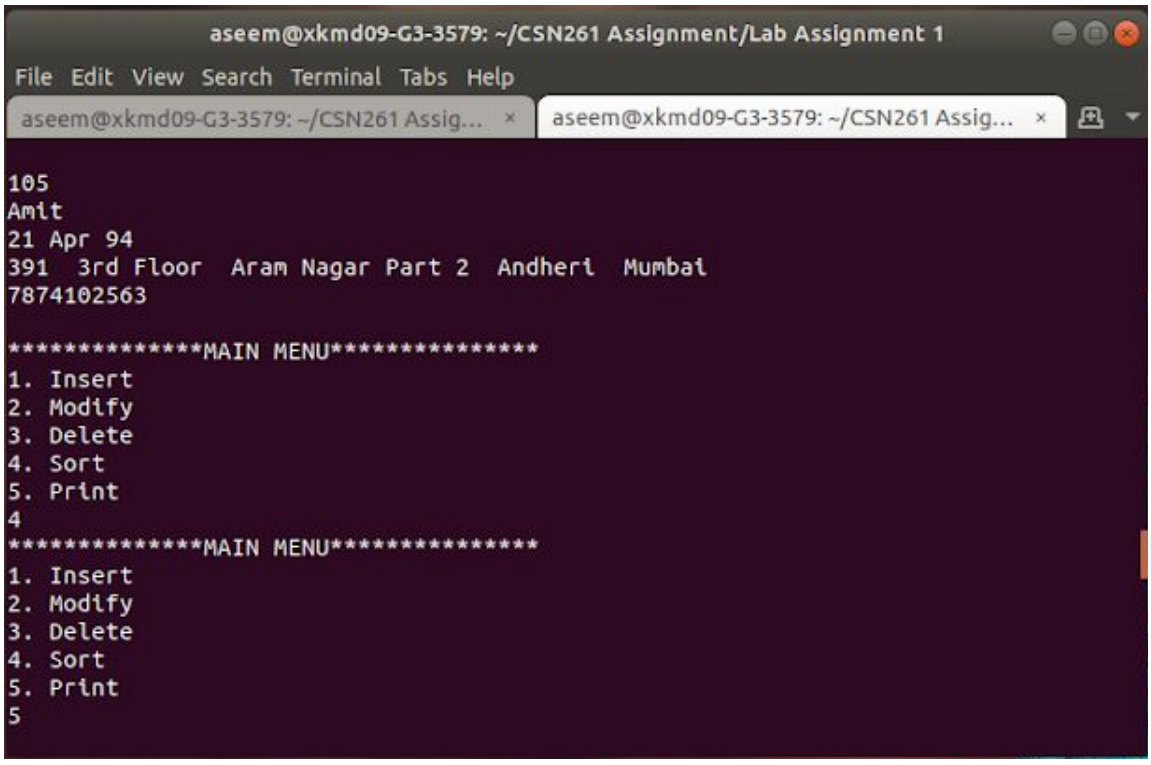
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
Inserted Successfully
**************MAIN MENU***************
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
5
101
Arijit Singh
25 Apr 94
181 1st Floor Aram Nagar Part 2 Andheri Mumbai
9874102563
102
Amit
19 Sep 88
G-21 Sector 9 Opposite of Community House Chandigarh
9644258744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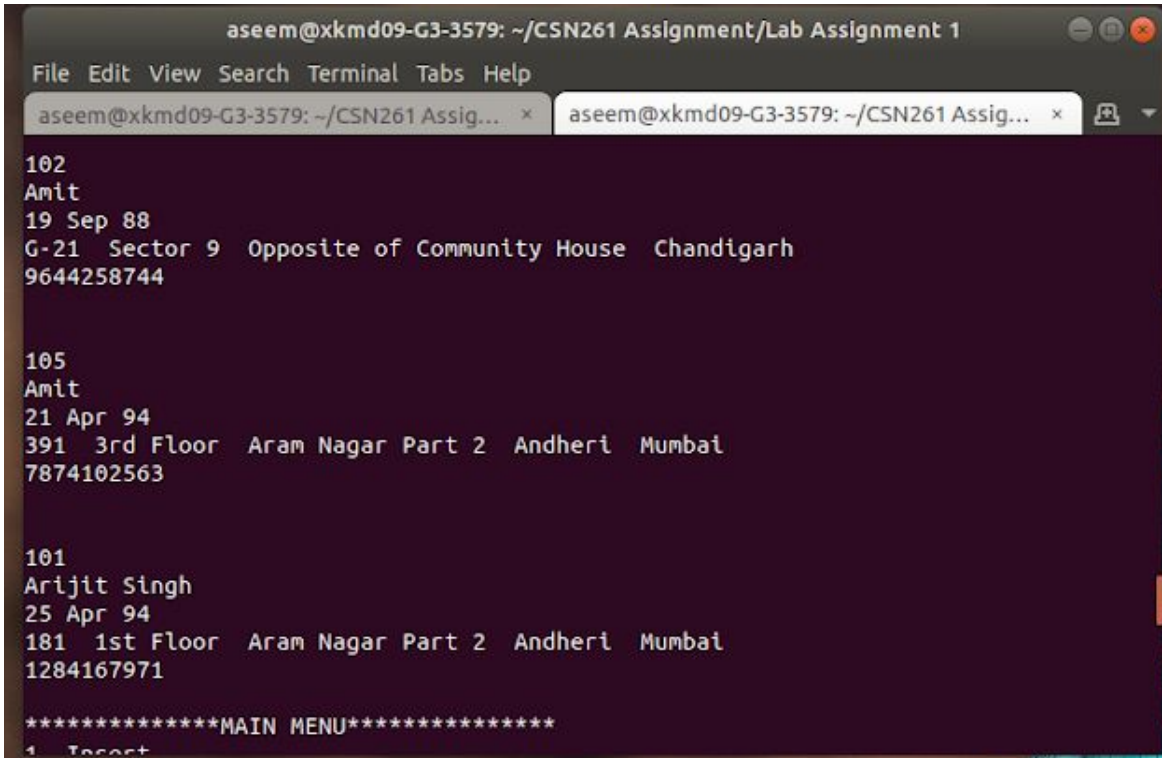
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
105
Amit
21 Apr 94
391 3rd Floor Aram Nagar Part 2 Andheri Mumbai
7874102563
**************MAIN MENU***************
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
