Employee Management System using Arrays

# 1. Introduction

This document describes the design and analysis of an Employee Management System using arrays. The system allows adding, searching, traversing, and deleting employee records efficiently.

# 2. Array Representation in Memory

Arrays in memory are stored contiguously, meaning each element is located next to the other. This allows for constant-time access using index positions (O(1)). However, arrays have a fixed size and are not suitable for dynamic data unless resized manually.

# 3. System Implementation

The system includes the following key operations:  
- Add an employee (O(1))  
- Search for an employee by ID (O(n))  
- Traverse all employees (O(n))  
- Delete an employee by ID (O(n))

# 4. Time Complexity Analysis

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| --- | --- | --- |
| Operation | Time Complexity | Remarks |
| Add Employee | O(1) | Directly added to the next index |
| Search Employee | O(n) | Linear search required |
| Traverse Employees | O(n) | Loop through array |
| Delete Employee | O(n) | Shift elements after deletion |

# 5. Limitations of Arrays

- Fixed size: Needs to be defined at declaration.  
- Insertion and deletion can be costly.  
- No built-in dynamic resizing.  
- Use List<T> or other data structures for better flexibility in real-world applications.