**CS-499 Computer Science Capstone**

**5-2 Milestone Four: Enhancement Three: Databases**

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**Artifact : Android Inventory Tracking App**

The artifact I selected is the mobile stock tracking application I developed as part of the CS-360 Mobile Architecture course. Initially, this application only worked with a local SQLite database. However, I aimed to transform it into a hybrid structure that can utilize both online MySQL and local SQLite.

In this development process, I have undertaken the following steps:

* Designing the new architecture
* Creating online and offline databases according to the new architecture
* Creating a RESTful web service to ensure the security of the online database
* Rewriting the mobile application to integrate with this web service

So far, I have completed all processes except for rewriting the mobile application. These processes demonstrate that the project provides a comprehensive platform to showcase my core software engineering competencies in Architecture Design, Algorithm and Data Structure, and Database. Additionally, it fulfills all the learning outcomes of the course, which is why I chose this project.

**Database Management Evaluation**

The fundamental database competencies expected from a software engineer are as follows:

* Creating databases and structuring data correctly
* Writing complex SQL queries
* Ensuring data reliability
* Managing database migration and replication processes

In this project, I had the opportunity to implement critical processes such as secure data migration between SQLite and MySQL and ensuring synchronized operation of these two systems (replication).

Furthermore, according to the recent architectural changes:

* I demonstrated my competency in database management by using LEFT JOIN, INNER JOIN, and VIEW structures.
* I ensured data reliability through the lock mechanism.
* I showcased my ability to perform complex operations on the database using advanced SQL statements such as CASE-WHEN.

In these respects, the project has been an ideal study to demonstrate the comprehensive database management competencies required of a software engineer.

**Progress to Date:**

Here’s what has been done since last week:

* I discovered an architectural flaw in the web service where each account only had the ability to operate within its own stock system. As a result, no one would work on the same data. Therefore, I redesigned the system so that each account can be used by multiple users. For this reason, I modified the user table, added a new sub-user table, and updated the remaining tables accordingly.
* Instead of adding ekstra line of code to verify the ownership of datas in tables items and notifications, I created views like item2 and notification2 that link these tables with the related inventory table.
* To manage the new user system, I added a new field named subuser to the web service. I re-coded all the previously prepared code in the web service according to this new system. I completed all the unfinished parts of the web service, including the newly added subuser part.
* I conducted tests on the web service, corrected erroneous parts, and completed missing sections.
* Finally, I manually reviewed the code for security vulnerabilities and found two unfiltered user inputs. I corrected these issues.

With all these actions, I completed the first phase of my project, the web service stage.

**Tasks Remaining:**

* Creation of the RESTHelper.java file and the RESTHelper class to manage and provide all web service interactions within the mobile application.
* Creation of the Settings page.
* Creation of the Users page.
* Re-coding of the existing code according to the new architecture.
* Coding of the data synchronization class.

**Course Outcomes:**

Although I have only completed the first phase of the project, I believe that I have met a significant portion of the course learning outcomes. However, I acknowledge that the final evaluation will be conducted by the person reviewing this project. Therefore, I have included a detailed document containing the code and test cases as an appendix to this assignment.

**Challenges Encountered During the Project:**

This week, the biggest challenge I faced was correcting an architectural mistake made during the initial project design in a way that would minimize time loss. To briefly explain the error: the project was designed to allow each account to operate only on its own data and permit multiple accounts. However, the existing user structure made it impossible for multiple users to work on a single account. At this stage, I had two options: either continue as is, which would mean not being able to fulfill some of my commitments for the first week, or start the entire project from scratch, which would set me back two weeks. Instead, I redesigned the system by making database adjustments and minimizing changes to the existing code. This allowed me to resolve the issue in two days instead of two weeks.

One of the key lessons learned from this error is that multiple people should compare the requirements with the architectural documents during the project's design phase. Professional blindness can prevent us from recognizing issues until the testing phase, leading to time loss and additional costs. To avoid this, collaborative work and seeking feedback and evaluation from others are essential.