LAB – 6 PROGRAM-1(WAP to Implement Single Linked List with following operations: Sort the linked list, Reverse the linked list, Concatenation of two linked lists)

SOURCE CODE:

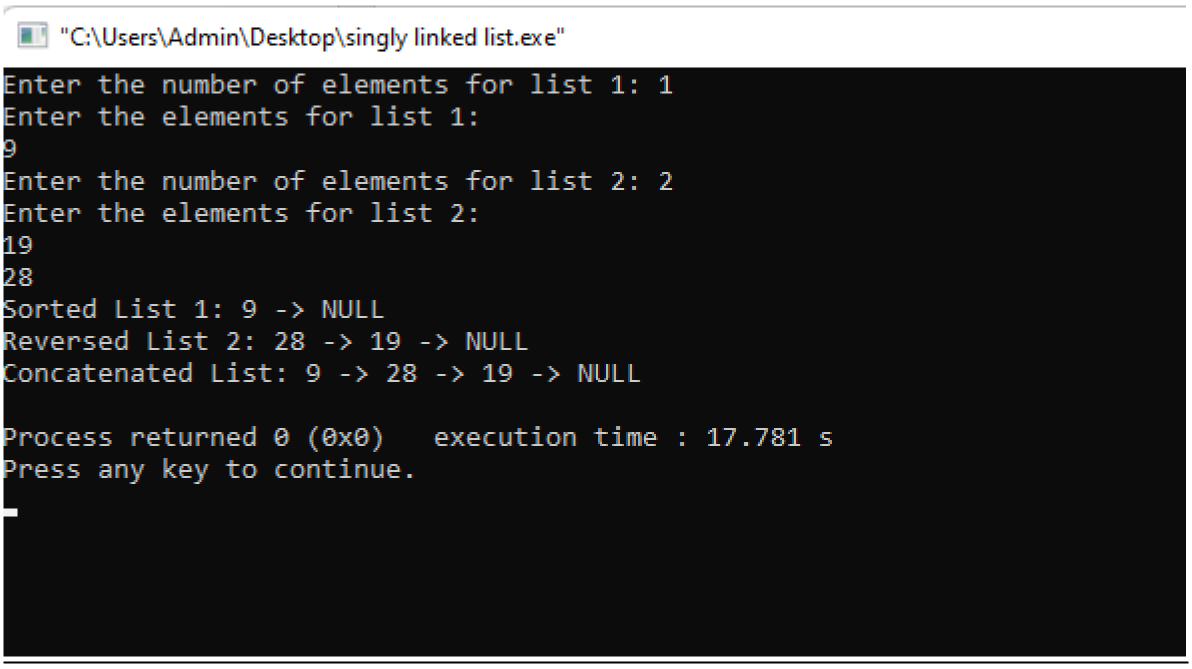
```
#include <stdio.h>

#include <stdlib.h>

struct Node {

   int data;

   struct Node* next;

};

struct Node* createNode(int value) {

   struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));

   newNode->data = value;

   newNode->next = NULL;

   return newNode;

}

void insertEnd(struct Node** head, int value) {

   struct Node* newNode = createNode(value);

   if (*head == NULL) {

      *head = newNode;

   } else {

      struct Node* temp = *head;

      while (temp->next != NULL) {

         temp = temp->next;

      }

      temp->next = newNode;

   }
```

```
}

void display(struct Node* head) {

    struct Node* temp = head;

    while (temp != NULL) {

        printf("%d -> ", temp->data);

        temp = temp->next;

    }

    printf("NULL\n");

}

void sortLinkedList(struct Node* head) {

    int swapped, i;

    struct Node* ptr;

    struct Node* lptr = NULL;

    if (head == NULL)

        return;

    do {

        swapped = 0;

        ptr = head;

        while (ptr->next != lptr) {

            if (ptr->data > ptr->next->data) {

                int temp = ptr->data;

                ptr->data = ptr->next->data;

                ptr->next->data = temp;

                swapped = 1;

            }

            ptr = ptr->next;
        }
        lptr = ptr;
    } while (swapped);
}
struct Node* reverseLinkedList(struct Node* head) {
    struct Node *prev = NULL, *current = head, *next = NULL;
    while (current != NULL) {
        next = current->next;
        current->next = prev;
        prev = current;
        current = next;
    }
    return prev;
}
void concatenateLinkedLists(struct Node** list1, struct Node* list2) {
    if (*list1 == NULL) {
        *list1 = list2;
    } else {
        struct Node* temp = *list1;
        while (temp->next != NULL) {
            temp = temp->next;
        }
        temp->next = list2;
    }
}
int main() {
```

```
struct Node* list1 = NULL;

struct Node* list2 = NULL;

int n, value;

printf("Enter the number of elements for list 1: ");

scanf("%d", &n);

printf("Enter the elements for list 1:\n");

for (int i = 0; i < n; i++) {

    scanf("%d", &value);

    insertEnd(&list1, value);

}

printf("Enter the number of elements for list 2: ");

scanf("%d", &n);

printf("Enter the elements for list 2:\n");

for (int i = 0; i < n; i++) {

    scanf("%d", &value);

    insertEnd(&list2, value);

}

sortLinkedList(list1);

printf("Sorted List 1: ");

display(list1);

list2 = reverseLinkedList(list2);

printf("Reversed List 2: ");

display(list2);

concatenateLinkedLists(&list1, list2);

printf("Concatenated List: ");

display(list1);
```

```
    struct Node* temp;

    while (list1 != NULL) {

        temp = list1;

        list1 = list1->next;

        free(temp);

    }

    return 0;

}
```

