Rajalakshmi Engineering College

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 0_Arrays and Functions

Attempt : 1
Total Mark : 5
Marks Obtained : 5

Section 1 : Coding

1. Problem Statement

Alex, a budding programmer, is tasked with writing a menu-driven program to perform operations on an array of integers. The operations include finding the smallest number, the largest number, the sum of all numbers, and their average. The program must repeatedly display the menu until Alex chooses to exit.

Write a program to ensure the specified tasks are implemented based on Alex's choices.

Input Format

The first line contains an integer n, representing the number of elements in the array.

The second line contains n space-separated integers representing the array elements.

The subsequent lines contain integers representing the menu choices:

Choice 1: Find and display the smallest number.

Choice 2: Find and display the largest number.

Choice 3: Calculate and display the sum of all numbers.

Choice 4: Calculate and display the average of all numbers as double.

Choice 5: Exit the program.

Output Format

For each valid menu choice, print the corresponding result:

For choice 1, print "The smallest number is: X", where X is the smallest number in the array.

For choice 2, print "The largest number is: X", where X is the largest number in the array.

For choice 3, print "The sum of the numbers is: X", where X is the sum of all numbers in the array.

For choice 4, print "The average of the numbers is: X. XX", where X.XX is the double value representing an average of all numbers in the array, rounded to two decimal places.

For choice 5, print "Exiting the program".

If an invalid choice is made, print "Invalid choice! Please enter a valid option (1-5)."

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 3
10 20 30
1
5
Output: The smallest number is: 10
Exiting the program

Answer

```
#include<stdio.h>
int smallest_number(int arr[],int n){
    int smallest = arr[0];
    for(int i=1;i<n;i++){
        if(arr[i]<smallest)
        smallest = arr[i];
    }
    return smallest;
}
int largest_number(int arr[],int n){
    int largest = arr[0];
    for(int i=1;i<n;i++){
        if(arr[i]>largest)
        largest=arr[i];
    }
    return largest;
}
int sum (int arr[],int n){
    int total=0;
    for(int i=0;i<n;i++)
    total+=arr[i];
    return total;
}
double avg (int arr[],int n){
    int total = sum(arr,n);
    return (double)total/n;
}
int main(){
    int n,choice;
    scanf("%d",&n);
    int arr[n];
    for(int i=0;i<n;i++)
    scanf("%d",&arr[i]);
    while(1){
```

```
        scanf("%d",&choice);
        switch(choice){
            case 1:
            printf("The smallest number is: %d\n",smallest_number(arr,n));
            break;
            case 2:
            printf("The largest number is: %d\n",largest_number(arr,n));
            break;
            case 3:
            printf("The sum of the numbers is: %d\n",sum(arr,n));
            break;
            case 4:
            printf("The average of the numbers is: %.2f\n",avg(arr,n));
            break;
            case 5:
            printf("Exiting the program\n");
            return 0;
            default:
            printf("Invalid choice! Please enter a valid option (1-5).\n");
        }
    }
    return 0;
}
```

Status : Correct **Marks : 1/1**

2. Problem Statement

Saurabh is the manager of a growing tech company. He needs a program to record and analyze the monthly salaries of his employees. The program will take the number of employees and their respective salaries as input and then calculate the average salary, and find the highest and lowest salary among them.

Help Saurabh automate this task efficiently.

Input Format

The first line of input consists of an integer n, representing the number of employees.

The second line consists of n integers, where each integer represents the salary of an employee.

Output Format

The output prints n lines, where each line will display: "Employee i: "Salary

Where i is the employee number (starting from 1) and salary is the respective salary of that employee.

After that, print the average salary in the following format: "Average Salary: "average_salary

Where average_salary is the average salary of all employees, rounded to two decimal places.

Next, print the highest salary in the following format: "Highest Salary: "max_salary

Where max_salary is the highest salary among all employees.

