**CS-499 Computer Science Capstone**

**3-2 Milestone Two: Enhancement One: Software Design and Engineering**

**Ali ARSLAN**

**Artifact : Android Inventory Tracking App**

This artifact was developed as part of the CS-360 Mobile Architecture and Design course. The aim of this project is to transform a system that currently operates on a local database into one that can work both offline and online by connecting to an online database via a web service interface. In this process, an online database will be created, a RESTful web service will be developed to manage interactions with the database, and the backend code will be modified to support both offline and online functionality.

The reason for selecting this project is the opportunity to showcase the following skills, which need to be demonstrated throughout the course, in a single project:

* Software Design and Engineering
* Algorithms and Data Structures
* Databases

Demonstrating all these skills in a single project offers a significant advantage. Additionally, transitioning from a simple structure to a more complex system, extracting and successfully implementing complex project architectures, provides an opportunity to showcase our Software Design and Engineering skills. Since a hybrid working system introduces complexities like data reliability and synchronization, the methods we develop will demonstrate my skills in Algorithms and Data Structures.

Moreover, the process of migrating the SQLite database to an online MySQL database, particularly regarding database setup, migration, and integration, highlights my expertise in these areas.

**Progress to Date:**

1. Potential architectural diagrams were drawn, and the best one was selected after discussing pros and cons.
2. Existing algorithms were organized, and insights into the required new structure were gathered.
3. Database templates were created, and missing aspects were tested.
4. Project requirements and constraints were defined.
5. The local database was updated, removing unnecessary fields.
6. The Item and Item2 classes related to the local database were modified.
7. The item addition section was rearranged according to these changes (the remaining parts of the backend will be recoded; this section was modified just to check if the necessary adjustments would break anything).
8. An online database was created.
9. The web service functions: userCreate, Login, addInventory, deleteInventory, updateInventory, addItem, updateItem, deleteItem were prepared.

**Tasks Remaining:**

1. Web service: Complete listInventory, lockInventory, listItem, lockItem, and all notification (add, delete, edit, send notification, etc.) functions.
2. Development of data synchronization architecture.
3. Creating the settings section in the Android application (including web service settings, synchronization settings, or working mode settings).
4. Rewriting the existing backend code in the Android application according to the new architecture.
5. Implementing the synchronization architecture.
6. Final check (security, errors, etc.).

Project Accomplishments and Course Outcomes: By the completion of the project, all five features defined as course outcomes will be addressed. Therefore, there has been no change in my expectations for the course outcomes. I believe I have made progress on the following three outcomes so far:

1. Using collaborative strategies to enable different stakeholder groups to contribute to organizational decision-making processes.
2. Designing, developing, and presenting professional-quality oral, written, and visual communications that are technically sound, consistent, and appropriate for specific audiences and contexts.
3. Designing and evaluating computational solutions using algorithmic principles and computer science applications to solve given problems, managing trade-offs in design decisions.

**Challenges Encountered During the Project:**

Two main challenges were encountered during the project process:

1. **Ensuring data reliability while multiple people are working on the same data:** This challenge was addressed using a locking mechanism to ensure that the data being processed is secured. Modifications were made to the existing algorithms, tested, and validated successfully.
2. **Data synchronization between offline and online modes:** This part has not yet been developed. After functional requirements are met, a solution will be created that does not affect the existing structure.

Both of these challenges have been successfully addressed, and with the completion of the project, all course objectives can be achieved.