4
**************MAIN MENU***************
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
5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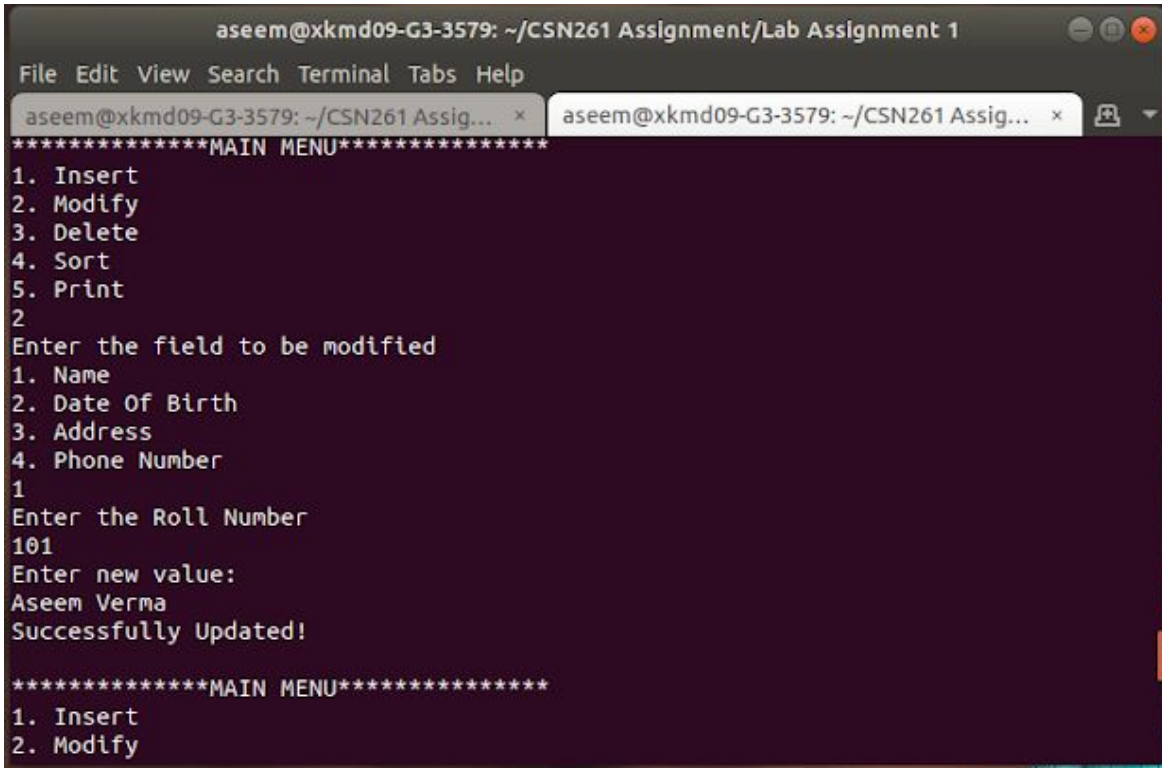
File Edit View Search Terminal Tabs Help
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
102
Amit
19 Sep 88
G-21 Sector 9 Opposite of Community House Chandigarh
9644258744
105
Amit
21 Apr 94
391 3rd Floor Aram Nagar Part 2 Andheri Mumbai
7874102563
101
Arijit Singh
25 Apr 94
181 1st Floor Aram Nagar Part 2 Andheri Mumbai
1284167971
**********MAIN MENU**********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File Edit View Search Terminal Tabs Help
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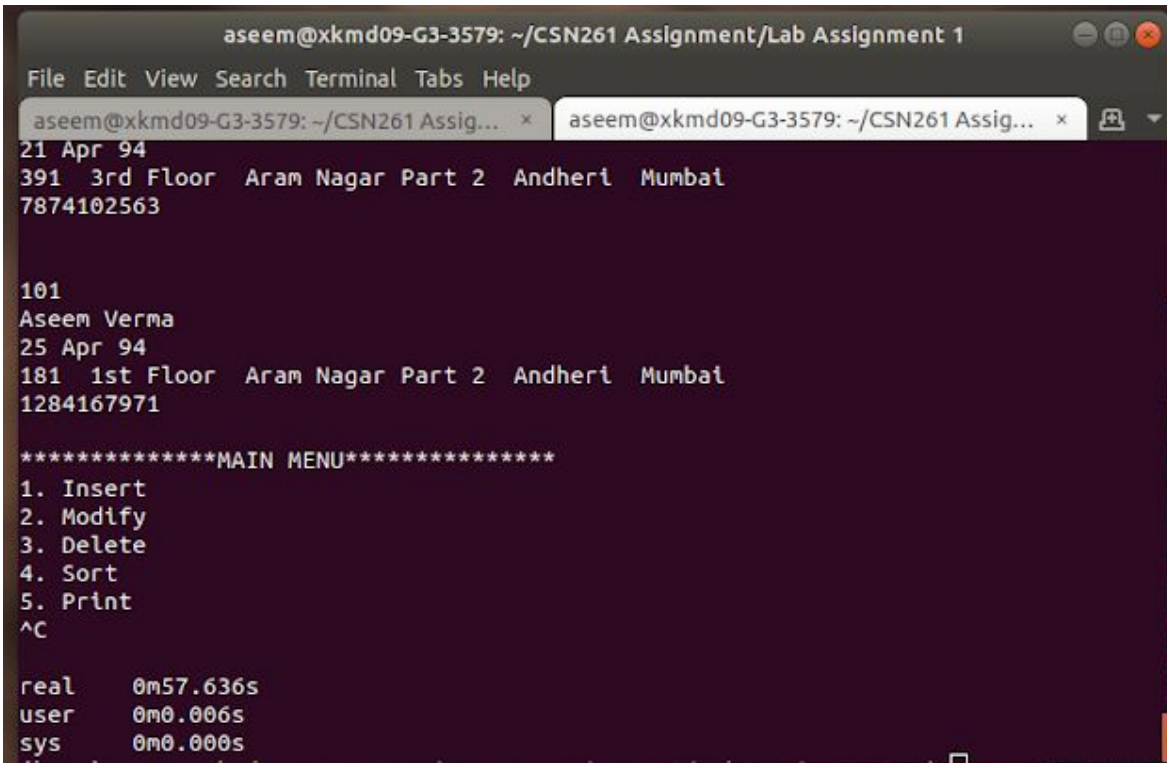
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
2
Enter the field to be modified
1. Name
2. Date Of Birth
3. Address
4. Phone Number
1
Enter the Roll Number
101
Enter new value:
Aseem Verma
Successfully Updated!
**********MAIN MENU**********
1. Insert
2. Modify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aseem@xkmd09-G3-3579: ~/CSN261 Assig...
21 Apr 94
391 3rd Floor Aram Nagar Part 2 Andheri Mumbai
7874102563
101
Aseem Verma
25 Apr 94
181 1st Floor Aram Nagar Part 2 Andheri Mumbai
1284167971
**********MAIN MENU**********
1. Insert
2. Modify
3. Delete
4. Sort
5. Print
^C
real 0m57.636s
user 0m0.006s
sys 0m0.000s

