N-Way Splay Tree Delete Complexity Proof

Shyamal Suhana Chandra

1 Theorem: N-Way Splay Tree Delete Complexity

Statement: Deleting from an N-way splay tree with n nodes takes $O(\log n)$ amortized time.

2 Proof

1. Splay node to root: $O(\log n)$ amortized
2. Delete root: $O(1)$
3. If needed, splay successor/predecessor: $O(\log n)$ amortized
4. Total: $O(\log n)$ amortized

Conclusion: N-way splay tree delete has $O(\log n)$ amortized time complexity.