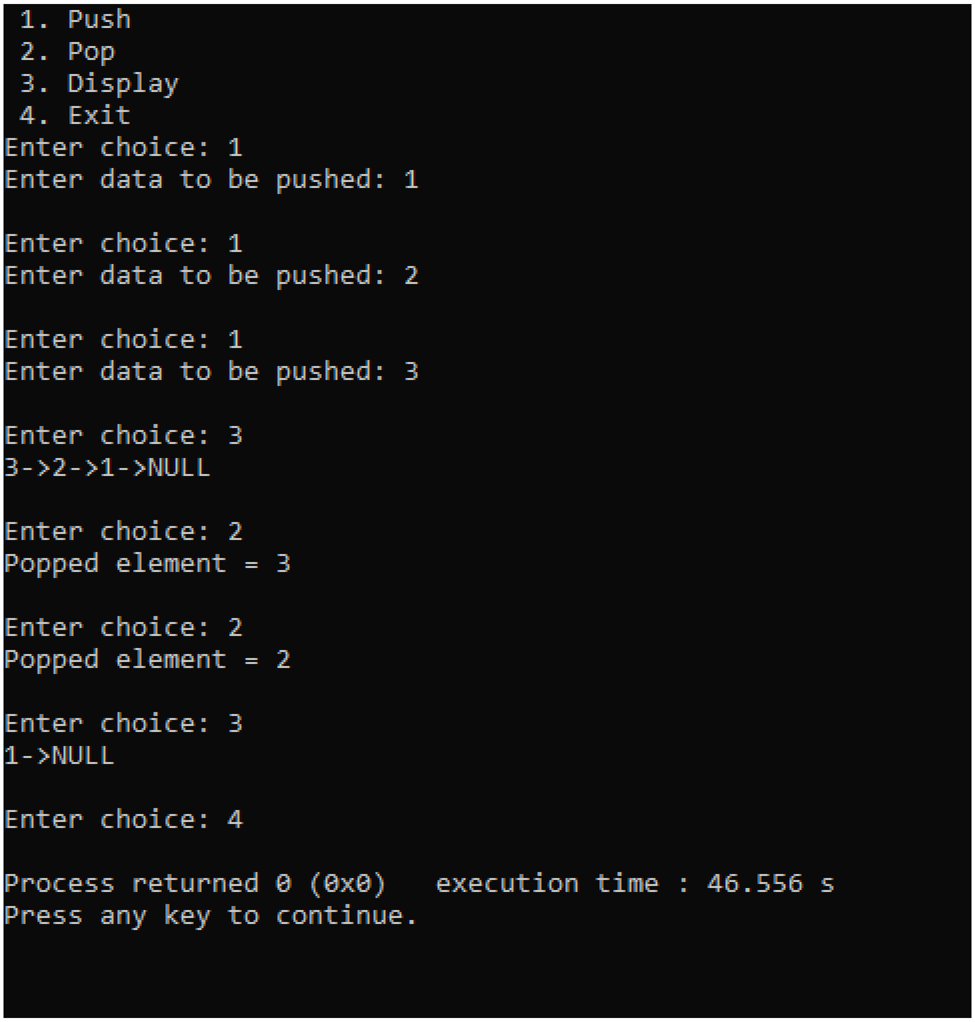
WAP to Implement Single Link List to simulate Stack , Queue Operations.-

Stack:

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

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

struct node *head = NULL;

void push(int val)
{
    struct node *newNode = malloc(sizeof(struct node));
    newNode->data = val;
    newNode->next = head;
    head = newNode;
}

void pop()
{
    struct node *temp;
    if(head == NULL)
        printf("Stack is Empty\n");
    else
    {
        printf("Popped element = %d\n", head->data);
        temp = head;
        head = head->next;
        free(temp);
    }
}

void printList()
{
    struct node *temp = head;

    while(temp != NULL)
    {
         printf("%d->", temp->data);
         temp = temp->next;
    }
    printf("NULL\n");
}

int main()
{
   int data, ch;
   printf("Menu:\n 1. Push\n 2. Pop\n 3. Display\n 4. Exit");

   printf("\nEnter choice: ");

   scanf("%d",&ch);

   while(ch!=4){

    switch(ch){

    case 1:

        printf("Enter data to be pushed: ");

        scanf("%d",&data);

        push(data);

        break;

    case 2:

        pop();

        break;

    case 3:

        printList();

        break;

    case 4:

        exit(0);

   }

   printf("\nEnter choice: ");

   scanf("%d",&ch);

   }

    return 0;

