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Assignment 1

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.

```
Enter 2 to change the Date of Birth
Enter 3 to change the Address
Enter 4 to change the Phone Number
1
Enter Roll number:
101
Enter new value:
Deepanshu

Deepanshu
Given instruction is successfully Updated.
Enter 1 to insert information from file
Enter 2 to modify the information
Enter 3 to delete some information
Enter 4 to sort the students name alphabetically
Enter 5 to print the list
Enter 6 to exit the program...
Enter 1 to change the Name
Enter 2 to change the Date of Birth
Enter 3 to change the Address
Enter 4 to change the Phone Number
Enter Roll number:
Enter new value:
Deepanshu
Given instruction is successfully Updated.
Enter 1 to insert information from file
Enter 2 to modify the information
Enter 3 to delete some information
Enter 4 to sort the students name alphabetically
Enter 5 to print the list
Enter 6 to exit the program...
Enter 1 to change the Name
Enter 2 to change the Date of Birth
Enter 3 to change the Address
Enter 4 to change the Phone Number
Enter Roll number:
Enter new value:
5
Given instruction is successfully Updated.
Enter 1 to insert information from file
Enter 2 to modify the information
Enter 3 to delete some information
Enter 4 to sort the students name alphabetically
Enter 5 to print the list
Enter 6 to exit the program...
Name : Deepanshu
Enrollment no. : 101
Date of Birth : 18 Jul 95
Contact No. : 1234567890
Address : 803, Karan Next to Green Acres, Lokhandwala Complex, Andheri West, Mumbai

Enter 1 to insert information from file
Enter 2 to modify the information
Enter 3 to delete some information
Enter 4 to sort the students name alphabetically
Enter 5 to print the list
Enter 6 to exit the program...
6

real    1m40.468s
user    0m0.003s
sys     0m0.004s
Deepanshus-MacBook-Air:L1Q1 deepanshumatia$
```

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.

```
Deepanshus-MacBook-Air:L1Q1 deepanshumatia$ cd ..
Deepanshus-MacBook-Air:CSN-261 L1 deepanshumatia$ ls
Doxyfile        L1Q1            L1Q2            L1Q3            docs            q1.c            q2.c            q3.c
Deepanshus-MacBook-Air:CSN-261 L1 deepanshumatia$ cd L1Q2
Deepanshus-MacBook-Air:L1Q2 deepanshumatia$ gcc -o q2 q2.c
Deepanshus-MacBook-Air:L1Q2 deepanshumatia$ time ./q2
1-Insert in Front
2-Insert in Rear
3-Delete from front
4-Delete from Rear
5-Print the dequeue
6-End the Program
1
Insert the number to be added
5
1-Insert in Front
2-Insert in Rear
3-Delete from front
4-Delete from Rear
5-Print the dequeue
6-End the Program
2
Insert the number to be added
7
1-Insert in Front
2-Insert in Rear
3-Delete from front
4-Delete from Rear
5-Print the dequeue
6-End the Program
1
Insert the number to be added
9
1-Insert in Front
2-Insert in Rear
3-Delete from front
4-Delete from Rear
5-Print the dequeue
6-End the Program
3
1-Insert in Front
2-Insert in Rear
3-Delete from front
4-Delete from Rear
5-Print the dequeue
6-End the Program
5
5 7 The size of the deque is 8 bytes.
1-Insert in Front
2-Insert in Rear
3-Delete from front
4-Delete from Rear
5-Print the dequeue
6-End the Program
6

real    0m39.167s
user    0m0.002s
sys     0m0.004s
Deepanshus-MacBook-Air:L1Q2 deepanshumatia$
```

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.