CS-499 Computer Science Capstone

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# Milestone Three

## Enhancement Two: Algorithms and Data Structures

The artifact I am presenting is the sorting and filtering functionality added to the CardGrove mobile application, which I originally developed in my Mobile Application Development course at SNHU. The CardGrove app is designed to help users manage their card inventory efficiently. This feature enhancement introduces the ability to sort cards by name, type, or inventory count and to filter cards by name using a search bar.

I selected this artifact for my ePortfolio because it demonstrates my ability to work with algorithms and data structures in a real-world mobile application. Implementing sorting and filtering required a solid understanding of how to retrieve and manipulate data efficiently. I used SQL queries with ORDER BY to perform sorting directly in the database and implemented a search function using LIKE to filter results dynamically. These components showcase my ability to work with structured data, optimize database queries, and integrate UI components with backend logic to enhance user experience. Initially, the application lacked sorting and filtering features, making it difficult for users to organize and find specific cards. The enhancement significantly improved usability by allowing users to arrange their inventory in a meaningful way and quickly locate items through a search.

This enhancement aligns with the CS-499 course outcomes, particularly in the areas of software engineering best practices, algorithms, and data optimization. The sorting functionality ensures efficient data retrieval, while the filtering feature provides real-time responsiveness by updating the displayed inventory dynamically. These improvements strengthen the application's performance and maintainability. The planned course outcomes were met through this enhancement, as it successfully integrates structured data management techniques and UI interactivity.

Throughout the process of modifying this artifact, I learned the importance of database efficiency and debugging SQL queries. One of the challenges I faced was ensuring that sorting by type worked correctly. Initially, the query did not return the expected results because the column name was not mapped correctly. I resolved this by verifying database column names and debugging using Log.d() to track query execution. Additionally, ensuring that RecyclerView updated efficiently required implementing swapCursor(), which allowed smooth UI updates without unnecessary reloading of data. Another challenge was ensuring that filtering did not cause performance issues, which I addressed by using database-side filtering instead of filtering large datasets in-memory.

This experience reinforced my skills in handling structured data efficiently and optimizing mobile application performance. By completing this enhancement, I was able to strengthen the CardGrove app and provide users with a more intuitive way to manage their inventory. The feature has been successfully merged into the main branch, marking a significant milestone in refining the application. This project demonstrates my ability to apply computer science principles to real-world development and highlights my growth as a software engineer.