

CS 1203: Data Structures

Semester: Monsoon 2023

Assignment #4

Instructor: Subhamoy Mitra

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Broad topics discussed:

1. **Stack:** We discussed the data structure stack where elements are stacked such that the last element added to the stack is the first one to be removed, i.e. it follows the last in first out principle. Stack mainly works on two functions: push and pop. The function push in stack perform as an insertion function where a new element is pushed onto the stack, again at the top and while popping, again the first element, the top, is popped off the list that is deleted.

Implementation: Stacks in programs manage control flow and local data, including function calls, local variables, and function parameters. When a function is called, a new stack frame is created, storing execution context. his frame is pushed onto the call stack. As functions complete, frames are popped off, returning control to the calling function. Stacks ensure order in function calls and scoped data.

2. **Queue:** Queue is a data structure representing queue in a program where every element is placed in the form of a queue. Similar to a real-life queue, elements that are newly inserted go to the last position the back/rear and this process is called enqueueing while the deleted or the removed elements are the one that are at the top-the front thus called dequeueing.

Implementation:

3. **Linked List:** A linked list is a linear data structure that consists of a sequence of elements, where each element points to the next one. A current element in the linked list links to the element in the next node in this data structure. Each element in a linked list is represented by a node. A node consists of two parts: Data: The actual value or data that the node holds and a reference (or pointer) pointing to the next node in the sequence. Thus, called a linked list. Linked list similar to queue has a front- the head that is the reference to the first node in the linked list. This serves as entry point for accessing the elements in the list. Also, the tail is a reference to the last node in the list.

Moreover, both stacks and queues can be implemented with linked lists to provide a program that has an eased insertion and deletion without overflow and unnecessary memory wastage.