CS 499

Professor Dr. Fitzroy Nembhard

Saugat Niroula

25th May 2024

Narrative for Software Design and Engineering Enhancement

Artifact Description and Origin:

The selected artifact for the Software Design and Engineering category is the Inventory Management Application. This application was developed for the CS360 Mobile Architecture and Programming course in September 2023 using Android Studio. The app is designed to enhance inventory management in warehouse environments by providing features such as user authentication, inventory display, item addition and removal, quantity adjustment, and low inventory notifications. The project was inspired by personal experiences in a warehouse setting, where a need for a more efficient inventory management system was identified.

Justification for Inclusion:

This artifact was chosen for inclusion in my ePortfolio because it demonstrates key skills and abilities in software development, particularly in the areas of software design, user interface design, and functionality enhancement. The original application showcased foundational skills in creating a mobile application with basic inventory management capabilities. However, the enhancements made to the artifact further highlight my proficiency in implementing design patterns, improving user interfaces, and adding advanced functionalities.

Enhancements and Course Objectives:

In alignment with the enhancement plan, the following improvements were made:

1. **Refactor Code to Use Design Patterns:**

   - **Singleton Pattern**: Implemented for the **DatabaseHelper** class to ensure a single instance throughout the app.

   - **MVC (Model-View-Controller) Pattern**: Applied to separate concerns and improve code maintainability. For example, the **DataController** class now handles data operations, while activities manage user interactions.

2. **Improve User Interface:**

   - **Material Design Guidelines**: Redesigned the user interface to enhance the user experience. This included updating layouts to follow Material Design principles and adding animations and transitions to make the app more intuitive and visually appealing.

3. **Enhance Functionality:**

   - **PDF Report Generation**: Added a feature for generating inventory reports in PDF format, which provides a valuable tool for inventory tracking and reporting.

   - **Barcode Scanner**: Implemented a barcode scanner for quick item lookup and addition, improving the efficiency of inventory management tasks.

These enhancements align with the course outcomes by demonstrating advanced software design principles, user interface design, mobile application development, and security best practices. They also support the course objectives of designing and delivering professional-quality communications and using innovative techniques in computing practices.

Learning and Challenges:

The process of enhancing this artifact provided valuable learning experiences. Implementing design patterns such as Singleton and MVC required a deeper understanding of software architecture and design principles. Redesigning the user interface to follow Material Design guidelines enhanced my skills in UI/UX design, while adding advanced functionalities like PDF report generation and barcode scanning expanded my knowledge of integrating third-party libraries and services.

Throughout the enhancement process, several challenges were encountered. For instance, integrating the ZXing library for barcode scanning required careful handling of dependencies and ensuring compatibility with the existing project structure. Additionally, implementing the PDF report generation involved learning how to use the **PDFDocument** class effectively to create well-formatted reports.

Overall, the enhancements made to this artifact demonstrate significant progress toward achieving the course outcomes and showcase my capabilities in software design and engineering. The improved application not only offers enhanced functionality and a better user experience but also reflects a high standard of code quality and maintainability.