**Exercise 4: Employee Management System**

**Scenario:**

You are developing an employee management system for a company. Efficiently managing employee records is crucial.

**Array Representation in Memory:**

* Arrays are stored in contiguous memory locations.
* Each element is placed directly after the previous one, allowing for fast access using indices.

**Advantages:**

* **Fast Access:** Direct access to any element using its index in constant time (O(1)).
* **Simple Implementation:** Easy to implement and understand.
* **Low Overhead:** Minimal memory overhead compared to more complex data structures.

**Time Complexity Analysis**

**Add:**

* **Time Complexity:** O(1) (constant time), as it adds the element at the end if there's space.

**Search:**

* **Time Complexity:** O(n) (linear time), as it may need to check each element to find a match.

**Traverse:**

* **Time Complexity:** O(n) (linear time), as it visits each element once.

**Delete:**

* **Time Complexity:** O(n) (linear time), as it may need to search for the element and then shift the remaining elements.

**Limitations of Arrays**

* **Fixed Size:** Cannot change size once initialized, which can lead to wasted space or the need for resizing.
* **Insertion/Deletion Complexity:** Inserting or deleting elements can be inefficient as it may require shifting elements.

**When to Use Arrays**

* **Predictable Size:** When the number of elements is known and constant.
* **Simple Use Case:** For straightforward data storage where dynamic resizing is not required.