OUTPUT:



"C:\Users\Admin\Desktop\singly linked list.exe"

```
Enter the number of elements for list 1: 1
Enter the elements for list 1:
9
Enter the number of elements for list 2: 2
Enter the elements for list 2:
19
28
Sorted List 1: 9 -> NULL
Reversed List 2: 28 -> 19 -> NULL
Concatenated List: 9 -> 28 -> 19 -> NULL

Process returned 0 (0x0)   execution time : 17.781 s
Press any key to continue.
```

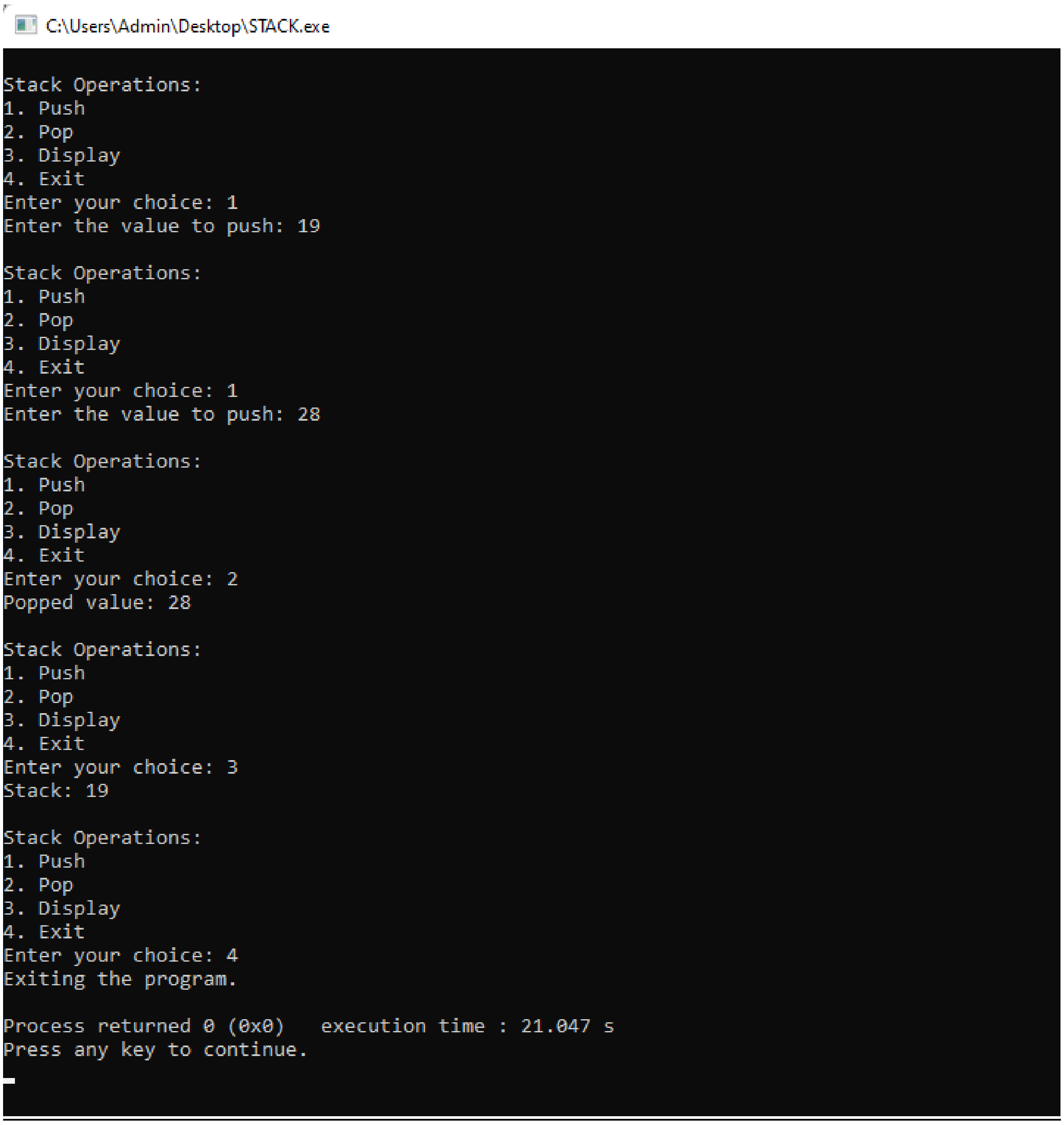
LAB-6 PROGRAM -2 (WAP to Implement Single Linked List to simulate Stack & Queue Operations. [Separate programs: one for Stack and another for Queue Implementation]

SOURCE CODE: #STACK

```
#include <stdio.h>
#include <stdlib.h>
struct Node {
   int data;
   struct Node* next;
};
struct Node* createNode(int value) {
   struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
   newNode->data = value;
   newNode->next = NULL;
   return newNode;
}
void push(struct Node** top, int value) {
   struct Node* newNode = createNode(value);
   newNode->next = *top;
   *top = newNode;
}
int pop(struct Node** top) {
   if (*top == NULL) {
      printf("Stack underflow!\n");
      return -1;
   }
   struct Node* temp = *top;
   int poppedValue = temp->data;
   *top = temp->next;
   free(temp);
   return poppedValue;
}
void displayStack(struct Node* top) {
   printf("Stack: ");
   while (top != NULL) {
      printf("%d ", top->data);
      top = top->next;
   }
   printf("\n");
}
int main() {
   struct Node* top = NULL;
   int choice, value;
   do {
      printf("\nStack Operations:\n");
      printf("1. Push\n");
      printf("2. Pop\n");
      printf("3. Display\n");
      printf("4. Exit\n");
      printf("Enter your choice: ");
```

```
        scanf("%d", &choice);
        switch (choice) {
            case 1:
                printf("Enter the value to push: ");
                scanf("%d", &value);
                push(&top, value);
                break;
            case 2:
                value = pop(&top);
                if (value != -1) {
                    printf("Popped value: %d\n", value);
                }
                break;
            case 3:
                displayStack(top);
                break;
            case 4:
                printf("Exiting the program.\n");
                break;
            default:
                printf("Invalid choice! Please enter a valid option.\n");
        }
    } while (choice != 4);
    struct Node* temp;
    while (top != NULL) {
        temp = top;
        top = top->next;
        free(temp);
    }
    return 0;
}
```