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.

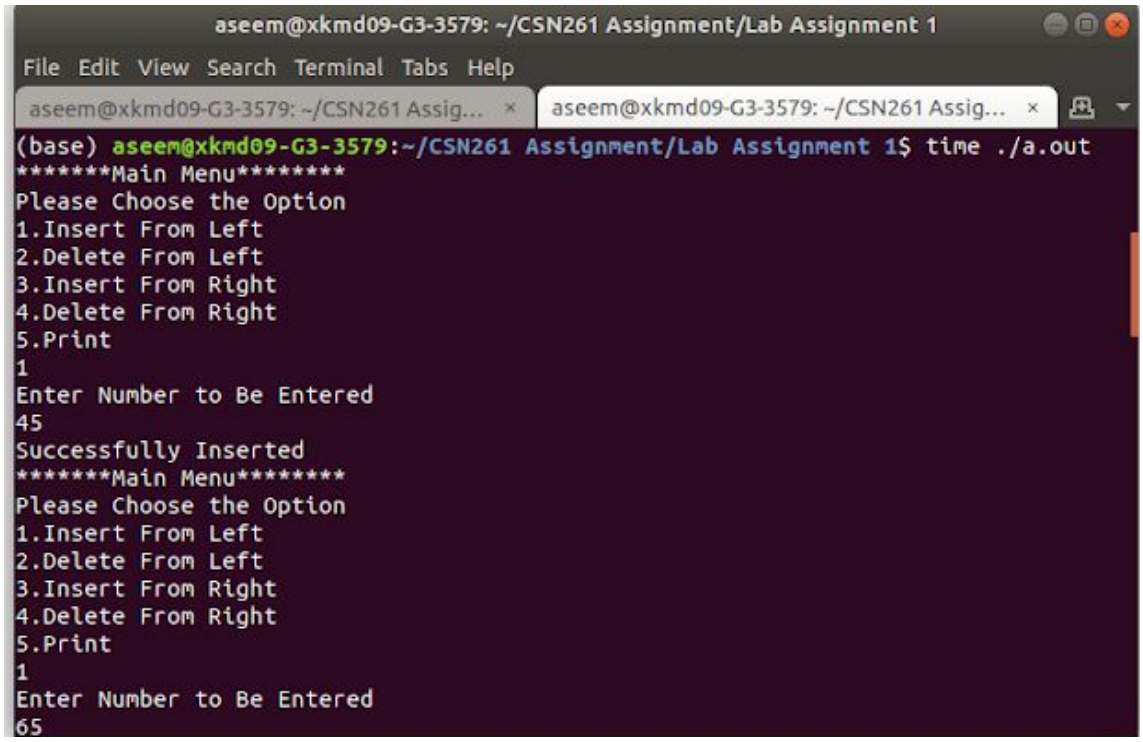
● After removing an element from a deque, if the number of elements are equal to half of the capacity of the deque, then its capacity is made half of its current size. The program should have the following three functions: insert(), delete() and print(). The function print() should display the current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

