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Cs499

The artifact is the **Weight Tracker mobile app**, with particular focus on the **`MainActivity.java`** and **`main_screen.java`** files. These components serve as the entry point and main dashboard of the app, respectively. Users interact with the app to **record daily weights, track progress toward personal goals, and manage weight targets**.

Originally, the main Activity and screen contained **tightly-coupled logic**, including database access, data calculations, dynamic UI generation, and user input handling. The enhancements were implemented to improve **software design, maintainability, and scalability**, reflecting professional software engineering principles.

This artifact demonstrates my ability to enhance **software design and application architecture** in a real-world Android project. The focus of the enhancement was on **separating responsibilities**, improving **UI/UX**, and implementing **modular, maintainable code**.

Key improvements include:

1. **Separation of Concerns:** Business logic and database operations were moved to dedicated manager classes (`DashboardManager`, `GoalManager`), leaving the Activities focused solely on **UI and navigation**.
2. **Reusable Components:** Dynamic table generation was refactored into `TableHelper`, reducing redundant code and ensuring consistent styling across the app.
3. **Input Validation:** Numeric and valid input checks were added to prevent app crashes and improve user experience.
4. **Scalability and Modularity:** The updated structure supports **future multi-user functionality**, UI redesigns, and database refactoring with minimal changes to the Activities.

These changes highlight professional skills in **software engineering principles, modular design, and user-focused application development**.

The enhancements support the following course outcomes:

- **Design and evaluate computing solutions** using algorithmic and software engineering principles.
- **Implement innovative techniques, skills, and tools** for software development.
- **Enhance user experience and usability** through improved UI design and dynamic content handling.

By implementing **manager/helper classes**, I applied **MVC principles, modular design, and separation of concerns**, reflecting professional software development practices.

Enhancement Details

1. MainActivity.java

- Refactored login and authentication logic for clarity and maintainability.
- Introduced `LoginManager` and `PasswordValidator` to validate credentials and prepare for multi-user support.
- Simplified navigation to `main_screen.java` while keeping UI responsibilities separate.

2. main_screen.java

- Focused on **UI rendering and navigation** only.
- Removed database queries and weight calculations from the Activity.
- Delegated data fetching and calculations to `DashboardManager` and `GoalManager`.
- Used `TableHelper` to dynamically generate weight entry rows with consistent styling.

- Input dialogs validate numeric values before updating goals.

3. Supporting Classes

- **DashboardManager:** Handles fetching weight entries and computing remaining weight toward goals.
- **GoalManager:** Updates user goals in the database and in the `UserModel`.
- **TableHelper:** Generates and styles table rows dynamically for displaying weight entries.
- **WeightEntryDisplay:** Data Transfer Object for passing weight data to the table helper.
- **LoginManager & PasswordValidator:** Streamlined login validation and multi-user support.

Reflection

Enhancing this artifact was a valuable learning experience:

1. **Separation of Concerns:** Refactoring logic into manager and helper classes improved **readability, maintainability, and testability**.
2. **UI/UX Awareness:** Moving dynamic table generation to `TableHelper` ensured **consistent user experience** and allowed focus on UI improvements.
3. **Scalability Considerations:** Modular design now supports **future enhancements**, including multi-user features, improved goal tracking, and UI redesigns.
4. **Challenges Overcome:** Managing **data consistency** between the user model and database while updating the UI required careful centralization of logic, successfully addressed via manager classes.

Through this process, I strengthened my ability to **refactor code responsibly**, **apply software engineering principles**, and **design maintainable Android applications**.

Conclusion

The enhanced **Weight Tracker app**, specifically the **MainActivity** and **main_screen**, demonstrates **professional software engineering skills** in creating scalable, maintainable, and user-friendly mobile applications.

The artifact showcases proficiency in:

- **Modular design and separation of concerns**
- **Reusable components for dynamic UI rendering**
- **Preparing software for scalability and future multi-user functionality**

This project reflects my growth in **Android development, software design, and application architecture**.