Finally, print the lowest salary in the following format:"Lowest Salary: "min_salary

Where min_salary is the lowest salary among all employees.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
4000
3500

6000
2500
4500

Output: Employee 1: 4000
Employee 2: 3500
Employee 3: 6000
Employee 4: 2500
Employee 5: 4500

Average Salary: 4100.00
Highest Salary: 6000
Lowest Salary: 2500

Answer

```
#include<stdio.h>
int main(){
    int n;
    scanf("%d",&n);
    int Salary[n];
    int sum=0,max_Salary=0,min_Salary=1000000;
    for(int i=0;i<n;i++){
        scanf("%d",&Salary[i]);
        sum+=Salary[i];
        if(Salary[i]>max_Salary){
            max_Salary=Salary[i];
        }
        if(Salary[i]<min_Salary){
            min_Salary=Salary[i];
        }
    }
    for(int i=0;i<n;i++){
        printf("Employee %d: %d\n",i+1,Salary[i]);
    }
    printf("Average Salary: %.2f\n",(float)sum/n);
    printf("Highest Salary: %d\n",max_Salary);
    printf("Lowest Salary: %d\n",min_Salary);
    return 0;
}
```

Status : Correct ***Marks : 1/1***

3. Problem Statement

Write a program that will read a Matrix (two-dimensional arrays) and print the sum of all elements of each row by passing the matrix to a function.

Function Signature: void calculateRowSum(int [ ][ ], int, int)

Input Format

The first line consists of an integer M representing the number of rows.

The second line consists of an integer N representing the number of columns.

The next M lines consist of N space-separated integers in each line representing the elements of the matrix.

Output Format

The output displays the sum of all elements of each row separated by a space.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 3
3
1 2 3
4 5 6
7 8 9

Output: 6 15 24

Answer

```
#include <stdio.h>

#include<stdio.h>
void calculateRowSum(int matrix[20][20], int rows, int cols) {
int i,j,sum;
for(i=0;i<=rows-1;i++)
{
   sum=0;
   for(j=0;j<=cols-1;j++)
```

```
    {
        sum+=matrix[i][j];
    }
    printf("%d",sum);
}
}

int main() {
    int matrix[20][20];
    int r, c;

    scanf("%d", &r);
    scanf("%d", &c);

    for (int i = 0; i < r; i++) {
        for (int j = 0; j < c; j++) {
            scanf("%d", &matrix[i][j]);
        }
    }

    calculateRowSum(matrix, r, c);
    return 0;
}
```

Status : Correct **Marks : 1/1**

4. Problem Statement

Write a program that reads an integer 'n' and a square matrix of size 'n x n' from the user. The program should then set all the elements in the lower triangular part of the matrix (including the main diagonal) to zero using a function and display the resulting matrix.

Function Signature: void setZeros(int [ ][ ], int)

Input Format

The first line consists of an integer M representing the number of rows & columns.

The next M lines consist of M space-separated integers in each line representing

the elements of the matrix.

Output Format

The output displays the matrix containing M space-separated elements in M lines where the lower triangular elements are replaced with zero.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 3
10 20 30
40 50 60
70 80 90

Output: 0 20 30
0 0 60
0 0 0

Answer

```
#include <stdio.h>
```

```
#include<stdio.h>
void setZeros(int matrix[10][10], int n) {
    for(int i=0;i<n;i++){
        for(int j=0;j<=i;j++){
            matrix[i][j]=0;
        }
    }
}

int main() {
    int arr1[10][10];
    int n;

    scanf("%d", &n);

    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            scanf("%d", &arr1[i][j]);
        }
    }
```

```
    setZeros(arr1, n);

    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            printf("%d ", arr1[i][j]);
        }
        printf("\n");
    }

    return 0;
}
```

Status : Correct **Marks : 1/1**

5. Problem Statement

Tim is creating a program to track and analyze student attendance. The program requires two inputs: the total number of students (n) and the total number of class sessions (m). The task is to design and populate an attendance matrix, 'matrix', representing the attendance record of each student for each session.

The program's specific objective is to determine whether the last student on the list attended an even or odd number of classes. This functionality will aid teachers in quickly evaluating the attendance habits of individual students.

Input Format

The first line of input consists of a positive integer n, representing the number of students.

The second line consists of a positive integer m, representing the number of class sessions.

The next n lines consist of m space-separated positive integers representing the number of classes attended by the student.

Output Format

The output displays one of the following results:

If the last session is even the output prints "[LastSession] is even".

