LAB 7

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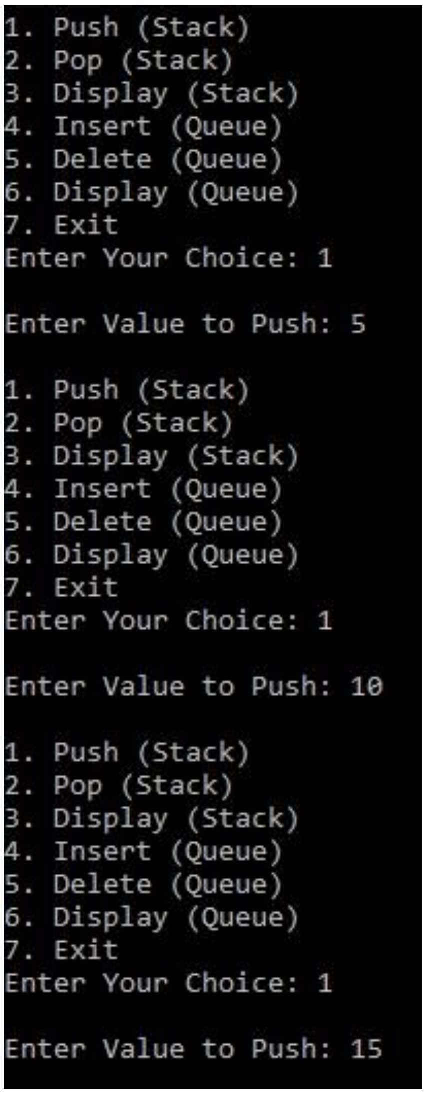
Implement stack and queue using linked list

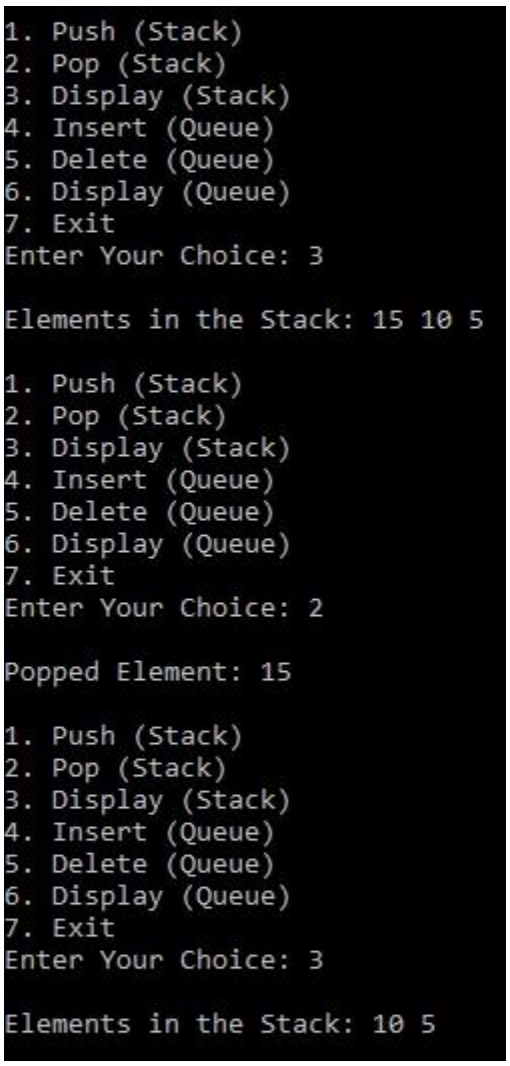
```
#include <stdio.h>
#include <stdlib.h>

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

typedef struct Node node;

//Stack
node *top=NULL;
void push();
void pop();
void displayStack();

void push(){
    node *new1=(node*)malloc(sizeof(node));
    if(new1==NULL){
        printf("\nStack Overflow.\n");
        return;
    }
    printf("\nEnter Value to Push: ");
    scanf("%d", &new1->data);
    new1->link=top;
    top=new1;
}

void pop(){
    if(top==NULL){
        printf("\nStack Underflow.\n");
        return;
    }

    node *temp=top;
    printf("\nPopped Element: %d\n", temp->data);
    top=top->link;
    free(temp);
}

void displayStack(){
    if(top==NULL){
        printf("\nThe Stack is Empty.\n");
        return;
    }

    printf("\nElements in the Stack: ");
    node *temp=top;
    while(temp!=NULL){
        printf("%d ", temp->data);
        temp=temp->link;
    }
    printf("\n");
}

//Queue
node *front=NULL, *rear=NULL;

void insert();
void del();
void displayQueue();

void insert(){
    node *new1=(node*)malloc(sizeof(node));
    if(new1==NULL){
        printf("\nQueue Full.\n");
        return;
    }

    printf("\nEnter Value to Insert: ");
    scanf("%d", &new1->data);
    new1->link=NULL;

    if(rear==NULL){
        front=rear=new1;
        return;
    }
    rear->link=new1;
    rear=new1;
```

```
}

void del(){
    if(front==NULL){
        printf("\nQueue Empty.\n");
        return;
    }

    node *temp=front;
    printf("\nDeleted Element: %d\n", temp->data);
    front=front->link;

    if(front==NULL){
        rear=NULL;
    }
    free(temp);
}

void displayQueue(){
    if(front==NULL){
        printf("\nThe Queue is Empty.\n");
        return;
    }

    printf("\nElements in the Queue: ");
    node *temp=front;
    while(temp!=NULL){
        printf("%d ", temp->data);
        temp=temp->link;
    }
    printf("\n");
}

void main(){
    int ch;

    while(1){
        printf("\n1. Push (Stack) \n2. Pop (Stack) \n3. Display (Stack)");
        printf("\n4. Insert (Queue) \n5. Delete (Queue) \n6. Display (Queue) \n7.
Exit");
        printf("\nEnter Your Choice: ");
        scanf("%d", &ch);

        switch(ch){
            case 1:
                push();
                break;
            case 2:
                pop();
                break;
            case 3:
                displayStack();
                break;
            case 4:
                insert();
                break;
            case 5:
                del();
                break;
            case 6:
                displayQueue();
                break;
            case 7:
                exit(0);
            default:
                printf("\nEnter Your Choice: \n");
        }
    }
}
```