Data Structures Used

- Deque implemented using dynamic array

Algorithms Implemented

- ‘realloc’ is used to re allocated memory after resizing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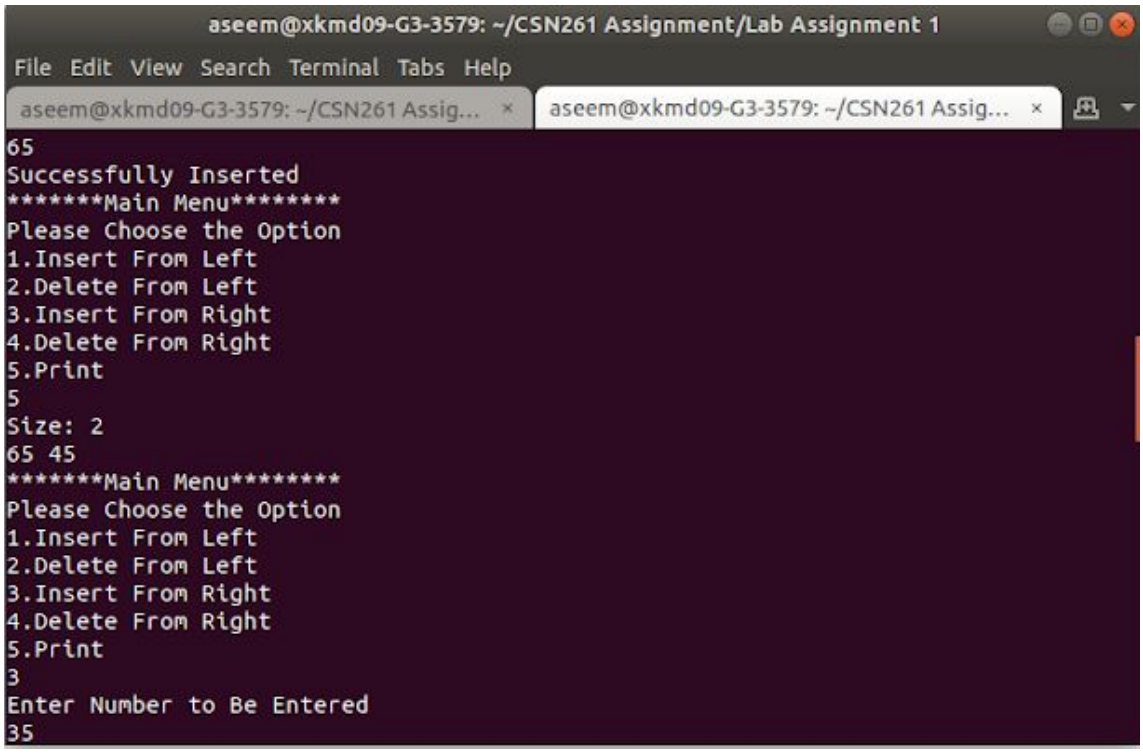
File Edit View Search Terminal Tabs Help
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
(base) aseem@xkmd09-G3-3579:~/CSN261 Assignment/Lab Assignment 1$ time ./a.out
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
1
Enter Number to Be Entered
45
Successfully Inserted
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
1
Enter Number to Be Entered
65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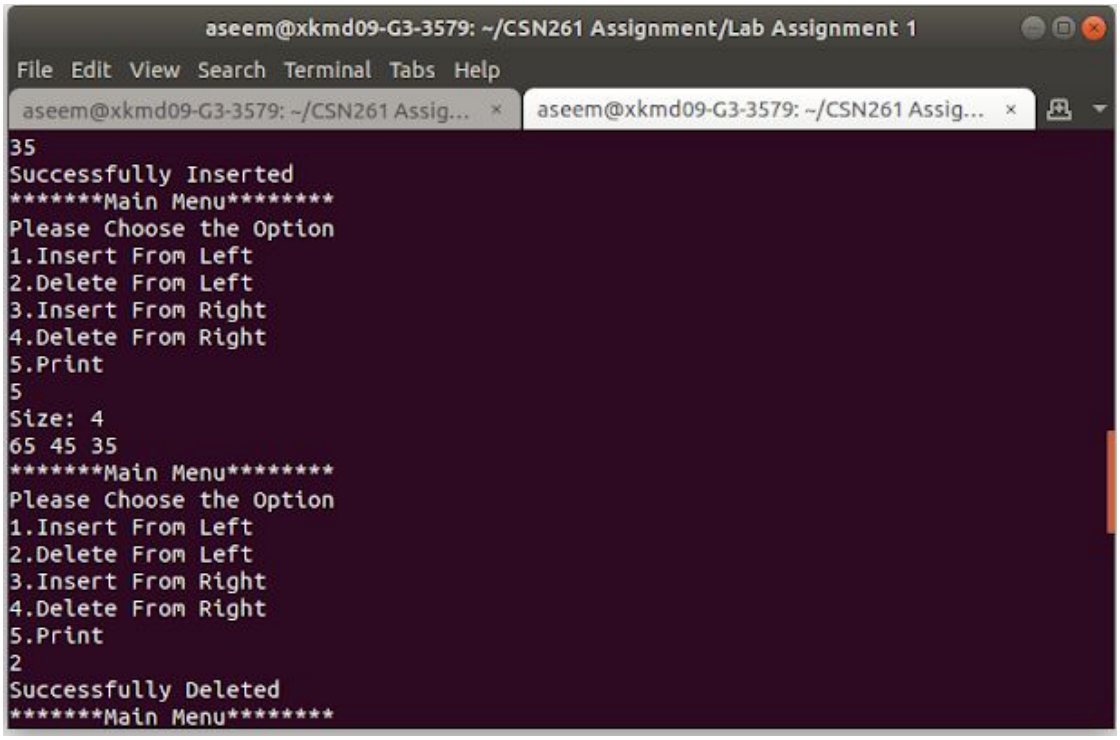
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
65
Successfully Inserted
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
5
Size: 2
65 45
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
3
Enter Number to Be Entered
35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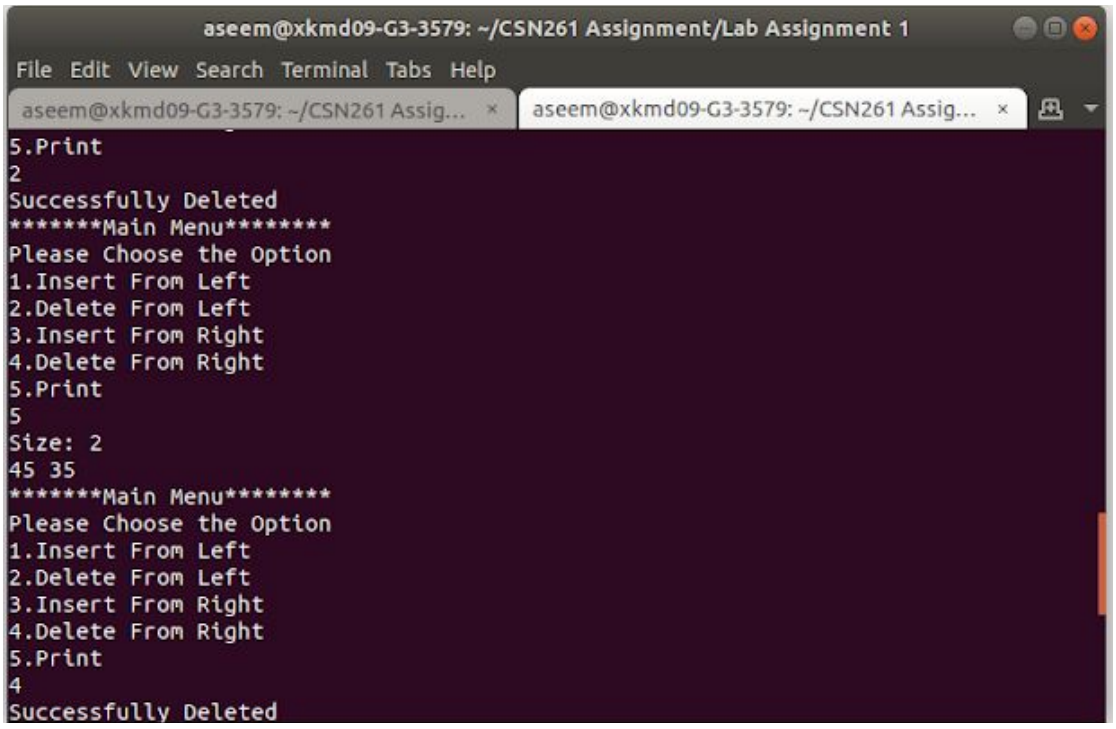
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
35
Successfully Inserted
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
5
Size: 4
65 45 35
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
2
Successfully Deleted
*******Main Menu********


aseem@xkmd09-G3-3579: ~/CSN261 Assignment/Lab Assignment 1
File Edit View Search Terminal Tabs Help
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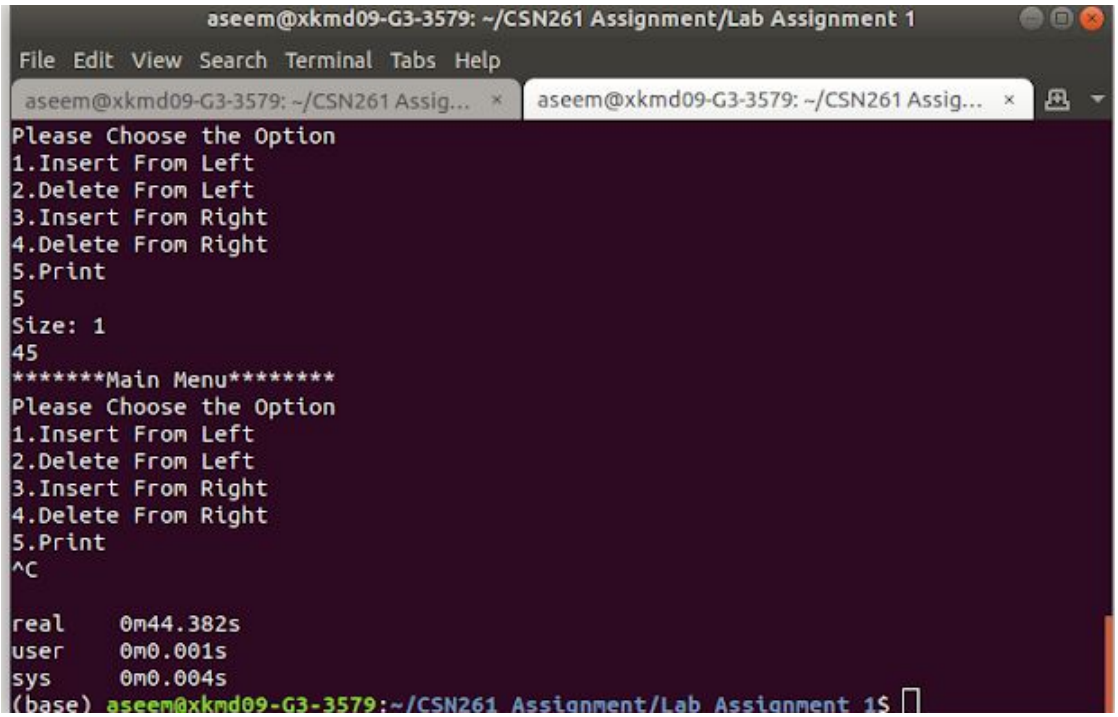
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
5.Print
2
Successfully Deleted
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
5
Size: 2
45 35
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
4
Successfully Deleted