If the last session is odd the output prints "[LastSession] is odd".

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 2
2
1 2
3 100
Output: 100 is even

Answer

```
#include<stdio.h>
int main(){
    int n,m;
    scanf("%d %d",&n,&m);
    int matrix[n][m];
    for(int i=0;i<n;i++){
        for(int j=0;j<m;j++){
            scanf("%d",&matrix[i][j]);
        }
    }
    int lastsession = matrix[n-1][m-1];
    if(lastsession %2==0){
        printf("%d is even\n",lastsession);
    }else{
        printf("%d is odd\n",lastsession);
    }
    return 0;
}
```

Status : Correct ***Marks : 1/1***

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 1

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Imagine a bustling coffee shop, where customers are placing their orders for their favorite coffee drinks. The cafe owner Sheeren wants to efficiently manage the queue of coffee orders using a digital system. She needs a program to handle this queue of orders.

You are tasked with creating a program that implements a queue for coffee orders. Each character in the queue represents a customer's coffee order, with 'L' indicating a latte, 'E' indicating an espresso, 'M' indicating a macchiato, 'O' indicating an iced coffee, and 'N' indicating a nabob.

Customers can place orders and enjoy their delicious coffee drinks.

Input Format

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Enqueue the coffee order into the queue. If the choice is 1, the following input is a space-separated character ('L', 'E', 'M', 'O', 'N').

Choice 2: Dequeue a coffee order from the queue.

Choice 3: Display the orders in the queue.

Choice 4: Exit the program.

Output Format

The output displays messages according to the choice and the status of the queue:

If the choice is 1:

1. Insert the given order into the queue and display "Order for [order] is enqueued." where [order] is the coffee order that is inserted.
2. If the queue is full, print "Queue is full. Cannot enqueue more orders."

If the choice is 2:

1. Dequeue a character from the queue and display "Dequeued Order: " followed by the corresponding order that is dequeued.
2. If the queue is empty without any orders, print "No orders in the queue."

If the choice is 3:

1. The output prints "Orders in the queue are: " followed by the space-separated orders present in the queue.
2. If there are no orders in the queue, print "Queue is empty. No orders available."

If the choice is 4:

1. Exit the program and print "Exiting program"

If any other choice is entered, the output prints "Invalid option."

Refer to the sample output for the exact text and format.

Sample Test Case

Input: 1 L
1 E
1 M
1 O
1 N
1 O
3
2
3
4

Output: Order for L is enqueued.
Order for E is enqueued.
Order for M is enqueued.
Order for O is enqueued.
Order for N is enqueued.
Queue is full. Cannot enqueue more orders.
Orders in the queue are: L E M O N
Dequeued Order: L
Orders in the queue are: E M O N
Exiting program

Answer

```
#include <stdio.h>
#define MAX_SIZE 5

char orders[MAX_SIZE];
int front = -1;
int rear = -1;

void initializeQueue() {
    front = -1;
    rear = -1;
}
char enqueue(char order) {
```

```
    if (rear == MAX_SIZE - 1) {
        printf("Queue is full. Cannot enqueue more orders.\n");
        return '$';
    }
    if (front == -1) {
        front = 0;
    }
    rear++;
    orders[rear] = order;
    printf("Order for %c is enqueued.\n", order);
    return orders[rear];
}


void dequeue() {
    if (front == -1 || front > rear) {
        printf("No orders in the queue.\n");
        return;
    }
    printf("Dequeued Order: %c\n", orders[front]);
    front++;
    if (front > rear) {
        front = rear = -1;
    }
}

void display() {
    if (front == -1 || front > rear) {
        printf("Queue is empty. No orders available.\n");
        return;
    }
    printf("Orders in the queue are: ");
    for (int i = front; i <= rear; i++) {
        printf("%c ", orders[i]);
    }
    printf("\n");
}


int main() {
    char order;
    int option;
```

```
    initializeQueue();
    while (1) {
        if (scanf("%d", &option) != 1) {
            break;
        }
        switch (option) {
            case 1:
                if (scanf(" %c", &order) != 1) {
                    break;
                }
                if (enqueue(order)) {
                }
                break;
            case 2:
                dequeue();
                break;
            case 3:
                display();
                break;
            case 4:
                printf("Exiting program");
                return 0;
            default:
                printf("Invalid option.\n");
                break;
        }
    }
    return 0;
}
```

Status : Correct ***Marks : 10/10***

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 2

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

In a bustling IT department, staff regularly submit helpdesk tickets to request technical assistance. Managing these tickets efficiently is vital for providing quality support.

