

Assignment 2: Data Structure Playground

MS (Data Structure)

Deadline: 14th October 2024

Assignment Description

Create a C++ program that allows users to manipulate linked lists, queues, and stacks. Users should be able to perform common operations like insertion, deletion, traversal, and display for each of these data structures. The program should provide a simple menu-based interface for users to interact with.

Assignment Components

Linked List

1. Create a singly linked list data structure.
2. Implement functions to:
 - Insert elements at the beginning of the list.
 - Delete elements from the list.
 - Search for an element in the list.
 - Display the elements in the list.

Queue

1. Implement a queue data structure using either an array or a linked list.
2. Implement functions to:
 - Enqueue (insert) elements into the queue.
 - Dequeue (remove) elements from the queue.
 - Check if the queue is empty.
 - Display the elements in the queue.

Stack

1. Implement a stack data structure using either an array or a linked list.
2. Implement functions to:
 - Push elements onto the stack.
 - Pop elements from the stack.
 - Check if the stack is empty.
 - Display the elements in the stack.

User Interface

1. Create a menu-based interface that allows users to choose which data structure they want to work with.
2. For each data structure, provide options to perform the available operations (insert, delete, display, etc.).
3. Allow the user to exit the program.

Sample Program Flow

Welcome to the Data Structure Playground!

1. Linked List
2. Queue
3. Stack
4. Exit

Enter your choice: 1

Linked List Menu:

1. Insert element
2. Delete element
3. Search element
4. Display elements
5. Back to main menu

Enter your choice: 1

Enter the element to insert: 42

Element inserted successfully.

Linked List Menu:

1. Insert element
2. Delete element
3. Search element
4. Display elements
5. Back to main menu

Enter your choice: 4

Elements in the linked list: 42

...

Enter your choice: 4

Elements in the linked list: 42, 17, 25

Enter your choice: 5

Welcome to the Data Structure Playground!

1. Linked List
2. Queue
3. Stack
4. Exit

Enter your choice: 2

...