OUTPUT:



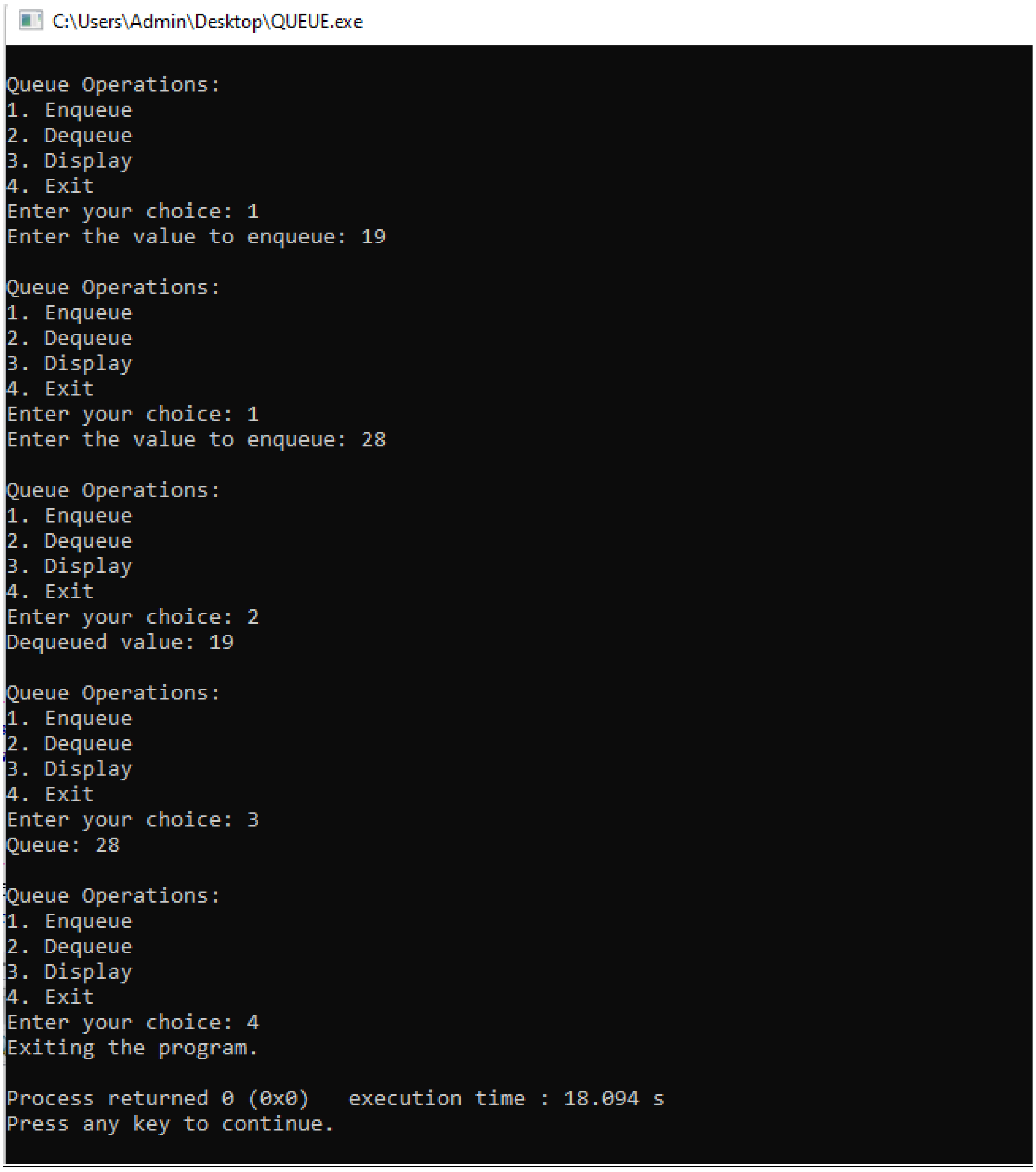
C:\Users\Admin\Desktop\STACK.exe

```

Stack Operations:
1. Push
2. Pop
3. Display
4. Exit
Enter your choice: 1
Enter the value to push: 19

Stack Operations:
1. Push
2. Pop
3. Display
4. Exit
Enter your choice: 1
Enter the value to push: 28

Stack Operations:
1. Push
2. Pop
3. Display
4. Exit
Enter your choice: 2
Popped value: 28

Stack Operations:
1. Push
2. Pop
3. Display
4. Exit
Enter your choice: 3
Stack: 19

Stack Operations:
1. Push
2. Pop
3. Display
4. Exit
Enter your choice: 4
Exiting the program.

Process returned 0 (0x0)   execution time : 21.047 s
Press any key to continue.
```

