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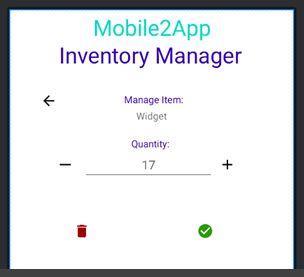
CS499

3-2 Milestone: Software Design and Engineering Narrative

The Software Design and Engineering artifact that I am demonstrating is an Android mobile application for tracking inventory items. The application supports allowing users to create accounts and log in, add items to a database, edit the quantity of items that currently exist in the database, and remove items from the database. The application also optionally supports SMS notifications when stock levels are low. I originally created this artifact for CS360: Mobile Architecture and Programming in August 2024. The following examples highlight the interface and functionality of the artifact before any enhancements have been implemented.

A screenshot of a login screen

Description automatically generated A screenshot of a computer

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This artifact is an excellent example of my skills in software development and design for several reasons. First, the application supports an end-to-end workflow for a use case that is common across many industries- tracking stock of items- which makes it an ideal example of the value I can add to an organization’s business cases through software development. This directly aligns with the course outcome:

Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry- specific goals

Additionally, because the Android platform is popular across many devices, architectures, and applications, it demonstrates my ability to develop applications with broad versatility to meet many possible user requirements. The application is specifically designed to enable collaboration between multiple users as they track and update the status of a single inventory, enabling accurate and current information to be available to stakeholders. This also aligns with the course outcome:

Employ strategies for building collaborative environments that enable diverse audiences to support organizational decision making in the field of computer science

Information security is a critical concern to nearly every industry that relies on computing solutions. To reflect this, I chose to enhance this artifact by adding additional security features to both better align with best practices and allow organizations more precise control over how their data is modified. To achieve these goals, I implemented password hashing to protect user credentials from compromise, applied role-based access controls to user accounts, and implemented the principle of least privilege to critical database functionality such as creating or deleting records. Administrators now have the ability to set the access level of users, restricting some functions only to users who directly require them.

A screen shot of a phone

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These enhancements directly support the course outcomes:

Develop a security mindset that anticipates adversarial exploits in software architecture and designs to expose potential vulnerabilities, mitigate design flaws, and ensure privacy and enhanced security of data and resources

Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry- specific goals

These outcomes align with the outcomes I planned to cover with this artifact, so my outcome coverage plan will not require modification at this time.

Enhancing this artifact to incorporate additional security features was an interesting challenge. First, it offered me the opportunity to review work I had done in the past and make some basic structural improvements based on the code review that I performed earlier in this course. These improvements helped better align the application with industry standard best practices. Overall, actually implementing user permission groups to support role-based access control was not a significant hurdle, though the application needed to be extended to take user access levels into account in many different areas.

Developing and implementing an interface to make that functionality useful to end users was much more of a challenge. Ultimately, functionality is only useful if it is accessible to users, so balancing powerful features with a simple and intuitive user experience is critical.