

Project 1 Report

For project 1, I created 2 classes: an MTFList class and an orderedList class which both store a series of integers. The MTFList utilizes a simple, singly linked list as its foundation because of the constant time of adding to the front. The only member variables are the Node head and the integer count. The methods include a default constructor, a deconstructor, an add function, a search function, a getCount function, and a print function. The add function adds new integers to the front of the list. The search function linearly searches for an item and if found it is removed, added to the front, and the function returns true. It also updates the count variable for each item searched. The getCount function returns the total count, and the print function prints the contents of the list.

The orderedList class is very similar to the MTFList, except that it uses an array instead of a linked list because of the constant time adding to the back and ease of implementing binary search. The member variables include a `unique_ptr<int []>`, which is set to `nullptr`, `int current`, which stores the next open address in the array (when the array is full, it is the size of the array), and `int count`, which tracks the traversals. I employed 2 constructors, a default and one that inputs the size. The add function pushes the value to the back and updates `current` by 1. The search function employs binary search, as it is an ordered list, and returns true if the value is found. The getCount function and print function do the same thing.

My main.cpp tests both the MTFList and orderedList classes. I first obtain the amount of values to be inputted into my lists before constructing the MTFList and then the orderedList set to said amount. After adding the values to each list, I created an array that stored all the queries. Finally, I timed how long it took each list to search through the array of queries and outputted that information along with the traversal counts.

	poisson_small	poisson	poisson_very_large	uniform_small	uniform	uniform_verylarge
MTFList count	71,119	906,024	12,889,462	509,792	19,986,159	595,328,179
MTFList time	593,957	3,311,165	50,178,572	1,902,465	96,458,473	2,949,034,974
orderedList count	57,333	109,711	3,291,330	57,818	109,889	3,296,670
orderedList time	2,197,095	4,161,165	119,819,096	2,234,055	4,594,551	124,747,751