**SEARCHING**

# Linear search

## Overview

Linear search (or sequential search) is a method to find a target value within a list. It sequentially checks each element until a match is found or all elements are searched.

## How It Works

* Start at the beginning of the list.
* Check each item one by one.
* Stop when the target is found or the entire list is checked.

## Time Complexibility

* Best Case: O(1) The target is the first element.
* Worst Case: O(n) The target is the last element or doesn’t exist.

# Binary Search

## Overview

Binary search is an efficient method to find a target in a sorted list. Instead of checking each element sequentially, it repeatedly divides the list in half, discarding the irrelevant portion, until the target is found or the list is exhausted.

**Prerequisite:** The list must be sorted.

## How It Works:

- Start at the middle of the list.

- Compare the target with the middle element:

* If the target is equal to the middle element, return it.
* If the target is smaller, discard the right half and search the left.
* If the target is larger, discard the left half and search the right.

- Repeat until the target is found or the list is empty.

## Time Complexibility

* Best Case: O(1) if the target is at the middle initially.
* Worst Case: O(n) each step reduces the search space by half.