Experiment No.:4

Aim: Implementation of double-ended queue for real world applications.

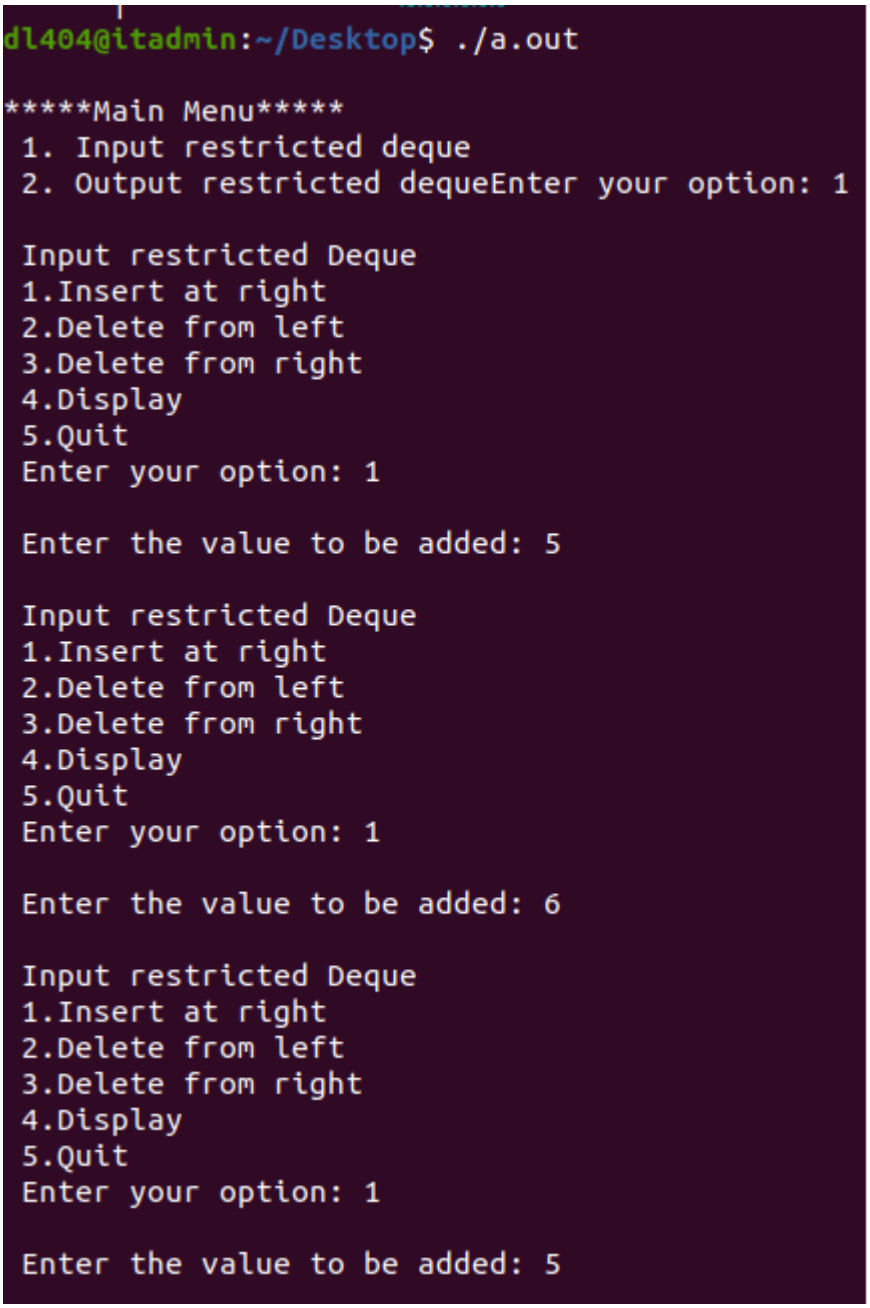
```
#include<stdio.h>

#define MAX 10
int deque[MAX];
int left = -1, right = -1;

void input_deque(void);
void output_deque(void);
void insert_left(void);
void insert_right(void);
void delete_left(void);
void delete_right(void);
void desplay(void);

int main(){
  int option;
  printf("\n*****Main Menu*****");
  printf("\n 1. Input restricted deque");
  printf("\n 2. Output restricted deque");
  printf("Enter your option: ");
  scanf("%d",&option);
  switch(option){
    case 1:input_deque();
           break;
    case 2:output_deque();
           break;
  }
  return 0;
}
void input_deque(){
  int option;
  do{
    printf("\n Input restricted Deque");
    printf("\n 1.Insert at right");
    printf("\n 2.Delete from left");
    printf("\n 3.Delete from right");
    printf("\n 4.Display");
    printf("\n 5.Quit");
    printf("\n Enter your option: ");
    scanf("%d",&option);
    switch(option){
      case 1:insert_right();
             break;
      case 2:delete_left();
             break;
      case 3:delete_right();
             break;
      case 4:display();
             break;
    }
  }while(option!=5);
```

```
}
void output_deque(){
  int option;
  do{
    printf("\n Output restricted Deque");
    printf("\n 1.Insert at right");
    printf("\n 2.Insert at left");
    printf("\n 3.Delete from left");
    printf("\n 4.Display");
    printf("\n 5.Quit");
    printf("\n Enter your option: ");
    scanf("%d",&option);
    switch(option){
      case 1:insert_right();
             break;
      case 2:insert_left();
             break;
      case 3:delete_left();
             break;
      case 4:display();
             break;
    }
  }while(option!=5);
}
void insert_right(){
  int val;
  printf("\n Enter the value to be added: ");
  scanf("%d",&val);
  if((left==0 && right==MAX-1)||(left==right+1)){
    printf("\n OVERFLOW!!!");
    return;
  }
  if(left==-1){
    left=0;
    right=0;
  }else{
    if(right==MAX-1){
