

BEST CASE, WORST CASE AND AVERAGE CASE ANALYSIS

1) Algorithm

→ array → sorted order

arr = [1, 5, 7, 9, 11]



1) Best case Analysis

key = 1

k = 1 → 1 comparison

$$TC = O(1) \checkmark$$

2) Worst case (sabse kharab hoga)

key = 11

key = 15

n = comparisons n*

$$TC = O(n)$$



n = 5

3) Average

$$Avg = \left(\frac{\sum \text{all possible numbers}}{\text{Total no. of possibilities}} \right)$$

1 | 5 | 7 | 9 | 11

$$\Rightarrow \left(\frac{k + 2k + 3k + \dots + nk + nk}{n+1} \right)$$

$$= \frac{k(1+2+3+\dots+n) + n}{n+1}$$

$$= \frac{\frac{kn(n+1)}{2} + n}{n+1}$$

$$\Rightarrow \frac{kn(n+1) + 2n}{2(n+1)}$$

$$\Rightarrow \frac{kn + 2n}{2}$$

$$\Rightarrow n + n \Rightarrow 2n \Rightarrow n$$

$$\Rightarrow O(n)$$

✓ Average = $\frac{\text{Total comparisons}}{\text{Total input}}$

2) Algorithm 2 //

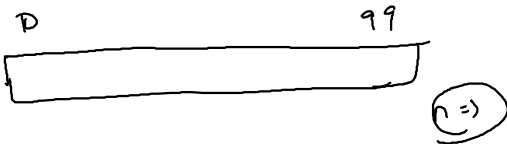
arr = {1, 5, 7, 9, 11} \Rightarrow sorted

key = 7 ✓

Best $\Rightarrow O(1)$

Worst \Rightarrow

k = 5



1 - 10.0 ✓

1 - 5.0 ✓

$\log n$ 1 - 2.5 ✓

1 - 1.2 ✓ $\neq n$

1 - 0.6 ✓

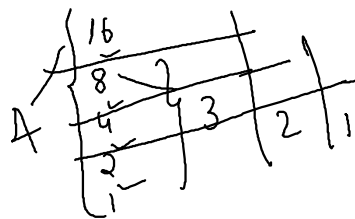
1 - 0.3 ✓

1 - 0.1 ✓

$\log n$

$$\log_2 16 = 4$$

$$\log_8 = 3$$



\log

$$O(\log n)$$

$$n=5$$

$$\frac{5^2}{2} = 12.5$$

