Program 6b

Write A Program to Implement Single Link List to simulate Stack & Queue Operations.

Code:

```
#include <stdio.h>
#include <stdlib.h>
typedef struct Node {
        int data;
        struct Node* next;
} Node;
Node* createNode(int data) {
        Node* newNode = (Node*)malloc(sizeof(Node));
        if (!newNode) {
      printf("Memory allocation error\n");
      return NULL;
        }
   newNode->data = data;
        newNode->next = NULL;
        return newNode;
}
void push(Node** top, int data) {
        Node* newNode = createNode(data);
        if (!newNode) return;
   newNode->next = *top;
```

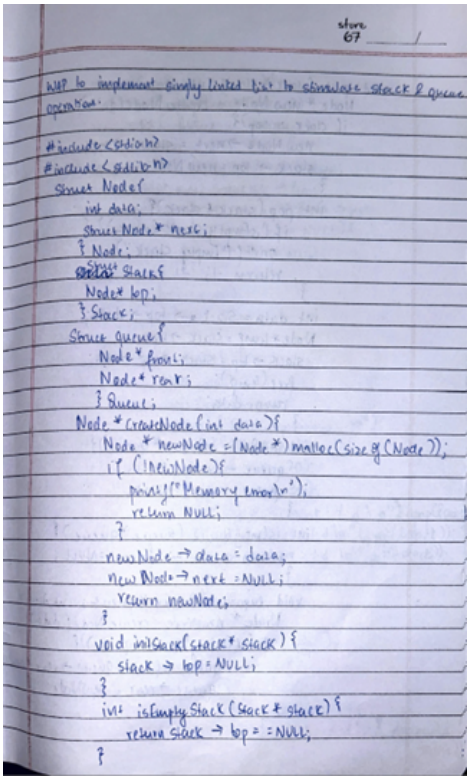
```
        *top = newNode;
    printf("%d pushed to stack\n", data);
}
 int pop(Node** top) {
        if (*top == NULL) {
      printf("Stack Underflow\n");
      return -1;
        }
        Node* temp = *top;
        int poppedData = temp->data;
        *top = temp->next;
    free(temp);
    printf("%d popped from stack\n", poppedData);
        return poppedData;
}
 void displayStack(Node* top) {
        if (top == NULL) {
      printf("Stack is empty\n");
      return;
        }
    printf("Stack: ");
        Node* temp = top;
        while (temp) {
```

```
        printf("%d -> ", temp->data);
        temp = temp->next;
            }
    printf("NULL\n");
}
 void enqueue(Node** front, Node** rear, int data) {
            Node* newNode = createNode(data);
            if (!newNode) return;
            if (*rear == NULL) {
        *front = *rear = newNode;
            } else {
        (*rear)->next = newNode;
        *rear = newNode;
            }
    printf("%d enqueued to queue\n", data);
}
 int dequeue(Node** front, Node** rear) {
            if (*front == NULL) {
        printf("Queue Underflow\n");
        return -1;
            }
            Node* temp = *front;
            int dequeuedData = temp->data;
```

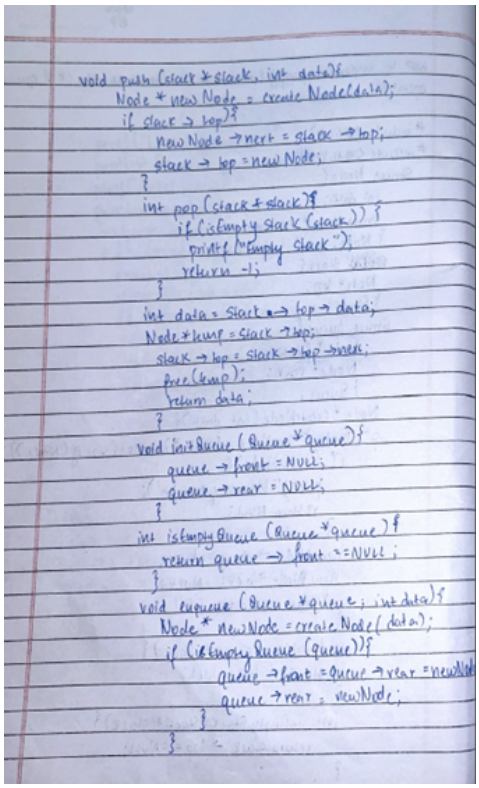
```
        *front = temp->next;
        if (*front == NULL) {
      *rear = NULL;
        }
   free(temp);
   printf("%d dequeued from queue\n", dequeuedData);
        return dequeuedData;
}
 void displayQueue(Node* front) {
        if (front == NULL) {
      printf("Queue is empty\n");
      return;
        }
   printf("Queue: ");
        Node* temp = front;
        while (temp) {
      printf("%d -> ", temp->data);
      temp = temp->next;
        }
   printf("NULL\n");
}
 int main() {
        Node* stackTop = NULL;
```

```
  printf("\n--- Stack Operations ---\n");
    push(&stackTop, 10);
    push(&stackTop, 20);
    push(&stackTop, 30);
    displayStack(stackTop);
    pop(&stackTop);
    displayStack(stackTop);
        Node* queueFront = NULL;
        Node* queueRear = NULL;
    printf("\n--- Queue Operations ---\n");
    enqueue(&queueFront, &queueRear, 1);
    enqueue(&queueFront, &queueRear, 2);
    enqueue(&queueFront, &queueRear, 3);
    displayQueue(queueFront);
    dequeue(&queueFront, &queueRear);
    displayQueue(queueFront);
        return 0;
}
```

```
--- Stack Operations ---
10 pushed to stack
20 pushed to stack
30 pushed to stack
Stack: 30 -> 20 -> 10 -> NULL
30 popped from stack
Stack: 20 -> 10 -> NULL

--- Queue Operations ---
1 enqueued to queue
2 enqueued to queue
3 enqueued to queue
Queue: 1 -> 2 -> 3 -> NULL
1 dequeued from queue
Queue: 2 -> 3 -> NULL
```



```
store
67

WAP to implement singly linked list to simulate stack & queue
operations.

#include <stdio.h>
#include <stdlib.h>
struct Node{
    int data;
    struct Node* next;
} Node;
struct Stack{
    Node* top;
} Stack;
struct Queue{
    Node* front;
    Node* rear;
} Queue;
Node *createNode(int data){
    Node *newNode = (Node*) malloc(sizeof(Node));
    if (!newNode){
        printf("Memory error\n");
        return NULL;
    }
    newNode->data = data;
    newNode->next = NULL;
    return newNode;
}
void initStack(Stack* stack){
    stack->top = NULL;
}
int isEmptyStack(Stack* stack){
    return stack->top == NULL;
}
```



```
void push(Stack *stack, int data){
    Node *newNode = createNode(data);
    if stack->top){
        newNode->next = stack->top;
        stack->top = newNode;
    }
int pop(Stack *stack){
    if (isEmptyStack(stack)){
        printf("Empty stack");
        return -1;
    }
    int data = stack->top->data;
    Node *temp = stack->top;
    stack->top = stack->top->next;
    free(temp);
    return data;
}
void initQueue(Queue *queue){
    queue->front = NULL;
    queue->rear = NULL;
}
int isEmptyQueue(Queue *queue){
    return queue->front == NULL;
}
void enqueue(Queue *queue, int data){
    Node* newNode = createNode(data);
    if (isEmptyQueue(queue)){
        queue->front = queue->rear = newNode;
    }else{
        queue->rear->next = newNode;
        queue->rear = newNode;
    }
}
```