      right=0;
    }else{
      right=right+1;
    }
  }
  deque[right] = val;
}
void insert_left(){
  int val;
  printf("\n Enter the value to be added: ");
  scanf("%d",&val);
  if((left==0 && right==MAX-1)||(left==right+1)){
    printf("\n OVERFLOW!!!");
    return;
  }
  if(left==-1){
    left=0;
    right=0;
  }else{
    if(left==0){
```

```
      left=MAX-1;
    }else{
      left=left-1;
    }
  }
  deque[left] = val;
}
void delete_left(){
  if(left==-1){
    printf("\n UNDERFLOW!!!");
    return;
  }
  printf("\n the deleted element is: %d",deque[left]);
  if(left==right){
    left=-1;
    right=-1;
  }else{
    if(left==MAX-1){
      left=0;
    }else{
      left=left+1;
    }
  }
}
void delete_right(){
  if(left==-1){
    printf("\n UNDERFLOW!!!");
    return;
  }
  printf("\n the deleted element is: %d",deque[left]);
  if(left==right){
    left=-1;
    right=-1;
  }else{
    if(right==0){
      right=MAX-1;
    }else{
      right=right-1;
    }
  }
}
void display() {
  int front = left , rear = right;
  if(front==-1){
    printf("\n QUEUE IS EMPTY!!!");
    return;
  }
  printf("\n The elements of the queue are: ");
  if(front<=rear){
    while(front<=rear){
      printf("%d",deque[front]);
      front++;
    }
  }else{
    while(front<=MAX-1){
      printf("%d",deque[front]);
      front++;
```

```
    }
    front=0;
    while(front<=rear){
      printf("%d",deque[front]);
      front++;
    }
  }
  printf("\n");
}
```

output:



```
Input restricted Deque
1.Insert at right
2.Delete from left
3.Delete from right
4.Display
5.Quit
Enter your option: 1

Enter the value to be added: 5

Input restricted Deque
1.Insert at right
2.Delete from left
3.Delete from right
4.Display
5.Quit
Enter your option: 2

the deleted element is: 5
Input restricted Deque
1.Insert at right
2.Delete from left
3.Delete from right
4.Display
5.Quit
Enter your option: 4

The elements of the queue are: 655

Input restricted Deque
1.Insert at right
2.Delete from left
3.Delete from right
4.Display
5.Quit
Enter your option: 5
dl404@itadmin:~/Desktop$
```