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SKIPLIST PERFORMANCE SUMMARY

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TEST DESCRIPTION

The skiplist data structure creates a key-value dictionary utilizing multiple linked lists with pointers that can quickly navigate through the keys. A skiplists can be an efficient algorithm for searching, inserting, and deleting elements in a dictionary. Using the Python programming language, we constructed a basic skiplist and then tested various operations 1,000 times on randomly-generated entries to evaluate the average run time for each. We repeated the tests for half-filled dictionaries of increasing size.

RESULTS TABLE

Average Run Time of Each Operation by Dictionary Size in Milliseconds

(milliseconds)	10,000	50,000	100,000	500,000	1,000,000	5,000,000
findElement	0.000	0.000	0.000	0.000	0.000	0.000
insertElement	0.000	0.000	0.000	0.000	0.000	0.000
removeElement	0.000	0.000	0.000	0.000	0.000	0.000
closestKeyAfter	0.000	0.000	0.000	0.000	0.000	0.000
closestKeyBefore	0.000	0.000	0.000	0.000	0.000	0.000

RESULTS GRAPHS

Graph of Average Run Times by Dictionary Size Compared to Log(n) Curve

CONCLUSION

The time complexity of skiplist's basic operations were comparable to the expected O(log n). These tests showed that a skiplist can be an efficient data structure for dictionary search, insertion, and deletion operations.