COURSE NAME: ALGORITHMS
COURSE CODE: CIS 212

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LINEAR SEARCH

- Linear Search or Sequential Search.
- Worst Case TC: O(n)
- Best Case TC: O(1)
- Average Case TC: (n+1/2)
- Explanation of Average Case: 1+2+3+…….+n = n*(n+1)/2*n = (n+1)/2
- Worst Case TC in Iterative: O(1) (when elements in the first or last position)
- Space Complexity: O(1)

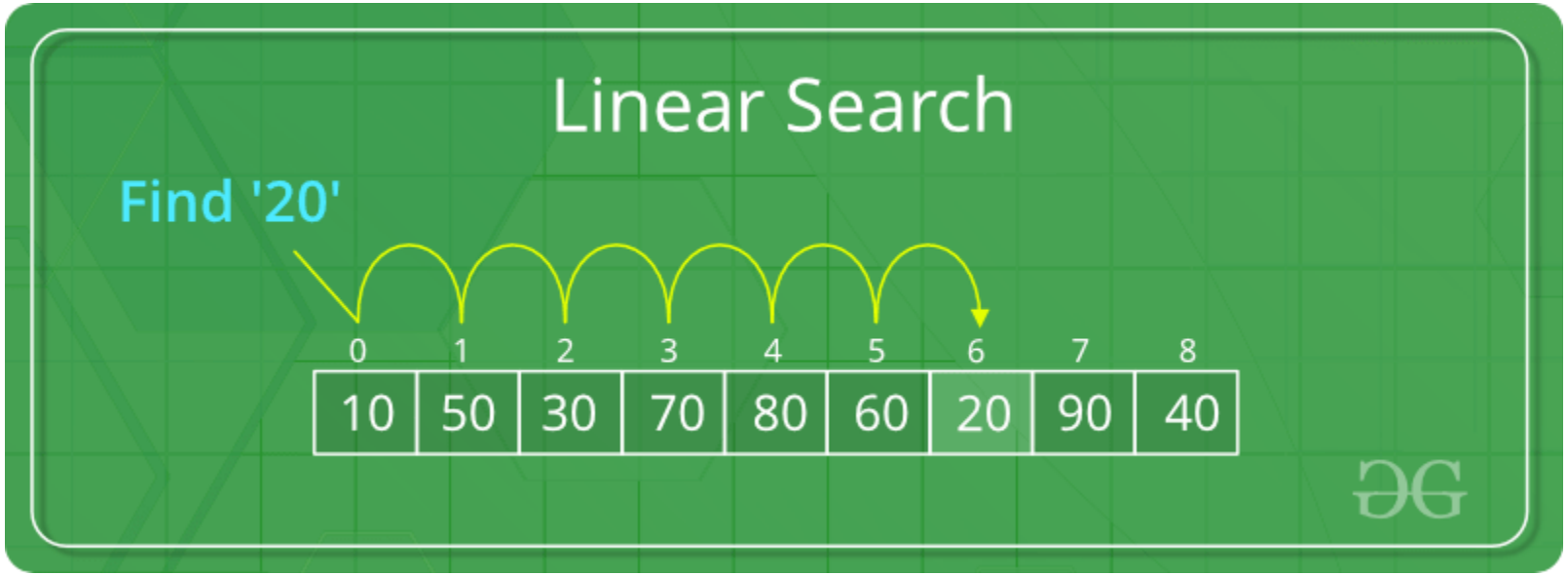
Advantages & Disadvantages

- **Advantages:**
- Perform faster in small and medium size array
- The array does not need to be sorted
- Not affected by insertions and deletions.

- **Disadvantages:**
- Slow searching in large arrays

LINEAR SEARCH

- Start from the leftmost element of arr[] and one by one compare x with each element of arr[]
- If x matches with an element, return the index.
- If x doesn't match with any of elements, return -1



BINARY SEARCH

- Binary Search, half-interval search, logarithmic search, binary chop
- Worst Case TC: O(log n)
- Best Case TC: O(1)
- Average Case TC: (log n)
- Space Complexity: O(1)

BINARY SEARCH

- **Worst Case TC explanation:**
- Iteration-1: length of array=n
- Iteration-2: length of array=n/2
- Iteration-3: length of array=n/2^2
- Iteration-k: length of array=n/2^k
- After k iterations, the length of array becomes 1, so
- Length of array: n/2^k=1
- n=2^k
- Log2(n)=log2 (2^k)
- Log2(n)=k log2 (2) //loga(a)=1
- K=log2(n)

BINARY SEARCH

- Compare x with the middle element.
- If x matches with the middle element, we return the mid index.
- Else If x is greater than the mid element, then x can only lie in the right half subarray after the mid element. So we recur for the right half.
- Else (x is smaller) recur for the left half.