SEM 3\Exp5\Stack_LL.c

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

// Node structure for the linked list
struct Node
{
    int data;
    struct Node *next;
};

// Stack structure using linked lists
struct StackLinkedList
{
    struct Node *top;
};

// Function to create a stack
struct StackLinkedList *createStack()
{
    struct StackLinkedList *stack = (struct StackLinkedList *)malloc(sizeof(struct StackLinkedList));
    stack->top = NULL; // Initialize the top pointer
    return stack;
}

// Check if the stack is empty
int isEmpty(struct StackLinkedList *stack)
{
    return stack->top == NULL;
}

// Push an element onto the stack
void push(struct StackLinkedList *stack, int value)
{
    struct Node *new_node = (struct Node *)malloc(sizeof(struct Node));
    new_node->data = value;
    new_node->next = stack->top;
    stack->top = new_node;
    printf("%d pushed onto stack\n", value);
}

// Pop an element from the stack
int pop(struct StackLinkedList *stack)
{
    if (isEmpty(stack))
    {
        printf("Stack underflow!\n");
        return -1;
    }
    struct Node *temp = stack->top;
    int popped_value = temp->data;
    stack->top = stack->top->next;
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    free(temp);
    return popped_value;
}

// Peek at the top element of the stack
int peek(struct StackLinkedList *stack)
{
    if (isEmpty(stack))
    {
        printf("Stack is empty!\n");
        return -1;
    }
    return stack->top->data;
}

// Display the stack
void display(struct StackLinkedList *stack)
{
    if (isEmpty(stack))
    {
        printf("Stack is empty!\n");
        return;
    }
    struct Node *temp = stack->top;
    printf("Stack elements: ");
    while (temp != NULL)
    {
        printf("%d ", temp->data);
        temp = temp->next;
    }
    printf("\n");
}

int main()
{
    struct StackLinkedList *stack = createStack();
    int choice, value;

    printf("\nStack Operations (Linked List Implementation):\n");
    printf("1. Push\n");
    printf("2. Pop\n");
    printf("3. Peek\n");
    printf("4. Display\n");
    printf("5. Exit\n");

    while (1)
    {

        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice)
        {
        case 1:
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            printf("Enter the value to push: ");
            scanf("%d", &value);
            push(stack, value);
            printf("\n");
            break;
        case 2:
            value = pop(stack);
            if (value != -1)
                printf("Popped value: %d\n", value);

            printf("\n");
            break;
        case 3:
            value = peek(stack);
            if (value != -1)
                printf("Top value: %d\n", value);

            printf("\n");
            break;
        case 4:
            display(stack);
            printf("\n");
            break;
        case 5:
            // Free linked list nodes (cleanup)
            while (!isEmpty(stack))
            {
                pop(stack);
            }
            free(stack);
            exit(0);
        default:
            printf("Invalid choice!\n");
        }
    }

    return 0;
}

```