aseem@xkmd09-G3-3579: ~/CSN261 Assignment/Lab Assignment 1
File Edit View Search Terminal Tabs Help
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
5
Size: 1
45
*******Main Menu********
Please Choose the Option
1.Insert From Left
2.Delete From Left
3.Insert From Right
4.Delete From Right
5.Print
^C
real 0m44.382s
user 0m0.001s
sys 0m0.004s
(base) aseem@xkmd09-G3-3579:~/CSN261 Assignment/Lab Assignment 1$

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.

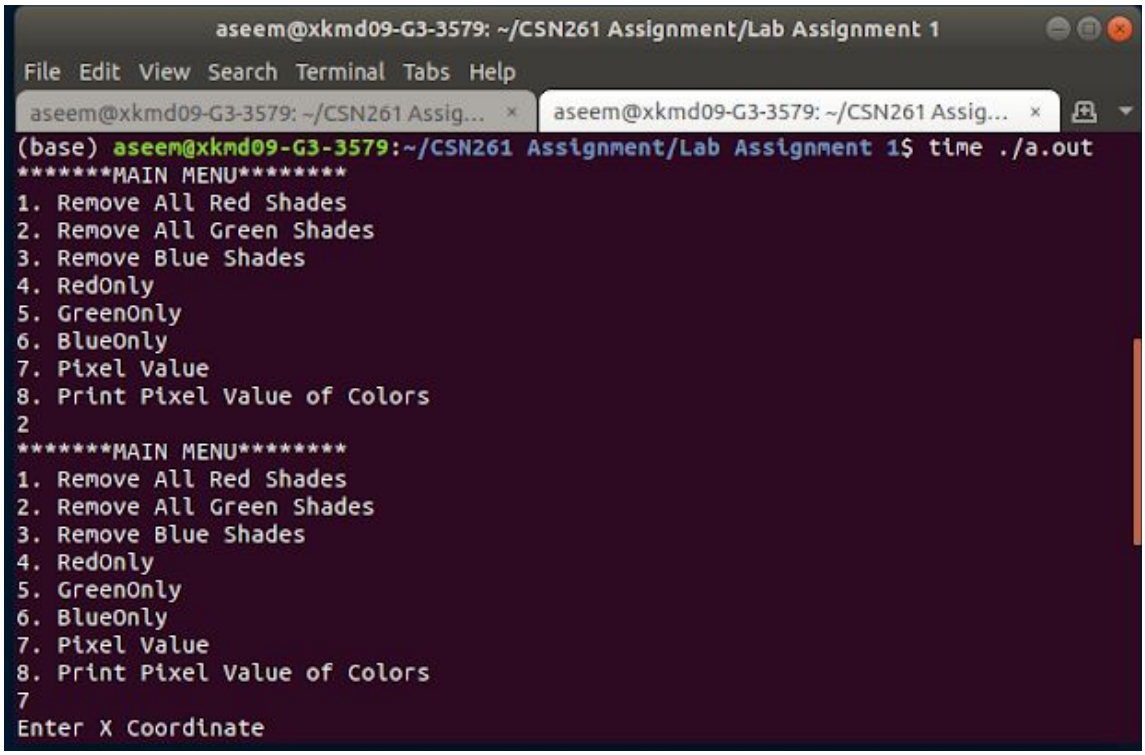
Write a function pixelValue() that has x and y as two parameters and displays the current pixel (RED, GREEN and BLUE) values of the input image at the point with coordinates (x, y), where x and y are the row and column numbers in that image file, respectively.

