#A PROGRAM TO IMPLEMENT DOUBLE ENDED QUEUE USING ARRAY.

```
 #include <stdio.h>
#include <stdlib.h>
#define SIZE 5
int deque[SIZE];

int front = -1, rear = -1;

int isFull() {
   return (front == (rear + 1) % SIZE);
}

int isEmpty() {
   return (front == -1);
}

void insertRear(int element) {
   if (isFull()) {
      printf("\nDeque is full. Cannot insert %d at rear.\n", element);
   } else {
      if (isEmpty()) {
         front = rear = 0;
      } else {
         rear = (rear + 1) % SIZE;
      }
      deque[rear] = element;
      printf("%d inserted at rear.\n", element);
   }
}

void insertFront(int element) {
   if (isFull()) {
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        printf("\nDeque is full. Cannot insert %d at front.\n", element);
    } else {
        if (isEmpty()) {  // If the deque is empty, initialize front and rear to 0
            front = rear = 0;
        } else {
            // Update front in a circular manner
            front = (front - 1 + SIZE) % SIZE;
        }
        deque[front] = element;
        printf("%d inserted at front.\n", element);
    }
}

int deleteRear() {
    if (isEmpty()) {
        printf("\nDeque is empty. Cannot delete from rear.\n");
        return -1;
    } else {
        int deleted = deque[rear];
        if (front == rear) {
            front = rear = -1;
        } else {
            rear = (rear - 1 + SIZE) % SIZE;
        }
        printf("\nThe element deleted from rear is %d\n", deleted);
        return deleted;
    }
}

int deleteFront() {
    if (isEmpty()) {
        printf("\nDeque is empty. Cannot delete from front.\n");
```

```
        return -1;
    } else {
        int deleted = deque[front];
        if (front == rear) {
            front = rear = -1;
        } else {
            front = (front + 1) % SIZE;
        }
        printf("\nThe element deleted from front is %d\n", deleted);
        return deleted;
    }
}

void display() {
    if (isEmpty()) {
        printf("\nDeque is empty.\n");
    } else {
        printf("\nElements in the deque are: ");
        int i = front;
        while (i != rear) {
            printf("%d ", deque[i]);
            i = (i + 1) % SIZE;
        }
        printf("%d\n", deque[rear]);
    }
}

int main() {
    int choice = 1, x;

    while (choice < 7 && choice != 0) {
        printf("\nPress 1: Insert an element at the rear");
```

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    printf("\nPress 2: Insert an element at the front");
    printf("\nPress 3: Delete an element from the rear");
    printf("\nPress 4: Delete an element from the front");
    printf("\nPress 5: Display the elements");
    printf("\nEnter your choice: ");
    scanf("%d", &choice);

    switch (choice) {
      case 1:
        printf("Enter the element to be inserted at rear: ");
        scanf("%d", &x);
        insertRear(x);
        break;
      case 2:
        printf("Enter the element to be inserted at front: ");
        scanf("%d", &x);
        insertFront(x);
        break;
      case 3:
        deleteRear();
        break;
      case 4:
        deleteFront();
        break;
      case 5:
        display();
        break;
      default:
        printf("\nInvalid choice\n");
    }
}
return 0;
```

}

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Press 1: Insert an element at the rear

Press 2: Insert an element at the front

Press 3: Delete an element from the rear

Press 4: Delete an element from the front

Press 5: Display the elements

Enter your choice: 1

Enter the element to be inserted at rear: 12

12 inserted at rear.

Press 1: Insert an element at the rear

Press 2: Insert an element at the front

Press 3: Delete an element from the rear

Press 4: Delete an element from the front

Press 5: Display the elements

Enter your choice: 2

Enter the element to be inserted at front: 12

12 inserted at front.

Press 1: Insert an element at the rear

Press 2: Insert an element at the front

Press 3: Delete an element from the rear

Press 4: Delete an element from the front

Press 5: Display the elements

Enter your choice: 5

Elements in the deque are: 12 12

Press 1: Insert an element at the rear
Press 2: Insert an element at the front
Press 3: Delete an element from the rear
Press 4: Delete an element from the front
Press 5: Display the elements
Enter your choice: 1
Enter the element to be inserted at rear: 13
13 inserted at rear.

Press 1: Insert an element at the rear
Press 2: Insert an element at the front
Press 3: Delete an element from the rear
Press 4: Delete an element from the front
Press 5: Display the elements
Enter your choice: 5

Elements in the deque are: 12 12 13

Press 1: Insert an element at the rear
Press 2: Insert an element at the front
Press 3: Delete an element from the rear
Press 4: Delete an element from the front
Press 5: Display the elements
Enter your choice: 4

The element deleted from front is 12

Press 1: Insert an element at the rear

Press 2: Insert an element at the front

Press 3: Delete an element from the rear

Press 4: Delete an element from the front

Press 5: Display the elements

Enter your choice: 3

The element deleted from rear is 13

Press 1: Insert an element at the rear

Press 2: Insert an element at the front

Press 3: Delete an element from the rear

Press 4: Delete an element from the front

Press 5: Display the elements

Enter your choice: