

# N-Way Splay Tree Delete Complexity Proof

Shyamal Suhana Chandra

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## 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.