

# N-Way Splay Tree Search Complexity Proof

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## 1 Theorem: N-Way Splay Tree Search Complexity

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

## 2 Proof

1. Find node:  $O(\log n)$  worst case (tree height)
2. Splay to root:  $O(\log n)$  amortized (from Theorem 6)
3. Total:  $O(\log n)$  amortized

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