Exercise 4: Employee Management System

# 1. Understand Array Representation

Arrays are a collection of elements stored at contiguous memory locations. Each element is accessed by its index, starting from 0. Arrays allow constant-time access (O(1)) to elements due to their indexed structure.

Advantages of Arrays:

* Fast access using index (O(1))
* Simple and easy to implement
* Useful when the number of elements is fixed and known in advance

# 4. Analysis

## Time Complexity of Operations:

* Add (at end): O(1) if space is available, O(n) if resizing is needed
* Search: O(n) in unsorted array, O(log n) in sorted array using binary search
* Traverse: O(n), as we visit each element
* Delete: O(n), since elements may need to be shifted

## Limitations of Arrays:

* Fixed Size: Once declared, the size of an array cannot be changed.
* Inefficient Insertions/Deletions: Especially in the middle, as elements need to be shifted.
* Wasted Memory: Pre-allocating large arrays may lead to unused memory.

## When to Use Arrays:

* When quick access using index is required
* When the number of elements is known and fixed
* For implementing low-level data structures like stacks and queues