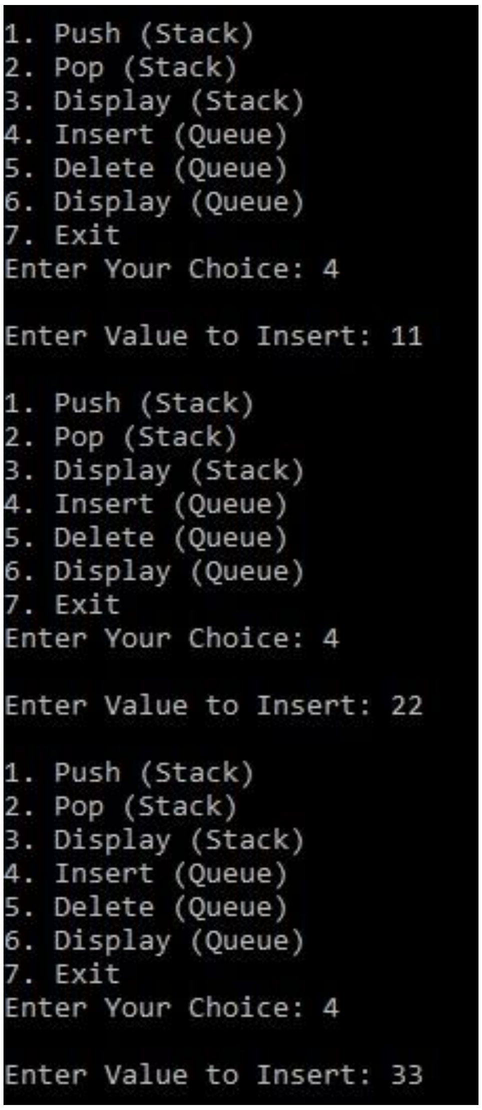
Output:



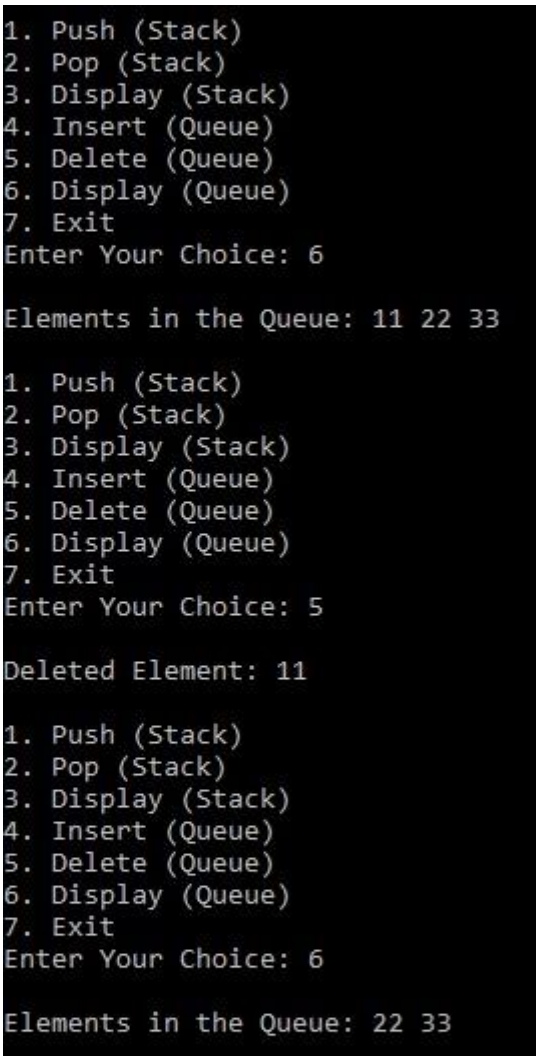
```
1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 1

Enter Value to Push: 5

1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 1

Enter Value to Push: 10

1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 1

Enter Value to Push: 15
```



```
1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 3

Elements in the Stack: 15 10 5

1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 2

Popped Element: 15

1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 3

Elements in the Stack: 10 5
```



```
1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 4

Enter Value to Insert: 11

1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 4

Enter Value to Insert: 22

1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 4

Enter Value to Insert: 33
```



```
1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 6

Elements in the Queue: 11 22 33

1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 5

Deleted Element: 11

1. Push (Stack)
2. Pop (Stack)
3. Display (Stack)
4. Insert (Queue)
5. Delete (Queue)
6. Display (Queue)
7. Exit
Enter Your Choice: 6

Elements in the Queue: 22 33
```