Your task is to develop a program that uses an array-based queue to handle and prioritize helpdesk tickets based on their unique IDs.

Implement a program that provides the following functionalities:

Enqueue Helpdesk Ticket: Add a new helpdesk ticket to the end of the queue. Provide a positive integer representing the ticket ID for the new ticket.Dequeue Helpdesk Ticket: Remove and process the next helpdesk ticket from the front of the queue. The program will display the ticket ID of the processed ticket.Display Queue: Display the ticket IDs of all the

helpdesk tickets currently in the queue.

Input Format

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Enqueue the ticket ID into the queue. If the choice is 1, the following input is a space-separated integer, representing the ticket ID to be enqueued into the queue.

Choice 2: Dequeue a ticket from the queue.

Choice 3: Display the ticket IDs in the queue.

Choice 4: Exit the program.

Output Format

The output displays messages according to the choice and the status of the queue:

If the choice is 1:

1. Insert the given ticket ID into the queue and display "Helpdesk Ticket ID [id] is enqueued." where [id] is the ticket ID that is inserted.
2. If the queue is full, print "Queue is full. Cannot enqueue."

If the choice is 2:

1. Dequeue a ticket ID from the queue and display "Dequeued Helpdesk Ticket ID: " followed by the corresponding ID that is dequeued.
2. If the queue is empty without any elements, print "Queue is empty."

If the choice is 3:

1. The output prints "Helpdesk Ticket IDs in the queue are: " followed by the space-separated ticket IDs present in the queue.
2. If there are no elements in the queue, print "Queue is empty."

If the choice is 4:

1. Exit the program and print "Exiting the program"

If any other choice is entered, print "Invalid option."

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 1 101
1 202
1 203
1 204
1 205
1 206
3
2
3
4

Output: Helpdesk Ticket ID 101 is enqueued.
Helpdesk Ticket ID 202 is enqueued.
Helpdesk Ticket ID 203 is enqueued.
Helpdesk Ticket ID 204 is enqueued.
Helpdesk Ticket ID 205 is enqueued.
Queue is full. Cannot enqueue.
Helpdesk Ticket IDs in the queue are: 101 202 203 204 205
Dequeued Helpdesk Ticket ID: 101
Helpdesk Ticket IDs in the queue are: 202 203 204 205
Exiting the program

Answer

```
#include <stdio.h>
#define MAX_SIZE 5

int ticketIDs[MAX_SIZE];
int front = -1;
int rear = -1;
int lastDequeued;

void initializeQueue() {
    front = -1;
    rear = -1;
}
```

```
void enqueue(int id) {
    if (rear == MAX_SIZE - 1) {
        printf("Queue is full. Cannot enqueue.\n");
        return;
    }
    if (front == -1) {
        front = 0;
    }
    rear++;
    ticketIDs[rear] = id;
    printf("Helpdesk Ticket ID %d is enqueued.\n", id);
}

int dequeue() {
    if (front == -1 || front > rear) {

        return 0;
    }
    lastDequeued=ticketIDs[front];
    front++;
    if (front > rear) {

        front = rear = -1;
    }
   return 1;
}

void display() {
    if (front == -1 || front > rear) {
        printf("Queue is empty.\n");
        return;
    }
    printf("Helpdesk Ticket IDs in the queue are: ");
    for (int i = front; i <= rear; i++) {
        printf("%d ", ticketIDs[i]);
    }
    printf("\n");
}



int main() {
```

```
    int ticketID;
    int option;
    initializeQueue();
    while (1) {
        if (scanf("%d", &option) == EOF) {
            break;
        }
        switch (option) {
            case 1:
                if (scanf("%d", &ticketID) == EOF) {
                    break;
                }
                enqueue(ticketID);
                break;
            case 2:
                if (dequeue()) {
                    printf("Dequeued Helpdesk Ticket ID: %d\n", lastDequeued);
                } else {
                    printf("Queue is empty.\n");
                }
                break;
            case 3:
                display();
                break;
            case 4:
                printf("Exiting the program\n");
                return 0;
            default:
                printf("Invalid option.\n");
                break;
        }
    }
    return 0;
}
```

Status : Correct ***Marks : 10/10***

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 4

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

In an office setting, a print job management system is used to efficiently handle and process print jobs. The system is implemented using a queue data structure with an array.