}
```

Output:



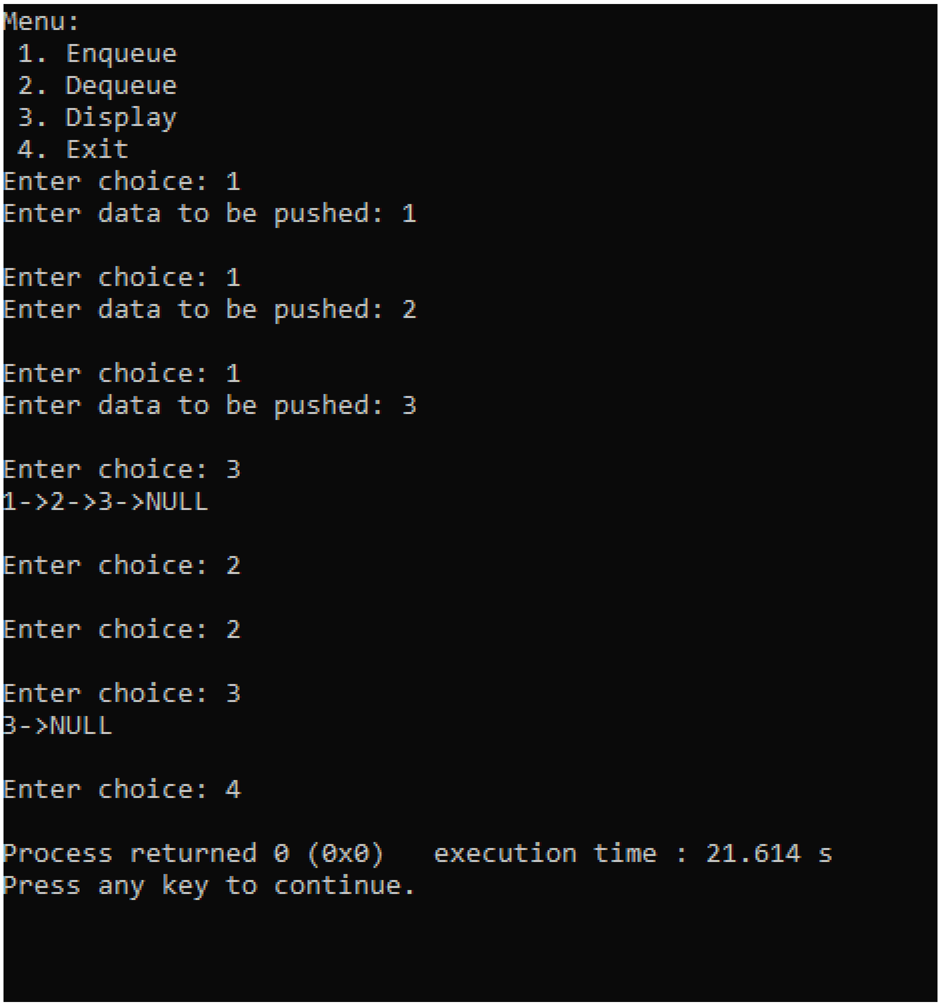
```
 1. Push
 2. Pop
 3. Display
 4. Exit
Enter choice: 1
Enter data to be pushed: 1

Enter choice: 1
Enter data to be pushed: 2

Enter choice: 1
Enter data to be pushed: 3

Enter choice: 3
3->2->1->NULL

Enter choice: 2
Popped element = 3

Enter choice: 2
Popped element = 2

Enter choice: 3
1->NULL

Enter choice: 4

Process returned 0 (0x0)   execution time : 46.556 s
Press any key to continue.
```

Queue:

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

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

struct node *front = NULL, *rear = NULL;

void enqueue(int val)
{
   struct node *newNode = malloc(sizeof(struct node));
   newNode->data = val;
```

```
    newNode->next = NULL;

    //if it is the first node
    if(front == NULL && rear == NULL)
        //make both front and rear points to the new node
        front = rear = newNode;
    else
    {
        //add newnode in rear->next
        rear->next = newNode;

        //make the new node as the rear node
        rear = newNode;
    }
}

void dequeue()
{
    //used to free the first node after dequeue
    struct node *temp;

    if(front == NULL)
         printf("Queue is Empty. Unable to perform dequeue\n");
    else
    {
        //take backup
        temp = front;

        //make the front node points to the next node
        //logically removing the front element
        front = front->next;

        //if front == NULL, set rear = NULL
        if(front == NULL)
            rear = NULL;

       //free the first node
       free(temp);
    }

}

void printList()
{
    struct node *temp = front;

    while(temp)
    {
        printf("%d->",temp->data);
        temp = temp->next;
    }
    printf("NULL\n");
}

int main()
{
   int data, ch;
   printf("Menu:\n 1. Enqueue\n 2. Dequeue\n 3. Display\n 4. Exit");
   printf("\nEnter choice: ");
   scanf("%d",&ch);
   while(ch!=4){
    switch(ch){
    case 1:
        printf("Enter data to be pushed: ");
        scanf("%d",&data);
        enqueue(data);
        break;
    case 2:
        dequeue();
        break;
    case 3:
        printList();
        break;
    case 4:
        exit(0);
   }
   printf("\nEnter choice: ");
   scanf("%d",&ch);
   }

    return 0;
}
```

Output:



```
Menu:
 1. Enqueue
 2. Dequeue
 3. Display
 4. Exit
Enter choice: 1
Enter data to be pushed: 1

Enter choice: 1
Enter data to be pushed: 2

Enter choice: 1
Enter data to be pushed: 3

Enter choice: 3
1->2->3->NULL

Enter choice: 2

Enter choice: 2

Enter choice: 3
3->NULL

Enter choice: 4

Process returned 0 (0x0)   execution time : 21.614 s
Press any key to continue.
```