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CSS 501 B

Program 1 Write Up

LinkedListStats.cpp output

LinkedList - Average number of nodes traversed per access (uniform): 500.778

MTFList - Average number of nodes traversed per access (uniform): 498.903

LinkedList - Average number of nodes traversed per access (normal): 500.791

MTFList - Average number of nodes traversed per access (normal): 388.467

The LinkedList class is a vanilla implementation of a singly linked list that will sequentially search for integer values specified in the contains method. MTFList, a subclass of LinkedList, which overrides the contains method to implement a move-to-front strategy. Specifically, MTFList sequentially searches for the integer value specified in the override method, but then shifts the Node (if found) to the front of the MTFList. This implementation may provide a more efficient approach for searching for integers that have an asymmetric prevalence. In this program, LinkedListStats will assess the average number of Nodes traversed as a measure of efficiency for uniformly and normally distributed integer values to assess and contrast the searching efficiency of LinkedList and MTFList.

As demonstrated above in the output of LinkedListStats, there is a marginal difference between the average number of Nodes traversed in the vanilla and move-to-front linked list implementation strategies when iteratively searching for uniformly distributed integers. The reason being is that each integer value has an equal likeliness of showing up, thus a given integer value will not be searched for at a much higher frequency than other integers. Searching for uniformly distributed integers mitigates the effectiveness of the “move-to-front” strategy since there is no need to move found Nodes if each integer has a nearly equal chance of being searched for. In contrast, the move-to-front strategy had a much lower average number of Node traversals as compared to LinkedList when sequentially searching for normally distributed integer values. This aligns with our expectations that the mote-to-front strategy will be more efficient since normally distributed values will have an asymmetry regarding frequency of each integer, thus less Node traversals will occur when we search for a repeated integer value. Lastly, the average number of Nodes traversed were nearly equal for both normally and uniformly distributed integers in the vanilla linked list implementation. This is expected since LinkedList only sequentially searches for integers a without modifying the structure of the singly linked list.