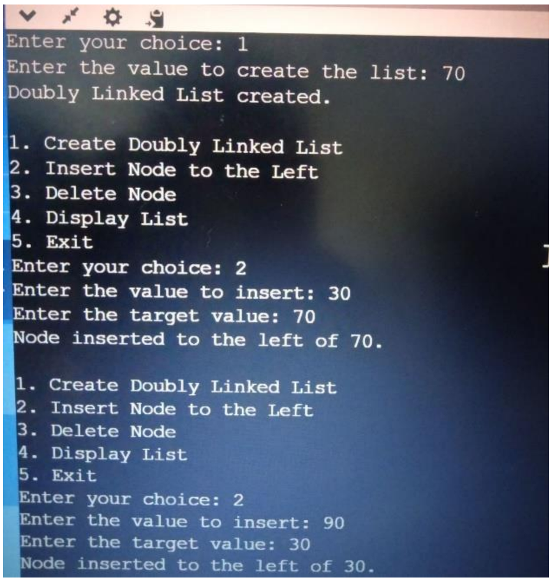
Lab-06

WAP to Implement Single Link List with following operations: Sort the linked list, Reverse the linked list, Concatenation of two linked lists.

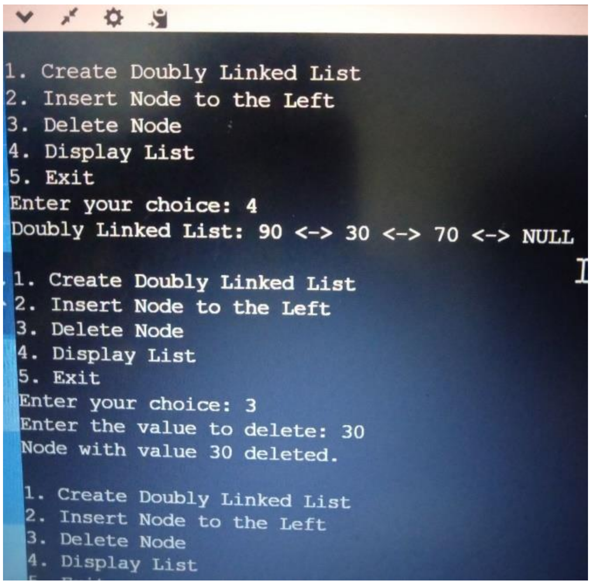
```
#include <stdio.h>
#include <stdlib.h>

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

// Insert at the beginning
void insertAtBeginning(struct Node** head_ref, int new_data) {
  // Allocate memory to a node
  struct Node* new_node
        = (struct Node*) malloc(sizeof(struct Node));

  // Put the data into the node
  new_node->data = new_data;

  // This new node is going to be the first node,
  // so set next of it as head
  new_node->next = (*head_ref);

  // Move the head to point to the new node
  (*head_ref) = new_node;
}

// Insert at the end
void insertAtEnd(struct Node** head_ref, int new_data) {
  // Allocate memory to a node
  struct Node* new_node
        = (struct Node*) malloc(sizeof(struct Node));

  // Put the data into the node
  new_node->data = new_data;

  // This new node is going to be the last node,
  // so set next of it as NULL
  new_node->next = NULL;

  if (*head_ref == NULL) {
    // If the Linked List is empty,
    // then make the new node as head
    *head_ref = new_node;
    return;
  }

  // Else traverse till the last node
  struct Node* last = *head_ref;
  while (last->next != NULL)
    last = last->next;

  // Change the next of the last node
  last->next = new_node;
  return;
}

// Display the linked list
void display(struct Node* head) {
  struct Node* ptr;
  ptr = head;
  while (ptr != NULL) {
    printf("%d -> ", ptr->data);
    ptr = ptr->next;
  }
  printf("NULL\n");
}

// Sort the linked list
void sortLinkedList(struct Node** head_ref) {
  struct Node* current = *head_ref;
  struct Node* index = NULL;
  int temp;

  if (head_ref == NULL) {
    return;
  } else {
    while (current != NULL) {
      // index points to the node next to current
      index = current->next;

      while (index != NULL) {
        if (current->data > index->data) {
          temp = current->data;
          current->data = index->data;
          index->data = temp;
        }
        index = index->next;
      }
      current = current->next;
    }
  }
}
```

```
// Reverse the linked list
void reverseLinkedList(struct Node** head_ref) {
  struct Node* prev = NULL;
  struct Node* current = *head_ref;
  struct Node* next;

  while (current != NULL) {
    next = current->next;
    current->next = prev;
    prev = current;
    current = next;
  }
  *head_ref = prev;
}

// Concatenation of two linked lists
void concatenation(struct Node** head1_ref, struct Node** head2_ref) {
  struct Node* temp1 = *head1_ref;
  struct Node* temp2 = *head2_ref;

  // Move temp1 to the end of first list
  while (temp1->next != NULL)
    temp1 = temp1->next;

  // Connect the two lists
  temp1->next = temp2;
}

int main() {
  // Create the first linked list
  struct Node* head1 = NULL;
  insertAtBeginning(&head1, 10);
  insertAtBeginning(&head1, 20);
  insertAtBeginning(&head1, 30);
  printf("First Linked List: ");
  display(head1);
// Create the second linked list
struct Node* head2 = NULL;
insertAtEnd(&head2, 40);
insertAtEnd(&head2, 50);
insertAtEnd(&head2, 60);
printf("Second Linked List: ");
display(head2);

// Concatenate the two linked lists
concatenation(&head1, &head2);
printf("Concatenated Linked List: ");
display(head1);
// Sort the concatenated linked list
sortLinkedList(&head1);
printf("Sorted Linked List: ");
display(head1);

// Reverse the sorted linked list
reverseLinkedList(&head1);
printf("Reversed Linked List: ");
display(head1);

return 0;
}
```

