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CTIS 310

List Implementation Analysis and Table

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| --- | --- | --- | --- | --- | --- | --- |
| **Lists:** (10,000 Elements) | **ArrayList** |  |  | **LinkedList** |  |  |
| add(); | 19 ms | 21 ms | 19 ms | 8 ms | 8 ms | 10 ms |
| Collectons.sort(); | 15 ms | 22 ms | 22 ms | 15 ms | 10 ms | 17 ms |
| Collections.shuffle(); | 5 ms | 8 ms | 4 ms | 14 ms | 7 ms | 10 ms |
| Random get(); | 50 ms | 75 ms | 44 ms | 28,749 ms | 36,332 ms | 27,507 ms |
| Sequential get(); | 1 ms | 8 ms | 1 ms | 246 ms | 336 ms | 270 ms |

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| --- | --- | --- | --- | --- | --- | --- |
| **Lists:** (100,000 Elements) | **ArrayList** |  |  | **LinkedList** |  |  |
| add(); | 50 ms | 57 ms | 56 ms | 42 ms | 46 ms | 37 ms |
| Collectons.sort(); | 79 ms | 49 ms | 48 ms | 57 ms | 71 ms | 82 ms |
| Collections.shuffle(); | 24 ms | 28 ms | 26 ms | 34 ms | 40 ms | 43 ms |
| Random get(); | 47 ms | 43 ms | 44 ms |  |  |  |
| Sequential get(); | 8 ms | 3 ms | 5 ms |  |  |  |

Analysis:

It takes the ArrayList longer to add n number of elements to the list compared to the LinkedList, roughly 10 ms slower than the LinkedList. It is most likely due to the ArrayList having to be created again and again for every new element that is added, whereas the LinkedList can just add a new element and have the tail point to the new element in memory instead of null.

This is the same for the sort method, as it takes the LinkedList a shorted amount of time to sort the Dog object by first name.

For the shuffle method, however, it takes the ArrayList a shorter amount of time. It takes the ArrayList 8-4 ms quicker, which could be because it is easier for the sort method to access the elements in the array, as they are right next to each other in memory and with the LinkedList, the elements are scattered throughout memory.

The get() methods:

The random get method is much much much more efficient with the ArrayList, as the elements of the ArrayList are contiguous in memory and are much easier to access. This analysis applies to both the sequential get and random get methods. The cells for the LinkedList are blacked out for the 100,000 element list because I was waiting for around 15 minutes and still did not get a response from the console or finished running at all. I imagine the result would be much larger than the result from the 10,000 element list and it is much more efficient and faster to access the elements from the ArrayList.