DAA Lab - Week-01 Solutions

Notes By - Deepak Uniyal
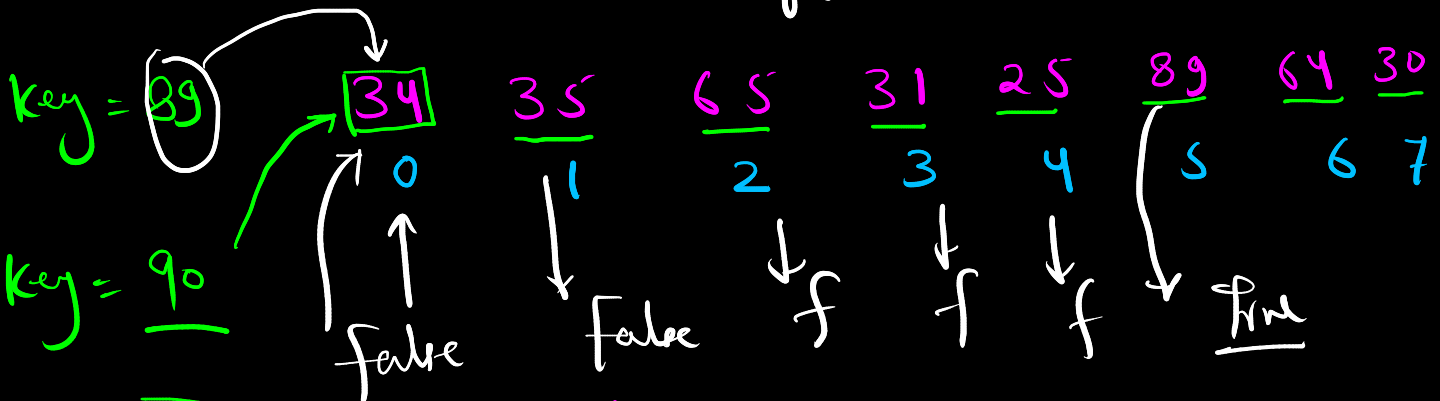
① Week-0 → Set up of Git & GitHub

     Take inputs from a file

     Store/Save o/p to a file

② Week-1 — Linear, Binary, Jump, Exponential
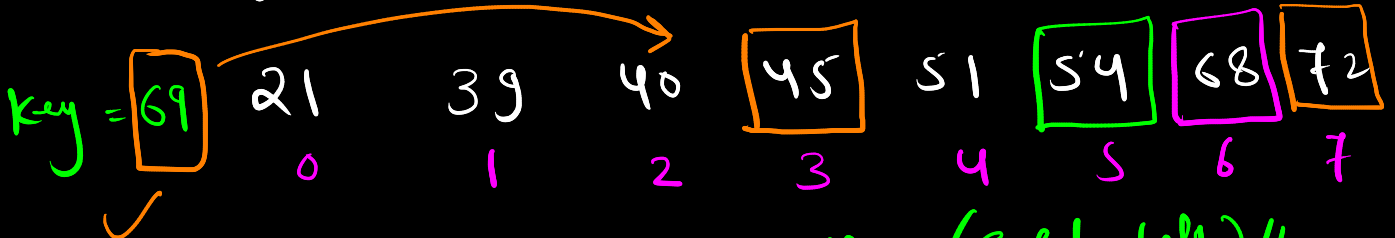
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① Linear Search —

Array [0] == key

key = 39

34	35	65	31	25	89	64	30
0	1	2	3	4	5	6	7

key = 90

false   False   f   f   f   Find

Time — $O(n)$

Present, 6 Comparisons

Space — $O(1)$

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② Binary Search

False   false   false   false

key = 69

21	39	40	45	51	54	68	72
0	1	2	3	4	5	6	7

(Iterative)

left = 0
Right = 7

$mid = left + (Right - left)/2$

$mid = 0 + 3 = 3$

left = 4
Right = 7

$mid = 4 + 3/2 = 5$ ✓

Time ↓
$O(\log n)$

left = 6
Right = 7
mid = $6 + \frac{(7-6)}{2}$ = $\underline{6}$

$O(1)$ ↓
Space

left = 7
Right = 7
mid = $7 + 0 = 7$

left = $\underline{8}$
Right = 7 } $\underline{false}$ ✓

Return -1

* Recursive Binary Search
Time - $O(\log n)$
. Space - $O(\log n)$ → Recursion (due to)

mid = left + (Right - left)//2

[* other ways of calculating mid?
→ why this is a better way?

* Jump Search-

key:69

n=8

C1 ✓   ✓C2 ✓C3   ✓C4   C3|C5|C6

21   39   40   45   51   59   68   72
0   1   2   3   4   5   6   7

4

jump = $\sqrt{8}$ = 2.828
steps = 2.828
prev = 0

int(min(steps, n) - 1) = 1.828
            ↓   ↓
          2.828   8

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$prev = \boxed{2.828}$

$steps = steps + jump = 5.65$

$int(min(5.65, 8) - 1)$

$\boxed{4.65}$

$prev = 5.65$

$steps = 8.48$

$int(roun(8.48, 8) - 1)$

$\boxed{7}$

$prev = 6.65$

$prev = 7.65$

Exponetial Search —

$n = 5$

key = 41

12	23	36
0	1	2

C_1 C_2 C_3

39
3

41
4

C_4

C_5 ✓

$i = 0$ $i = 1$ $i = 2$

$i = 4$ $\underline{i = 8}$

$\boxed{5}$ ✓

$i = 8/2 = \boxed{4}$

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