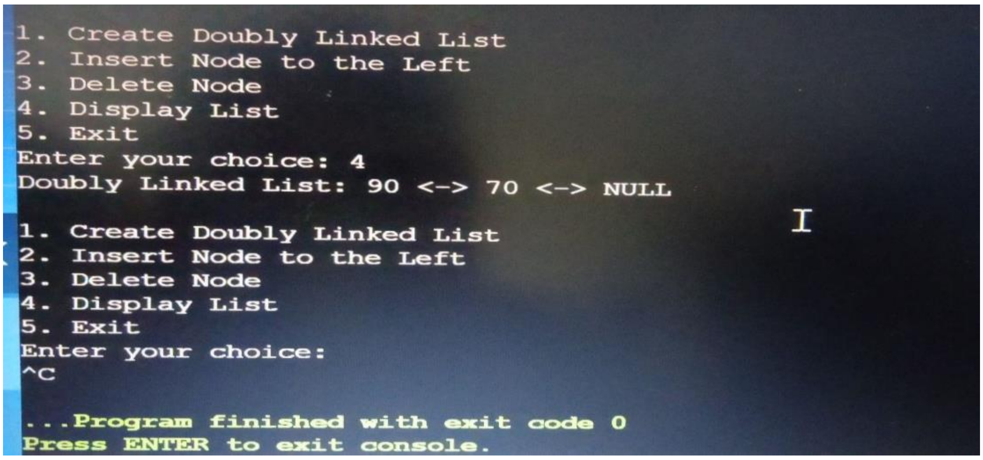
OUTPUT



```
Enter your choice: 1
Enter the value to create the list: 70
Doubly Linked List created.

1. Create Doubly Linked List
2. Insert Node to the Left
3. Delete Node
4. Display List
5. Exit
Enter your choice: 2
Enter the value to insert: 30
Enter the target value: 70
Node inserted to the left of 70.

1. Create Doubly Linked List
2. Insert Node to the Left
3. Delete Node
4. Display List
5. Exit
Enter your choice: 2
Enter the value to insert: 90
Enter the target value: 30
Node inserted to the left of 30.
```



```
1. Create Doubly Linked List
2. Insert Node to the Left
3. Delete Node
4. Display List
5. Exit
Enter your choice: 4
Doubly Linked List: 90 <-> 30 <-> 70 <-> NULL

1. Create Doubly Linked List
2. Insert Node to the Left
3. Delete Node
4. Display List
5. Exit
Enter your choice: 3
Enter the value to delete: 30
Node with value 30 deleted.

1. Create Doubly Linked List
2. Insert Node to the Left
3. Delete Node
4. Display List
```



```
1. Create Doubly Linked List
2. Insert Node to the Left
3. Delete Node
4. Display List
5. Exit
Enter your choice: 4
Doubly Linked List: 90 <-> 70 <-> NULL

1. Create Doubly Linked List
2. Insert Node to the Left
3. Delete Node
4. Display List
5. Exit
Enter your choice:
^C

...Program finished with exit code 0
Press ENTER to exit console.
```