**Milestone Three: Enhancement Two: Data Structures and Algorithms**

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CS 499 Computer Science Capstone Module 4 Milestone Three

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My artifact is the inventory mobile app I developed for the CS 360 Mobile Architect and Programming course in Fall 2024. The app helps users manage inventory by displaying item details such as name, ID, quantity, and description.

I selected this artifact for my ePortfolio because it demonstrates algorithmic problem-solving and data structure implementation in a real-world mobile application. The primary enhancement was adding a real-time linear search function, which significantly improves usability over manually scanning through the inventory list.

While I initially considered binary search or hash maps, I opted for a linear search (O(n)) due to the relatively small dataset expected in mobile inventory applications. The performance trade-off between O(n) and O(log n) is negligible in this context, and this decision reflects my ability to evaluate algorithmic trade-offs based on practical constraints.

Before this enhancement, the app lacked search functionality, requiring users to scroll through inventory manually. Implementing real-time search streamlined navigation and improved the user experience. During development, I encountered a critical bug related to Android’s updated search view, causing the app to crash due to type-casting issues and null reference errors. Using Logcat and searching for “fatal” helped me diagnose and resolve the problem, reinforcing my debugging skills and deepening my understanding of Android’s evolving framework.

This enhancement aligns with the course outcomes by demonstrating effective problem-solving, data structure application, and time complexity analysis. While I initially planned for an O(log n) search, adapting to a more practical O(n) approach showcases my ability to make informed technical decisions based on project needs.

Throughout this process, I learned the importance of choosing algorithms based on real-world constraints, rather than theoretical efficiency alone. I also gained experience in troubleshooting Android crashes, particularly those related to type mismatches and null references.

One of the biggest challenges was identifying the cause of the crash, as Android provided no explicit error message. However, refining my debugging approach allowed me to diagnose and fix the issue efficiently. This experience strengthened both my technical problem-solving skills and my ability to implement and troubleshoot key features in a mobile application.