Add Time (nanoseconds)- LinkedList

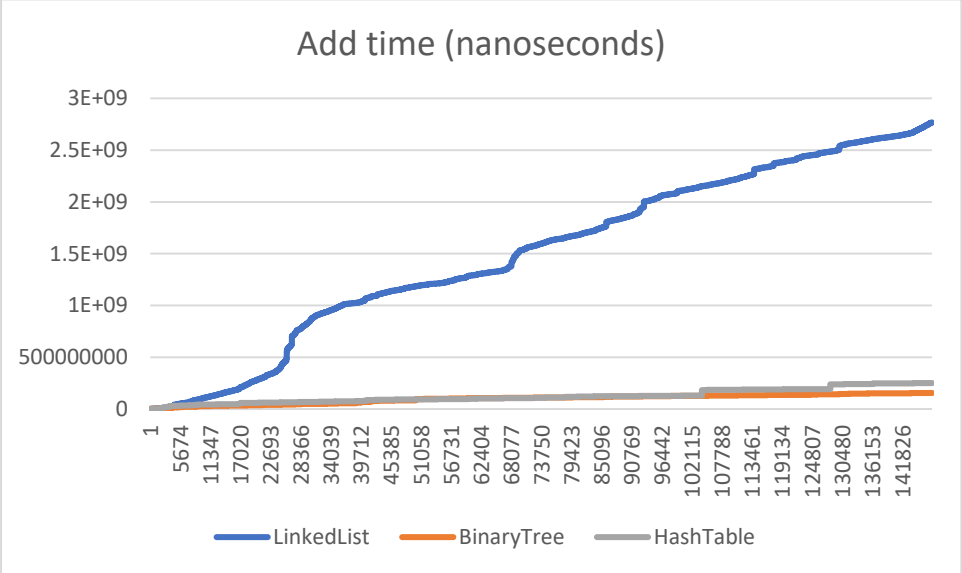
	1	2	3	4	5	6	7	8	9	10
Average	7067.516	8270.909	7651.558	9865.143	5823.85	9260.352	7799.214	7138.541	8902.009	9162.202
Standard Deviation	53366.98	99337.1	63501.65	102096.4	23831.04	158679.3	53564.49	58760.83	63839.11	105627.8

Add Time (nanoseconds)- Binary Tree

	1	2	3	4	5	6	7	8	9	10
Average	1568.87	2422.219	2836.838	5840.448	2227.461	1624.068	4613.323	1499.228	1438.891	3051.034
Standard Deviation	25971.69	53432.45	80978.96	257842.3	74295.91	23922.92	271721.7	18422.76	15174.33	91846.6

Add Time (nanoseconds)- Hash Table

	1	2	3	4	5	6	7	8	9	10
Average	1950.597	1854.761	12522.18	1133.197	2655.941	1266.715	1855.97	3124.796	1684.988	4880.722
Standard Deviation	44467.58	21784.68	934333.3	6450.813	87887.36	7393.7	47814.61	153819.4	16972.1	140388.4



Search Time (nanoseconds)- LinkedList

	1	2	3	4	5	6	7	8	9	10
Average	28058.4	30443.74	25135.98	26166.23	28074.11	27402.66	27514.71	31857.24	29128.89	42012.32
Standard Deviation	43137.18	89832.56	25365.67	23431.56	43745.18	31161.17	30393.23	387623.2	97390.32	309956.3

For linked list, **the worst case:** 11414800 nanoseconds; **the best case:** 100 nanoseconds; **the average of all words:** 8094.129295 nanoseconds

Search Time (nanoseconds)- Binary Tree

	1	2	3	4	5	6	7	8	9	10
Average	826.9365	939.9097	833.5178	892.152	805.2854	1523.5	1193.244	1265.492	2127.577	1675.131
Standard Deviation	1126.938	1872.902	1376.115	2644.984	1005.308	28187.35	5764.073	7728.764	54256.88	47759.5

For binary tree, **the worst case:** 22461600 nanoseconds; **the best case:** 100 nanoseconds; **the average of all words:** 2712.237915 nanoseconds

Search Time (nanoseconds)- Hash Table

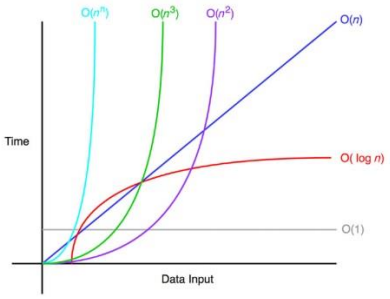
	1	2	3	4	5	6	7	8	9	10
Average	1327.548	1143.856	918.3605	728.0577	671.8113	857.0909	883.3722	910.6144	610.5271	836.721
Standard Deviation	31728.96	11321.42	4870.352	2439.019	1725.213	3613.839	4697.412	5474.516	1119.947	1338.499

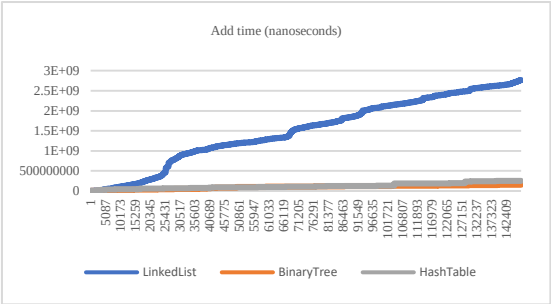
For hash table, **the worst case:** 126105500 nanoseconds; **the best case:** 100 nanoseconds; **the average of all words:** 3292.986313

2.

There are 147485 words for add method with no repetitions.

At first, I expect the complexity of linkedlist is O(n), of binary tree is O(logn), of hash table is O(1).





After experiments, to Compare to the two pictures above, from https://dev.to/b0nbon1/understanding-big-o-notation-with-javascript-25mc, the complexity of linked list seems like O(n), that of binary tree seems like O(log n), and that of hash table seems like O(log n).

It was what I expected except for the complexity of hash table. If I chose the improper hash function, then many hash nodes may occur collision and may increase the runtime performance.