# **Exercise 4: Employee Management System**

## **Understand Array Representation:**

### **Explain how arrays are represented in memory and their advantages.**

Arrays are represented in memory as contiguous blocks of memory locations. Each element in the array occupies a fixed-size memory slot, and the entire array is laid out sequentially. The memory address of any element can be computed using the base address of the array and the index of the element, leveraging the formula:

Address(i)=Base Address+ i × Size of Each Element

Advantages of Arrays:

1. Efficient Access:
   * Constant Time Access: Elements can be accessed in O(1) time using their index due to direct computation of memory addresses.
2. Memory Efficiency:
   * Low Overhead: Arrays have minimal overhead since they do not store additional metadata for each element.
3. Cache Friendly:
   * Spatial Locality: Contiguous memory allocation improves cache performance, as accessing sequential elements tends to load them into the cache efficiently.
4. Predictable Performance:
   * Fixed Size: The size of the array is known at compile time (for static arrays) or allocation time (for dynamic arrays), making performance predictable.
5. Simple Implementation:
   * Ease of Use: Arrays are straightforward to implement and use, providing a fundamental data structure for various algorithms and applications.