**Exercise 4: Employee Management System**

Understand Array Representation

How Arrays Are Represented:

* Arrays are contiguous blocks of memory where elements are stored one after another.
* Each element can be accessed using its index in constant time (O(1)).

Advantages:

* Fast random access.
* Simple structure and low overhead.

Limitations:

* Fixed size: You must know or define the size at creation.
* Expensive insertions/deletions in the middle due to shifting.

**Analysis of Operations**

| **Operation** | **Time Complexity** | **Notes** |
| --- | --- | --- |
| Add | O(1) | At end; constant time unless full |
| Search | O(n) | Linear scan |
| Traverse | O(n) | Print each one |
| Delete | O(n) | Shift all elements after the deleted one |

**Better Alternatives for Large or Dynamic Systems**

| **Data Structure** | **When to Use** |
| --- | --- |
| ArrayList | If size changes often |
| HashMap | For fast lookups by ID |
| LinkedList | For frequent insertions/deletions |