

Data Structures and Algorithms

Exercise 4:

Employee Management System

This project implements an Employee Management System using Java and arrays to store employee records. It demonstrates how to efficiently add, search, traverse, and delete employee data using array-based operations. Here's a detailed explanation:

Step 1: Understand Array Representation

- Arrays are stored in contiguous memory blocks.
 - **Advantages:** Fast index access $O(1)$, predictable memory.
 - **Limitations:** Fixed size, costly insertions/deletions.
-

Step 2: Setup

- *Employee* class includes *employeeId*, *name*, *position*, and *salary*.
-

Step 3: Implementation

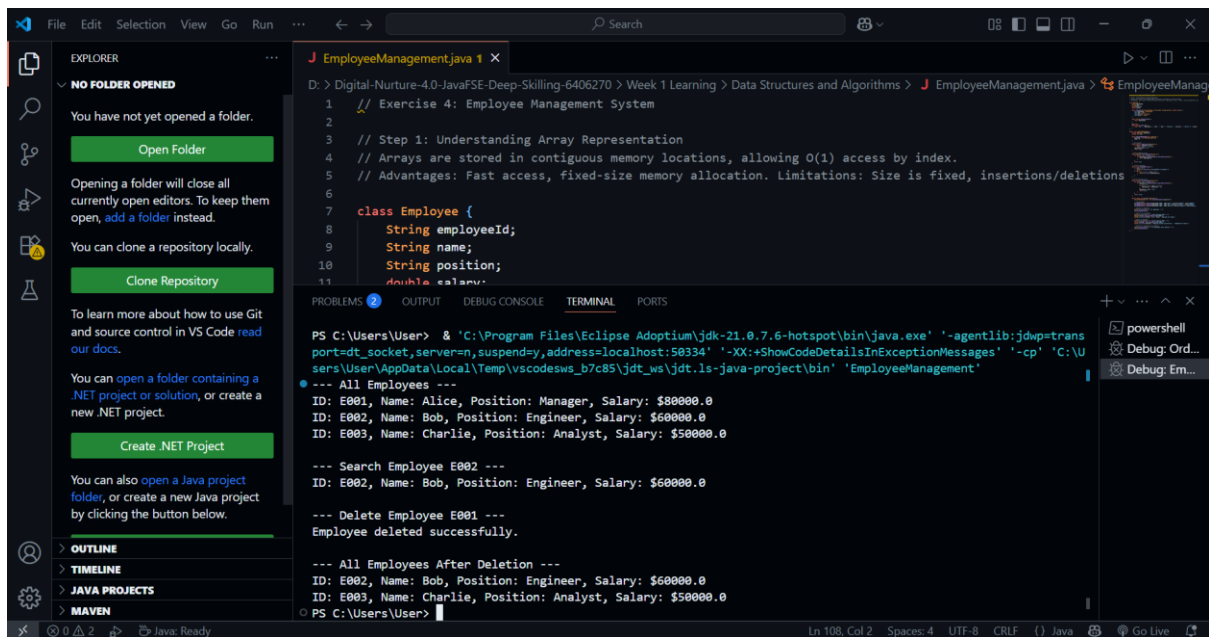
- Use a fixed-size array.
 - Methods implemented:
 - *addEmployee()*
 - *searchEmployee()*
 - *displayEmployees()*
 - *deleteEmployee()* (with left shift)
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Step 4: Analysis

Operation	Time Complexity
Add	$O(1)$ (if space)
Search	$O(n)$
Traverse	$O(n)$
Delete	$O(n)$ (due to shift)

- **Arrays** are suitable for fixed-size data where fast access is needed.

Output



The screenshot shows the Visual Studio Code interface. The Explorer panel on the left indicates 'NO FOLDER OPENED'. The main editor displays the file 'EmployeeManagement.java' with the following content:

```
1 // Exercise 4: Employee Management System
2
3 // Step 1: Understanding Array Representation
4 // Arrays are stored in contiguous memory locations, allowing O(1) access by index.
5 // Advantages: Fast access, fixed-size memory allocation. Limitations: Size is fixed, insertions/deletions
6
7 class Employee {
8     String employeeId;
9     String name;
10    String position;
11    double salary;
```

The TERMINAL panel at the bottom shows the execution of the program:

```
PS C:\Users\User> & 'C:\Program Files\Eclipse Adoptium\jdk-21.0.7.6-hotspot\bin\java.exe' '-agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:50334' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\User\AppData\Local\Temp\vscodesws_b7c85\jdt_ws\jdt.ls-java-project\bin' 'EmployeeManagement'

--- All Employees ---
ID: E001, Name: Alice, Position: Manager, Salary: $80000.0
ID: E002, Name: Bob, Position: Engineer, Salary: $60000.0
ID: E003, Name: Charlie, Position: Analyst, Salary: $50000.0

--- Search Employee E002 ---
ID: E002, Name: Bob, Position: Engineer, Salary: $60000.0

--- Delete Employee E001 ---
Employee deleted successfully.

--- All Employees After Deletion ---
ID: E002, Name: Bob, Position: Engineer, Salary: $60000.0
ID: E003, Name: Charlie, Position: Analyst, Salary: $50000.0
PS C:\Users\User>
```