Data Structures Used

- Dynamic Array
- Implement 2D array using pointer to pointer

Algorithms Implemented

- Using fgets to store data in 2D array Data Structure


aseem@xkmd09-G3-3579: ~/CSN261 Assignment/Lab Assignment 1
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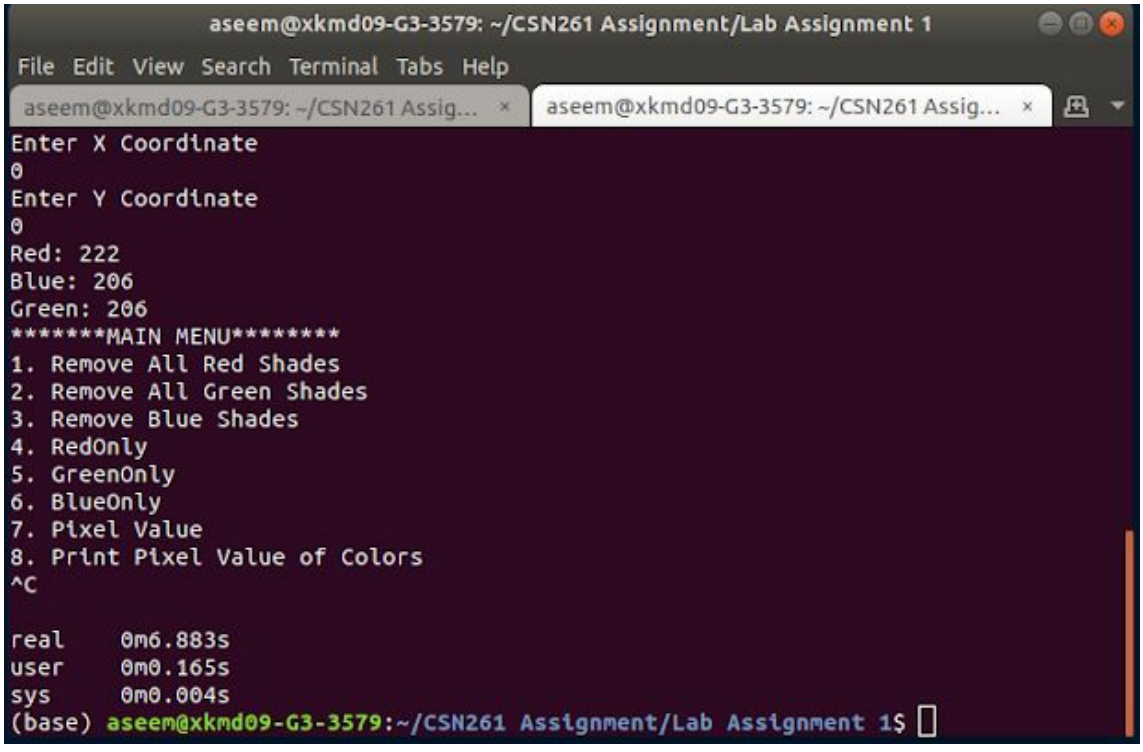
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
(base) aseem@xkmd09-G3-3579:~/CSN261 Assignment/Lab Assignment 1$ time ./a.out
*******MAIN MENU********
1. Remove All Red Shades
2. Remove All Green Shades
3. Remove Blue Shades
4. RedOnly
5. GreenOnly
6. BlueOnly
7. Pixel Value
8. Print Pixel Value of Colors
2
*******MAIN MENU********
1. Remove All Red Shades
2. Remove All Green Shades
3. Remove Blue Shades
4. RedOnly
5. GreenOnly
6. BlueOnly
7. Pixel Value
8. Print Pixel Value of Colors
7
Enter X Coordinate


aseem@xkmd09-G3-3579: ~/CSN261 Assignment/Lab Assignment 1
File Edit View Search Terminal Tabs Help
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
aseem@xkmd09-G3-3579: ~/CSN261 Assig...
Enter X Coordinate
0
Enter Y Coordinate
0
Red: 222
Blue: 206
Green: 206
*******MAIN MENU********
1. Remove All Red Shades
2. Remove All Green Shades
3. Remove Blue Shades
4. RedOnly
5. GreenOnly
6. BlueOnly
7. Pixel Value
8. Print Pixel Value of Colors
^C
real 0m6.883s
user 0m0.165s
sys 0m0.004s
(base) aseem@xkmd09-G3-3579:~/CSN261 Assignment/Lab Assignment 1$