Data Structures and Algorithms

Exercise 1:

Inventory Management System

This project implements an efficient Inventory Management System using Java. It focuses on fast data operations using *HashMap* to manage large inventories effectively. Here's a detailed explanation:

Step 1: Understanding

- **Why DS & Algorithms?** For large inventories, efficiency in searching, updating, and managing products is crucial. *HashMap* offers average *O(1)* time complexity for these.
- **Chosen Data Structure:** *HashMap<String, Product>* where the key is *productId*.

Step 2: Setup

- All functionality is encapsulated in the *InventoryApp.java* file.

Step 3: Implementation

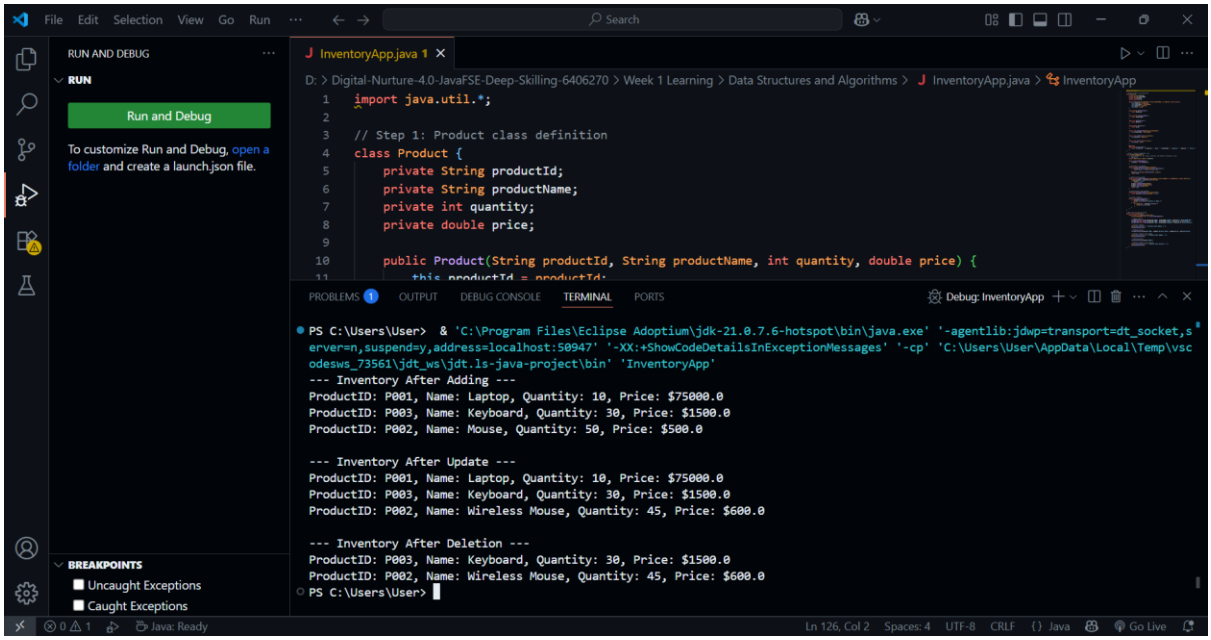
- *Product* class with attributes and proper getters/setters.
- *InventoryManagement* class handles core operations.
- *main()* method demonstrates adding, updating, and deleting products.

Step 4: Time Complexity Analysis

Operation	Data Structure	Time Complexity
Add	HashMap	O(1) average
Update	HashMap	O(1) average
Delete	HashMap	O(1) average
Display All	HashMap	O(n)

- Optimized via constant-time map operations and clean, modular code structure.

Output


File Edit Selection View Go Run
Search
RUN AND DEBUG
RUN
Run and Debug
To customize Run and Debug, open a folder and create a launch.json file.
BREAKPOINTS
Uncaught Exceptions
Caught Exceptions
InventoryApp.java 1
D: > Digital-Nurture-4.0-JavaFSE-Deep-Skilling-6406270 > Week 1 Learning > Data Structures and Algorithms > InventoryApp.java > InventoryApp
1 import java.util.*;
2
3 // Step 1: Product class definition
4 class Product {
5 private String productId;
6 private String productName;
7 private int quantity;
8 private double price;
9
10 public Product(String productId, String productName, int quantity, double price) {
PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS
Debug: InventoryApp
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:50947' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\User\AppData\Local\Temp\vscodesws_73561\jdt_ws\jdt.ls-java-project\bin' 'InventoryApp'
--- Inventory After Adding ---
ProductID: P001, Name: Laptop, Quantity: 10, Price: $75000.0
ProductID: P003, Name: Keyboard, Quantity: 30, Price: $1500.0
ProductID: P002, Name: Mouse, Quantity: 50, Price: $500.0
--- Inventory After Update ---
ProductID: P001, Name: Laptop, Quantity: 10, Price: $75000.0
ProductID: P003, Name: Keyboard, Quantity: 30, Price: $1500.0
ProductID: P002, Name: Wireless Mouse, Quantity: 45, Price: $600.0
--- Inventory After Deletion ---
ProductID: P003, Name: Keyboard, Quantity: 30, Price: $1500.0
ProductID: P002, Name: Wireless Mouse, Quantity: 45, Price: $600.0
PS C:\Users\User>
Java: Ready
Ln 126, Col 2 Spaces: 4 UTF-8 CRLF Java Go Live