The program provides the following operations:

Enqueue Print Job: Add a print job with a specified number of pages to the end of the queue.Dequeue Print Job: Remove and process the next print job in the queue.Display Queue: Display the print jobs in the queue

The program should ensure that print jobs are processed in the order they are received.

Input Format

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Enqueue the print job into the queue. If the choice is 1, the following input is a space-separated integer, representing the pages to be enqueued into the queue.

Choice 2: Dequeue a print job from the queue.

Choice 3: Display the print jobs in the queue.

Choice 4: Exit the program.

Output Format

The output displays messages according to the choice and the status of the queue:

If the choice is 1:

1. Insert the given page into the queue and display "Print job with [page] pages is enqueued." where [page] is the number of pages that are inserted.
2. If the queue is full, print "Queue is full. Cannot enqueue."

If the choice is 2:

1. Dequeue a page from the queue and display "Processing print job: [page] pages" where [page] is the corresponding page that is dequeued.
2. If the queue is empty without any elements, print "Queue is empty."

If the choice is 3:

1. The output prints "Print jobs in the queue: " followed by the space-separated pages present in the queue.
2. If there are no elements in the queue, print "Queue is empty."

If the choice is 4:

1. Exit the program and print "Exiting program"

If any other choice is entered, the output prints "Invalid option."

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 1
10
1
20
1
30
1
40
1
50
1
60
3
2
3
4

Output: Print job with 10 pages is enqueued.
Print job with 20 pages is enqueued.
Print job with 30 pages is enqueued.
Print job with 40 pages is enqueued.
Print job with 50 pages is enqueued.
Queue is full. Cannot enqueue.
Print jobs in the queue: 10 20 30 40 50
Processing print job: 10 pages
Print jobs in the queue: 20 30 40 50
Exiting program

Answer

```
int count=0;
void enqueue(int pages) {
   if (count == MAX_SIZE) {
      printf("Queue is full. Cannot enqueue.\n");
      return;
```

```
    }

    queue[rear] = pages;
    rear = (rear + 1) % MAX_SIZE;
    count++;

    printf("Print job with %d pages is enqueued.\n", pages);
}

void dequeue() {
    if (count == 0) {
        printf("Queue is empty.\n");
        return;
    }

    int pages = queue[front];
    front = (front + 1) % MAX_SIZE;
    count--;

    printf("Processing print job: %d pages\n", pages);
}

void display() {
    if (count == 0) {
        printf("Queue is empty.\n");
        return;
    }

    printf("Print jobs in the queue: ");
    for (int i = 0; i < count; i++) {
        int index = (front + i) % MAX_SIZE;
        printf("%d ", queue[index]);
    }
   printf("\n");
}
```

Status : Correct **Marks : 10/10**

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 3

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Write a program to implement a queue using an array and pointers. The program should provide the following functionalities:

Insert an element into the queue.Delete an element from the queue.Display the elements in the queue.

The queue has a maximum capacity of 5 elements. If the queue is full and an insertion is attempted, a "Queue is full" message should be displayed. If the queue is empty and a deletion is attempted, a "Queue is empty" message should be displayed.

Input Format

Each line contains an integer representing the chosen option from 1 to 3.

Option 1: Insert an element into the queue followed by an integer representing the element to be inserted, separated by a space.

Option 2: Delete an element from the queue.

Option 3: Display the elements in the queue.

Output Format

For option 1 (insertion):-

1. The program outputs: "<data> is inserted in the queue." if the data is successfully inserted.
2. "Queue is full." if the queue is already full and cannot accept more elements.

For option 2 (deletion):-

1. The program outputs: "Deleted number is: <data>" if an element is successfully deleted and returns the value of the deleted element.
2. "Queue is empty." if the queue is empty no elements can be deleted.

For option 3 (display):-

1. The program outputs: "Elements in the queue are: <element1> <element2> ... <elementN>" where <element1>, <element2>, ..., <elementN> represent the elements present in the queue.
2. "Queue is empty." if the queue is empty no elements can be displayed.

For invalid options, the program outputs: "Invalid option."

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 1 10

3
5
Output: 10 is inserted in the queue.
Elements in the queue are: 10
Invalid option.

Answer

```
#include <stdio.h>
#include <stdlib.h>

#define max 5

int queue[max];
int front = -1, rear = -1;

// You are using GCC
int insertq(int *data) {
    if (rear == max- 1) {
      return 0;
    } else {
        if (front == -1) front = 0;
        rear++;
        queue[rear] = *data;
        return 1;
    }
}

void delq() {
    if (front == -1 || front > rear) {
        printf("Queue is empty.\n");
    } else {
        printf("Deleted number is: %d\n", queue[front]);
        front++;
        if (front > rear) {
            front = rear = -1;
        }
    }
}

void display() {
    if (front == -1 || front > rear) {
        printf("Queue is empty.\n");
```

```
    } else {
        printf("Elements in the queue are: ");
        for (int i = front; i <= rear; i++) {
            printf("%d ", queue[i]);
        }
        printf("\n");
    }
}

int main()
{
    int data, reply, option;
    while (1)
    {
        if (scanf("%d", &option) != 1)
            break;
        switch (option)
        {
            case 1:
                if (scanf("%d", &data) != 1)
                    break;
                reply = insertq(&data);
                if (reply == 0)
                    printf("Queue is full.\n");
                else
                    printf("%d is inserted in the queue.\n", data);
                break;
            case 2:
                delq();  //    Called without arguments
                break;
            case 3:
                display();
                break;
            default:
                printf("Invalid option.\n");
                break;
        }
    }
    return 0;
}
```

Status : Correct *Marks : 10/10*

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Scan to verify results

NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 5

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

You are tasked with implementing basic operations on a queue data structure using a linked list.

You need to write a program that performs the following operations on a queue:

Enqueue Operation: Implement a function that inserts an integer element at the rear end of the queue.Print Front and Rear: Implement a function that prints the front and rear elements of the queue. Dequeue Operation: Implement a function that removes the front element from the queue.

Input Format

The first line of input consists of an integer N, representing the number of elements to be inserted into the queue.

The second line consists of N space-separated integers, representing the queue elements.

Output Format

The first line prints "Front: X, Rear: Y" where X is the front and Y is the rear elements of the queue.

The second line prints the message indicating that the dequeue operation (front element removed) is performed: "Performing Dequeue Operation:".

The last line prints "Front: M, Rear: N" where M is the front and N is the rear elements after the dequeue operation.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 5
12 56 87 23 45

Output: Front: 12, Rear: 45
Performing Dequeue Operation:
Front: 56, Rear: 45

Answer

```
#include <stdio.h>
#include <stdlib.h>

struct Node {
    int data;
    struct Node* next;
};

struct Node* front = NULL;
struct Node* rear = NULL;

void enqueue(int d) {
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = d;
    newNode->next = NULL;
```

```
    if (rear == NULL) {
        front = rear = newNode;
    } else {
        rear->next = newNode;
        rear = newNode;
    }
}

void printFrontRear() {
    if (front != NULL && rear != NULL) {
        printf("Front: %d, Rear: %d\n", front->data, rear->data);
    }
}

void dequeue() {
    if (front != NULL) {
        struct Node* temp = front;
        front = front->next;
        if (front == NULL) {
            rear = NULL;
        }
        free(temp);
    }
}

int main() {
    int n, data;
    scanf("%d", &n);
    for (int i = 0; i < n; i++) {
        scanf("%d", &data);
        enqueue(data);
    }
    printFrontRear();
    printf("Performing Dequeue Operation:\n");
    dequeue();
    printFrontRear();
    return 0;
}
```

Status : Correct ***Marks : 10/10***