

Homework #2: Stack, Queue, and List

Part 1:

Use the stack implementation with a Simply Linked List discussed in the class to answer this question. Modify the pop functions so that it returns the value of popped node.

Define a new class, StackQueue, which implements the functionalities of the queue data structure using two stacks. All the queue functions will be based on these two stacks. However, the data is not duplicated in the two stacks, so your program should handle moving the data from one stack to another. For example if we call these two stacks input and output. The push function will insert into the input stack, and the pop function will remove the top of the output stack.

Part 2:

Implement a solution to the below problem using doubly linked circular lists and iterators. You can adapt one of the DLL classes discussed in the class to solve this problem. However, you are required to keep only the list functions needed for your solution. Be very careful to define a clean and optimized solution. The classes for the nodes and iterators should be nested within the list class.

The Missionaries and Cannibals Problem: A band of M missionaries is surrounded by a tribe of cannibals. The cannibals, being folks of small appetite, only demand one of them for dinner each day. The missionaries find drawing straws distasteful for people of their learning and sophistication. Instead, they form a circle and pick an integer N out of a hat. Then beginning with the first missionary in circle they start to count from one to N . The direction in which the count proceeds depends on the initial number of missionaries in the circle. If there are an even number of them, the count goes clockwise; otherwise, it goes counter-clockwise. Whenever N is reached, that missionary steps out of the circle and the count re-starts with the next person (note that the direction of the count does not change until the dinner du jour is decided). This process repeats until only one missionary is left in the "circle", who is the unfortunate one.

For example, say that you have four missionaries A, B, C and D forming a circle clockwise in that order: On the first day, they pick 3. There are four of them so the count goes clockwise for the day. C is the first person out of the circle, B is the second and D is the third; A is consumed. On the second day, the new circle is C, B, D, and the count goes counter-clockwise. They pick 6. B is the first one out and D the second; C is consumed. On the third day, the new circle is B, D. They pick 1. B is the first one out and D is eaten. On the last day, B is consumed. So the order in which they are consumed is A, C, D, B.

How to submit: Comment and organize your program as a project and upload it on the submission system. Your submission should include the following files (SLinkedList.h, SLinkedList.cpp, StackQueue.h, StackQueue.cpp, part1Driver.cpp, DLCirList.h, DLCirList.cpp, part2Driver.cpp). Email attached submissions will not be considered.

Deadline: Check the deadline date on the NYU new classes system.