SOURCE CODE: #QUEUE

```
#include <stdio.h>
#include <stdlib.h>
struct Node {
    int data;
    struct Node* next;
};
struct Queue {
    struct Node* front;
    struct Node* rear;
};
struct Node* createNode(int value) {
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = value;
    newNode->next = NULL;
    return newNode;
}
struct Queue* createQueue() {
    struct Queue* queue = (struct Queue*)malloc(sizeof(struct Queue));
    queue->front = queue->rear = NULL;
    return queue;
}
void enqueue(struct Queue* queue, int value) {
    struct Node* newNode = createNode(value);
    if (queue->rear == NULL) {
        queue->front = queue->rear = newNode;
        return;
    }
    queue->rear->next = newNode;
    queue->rear = newNode;
}
int dequeue(struct Queue* queue) {
    if (queue->front == NULL) {
        printf("Queue underflow!\n");
        return -1;
    }
    struct Node* temp = queue->front;
    int dequeuedValue = temp->data;
    queue->front = temp->next;
    if (queue->front == NULL) {
        queue->rear = NULL;
    }
    free(temp);
    return dequeuedValue;
}
void displayQueue(struct Queue* queue) {
    struct Node* temp = queue->front;
    printf("Queue: ");
    while (temp != NULL) {
        printf("%d ", temp->data);
        temp = temp->next;
    }
    printf("\n");
}
int main() {
    struct Queue* queue = createQueue();
    int choice, value;
    do {
        printf("\nQueue Operations:\n");
        printf("1. Enqueue\n");
        printf("2. Dequeue\n");
        printf("3. Display\n");
        printf("4. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);
        switch (choice) {
            case 1:
                printf("Enter the value to enqueue: ");
                scanf("%d", &value);
                enqueue(queue, value);
                break;
            case 2:
                value = dequeue(queue);
                if (value != -1) {
                    printf("Dequeued value: %d\n", value);
                }
                break;
            case 3:
                displayQueue(queue);
                break;
            case 4:
                printf("Exiting the program.\n");
                break;
            default:
                printf("Invalid choice! Please enter a valid option.\n");
        }
    } while (choice != 4);
    struct Node* temp;
    while (queue->front != NULL) {
        temp = queue->front;
        queue->front = queue->front->next;
        free(temp);
    }
    free(queue);
    return 0;
}
```

OUTPUT:



C:\Users\Admin\Desktop\QUEUE.exe

```
Queue Operations:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter the value to enqueue: 19

Queue Operations:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 1
Enter the value to enqueue: 28

Queue Operations:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 2
Dequeued value: 19

Queue Operations:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 3
Queue: 28

Queue Operations:
1. Enqueue
2. Dequeue
3. Display
4. Exit
Enter your choice: 4
Exiting the program.

Process returned 0 (0x0)   execution time : 18.094 s
Press any key to continue.
```