PROJECT / RELEASE 1

Project Design Document

Team 1a - JSCOPE
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1 Project Summary

FundGoodDeeds is a community-driven fundraising platform designed to connect individuals or organizations in need with donors who wish to contribute directly to meaningful causes. Users can browse and contribute to individual needs or combined bundles of related needs, while admins can oversee donations, reporting, and systems integrity.

The system follows a clear separation between the user interface, controller, and model logic, as well as data persistence. It enables extensibility for the future. The first release focuses on implementing core interactions among needs, bundles, and ledger subsystems, for donation tracking and transparency.

2 Design Overview

The Design evolved from simple class sketches and noun verb analysis of project requirements to a structured multi-subsystem architecture emphasizing separation of concerns, high cohesion, and low coupling.

Model–View–Controller (MVC) separates presentation, business logic, and data.

Composite Pattern models *Bundles* of *Needs* uniformly, enabling recursive operations such as total cost or fulfillment status.

Observer Pattern allows the UI and reporting components to react automatically to updates in the data model.

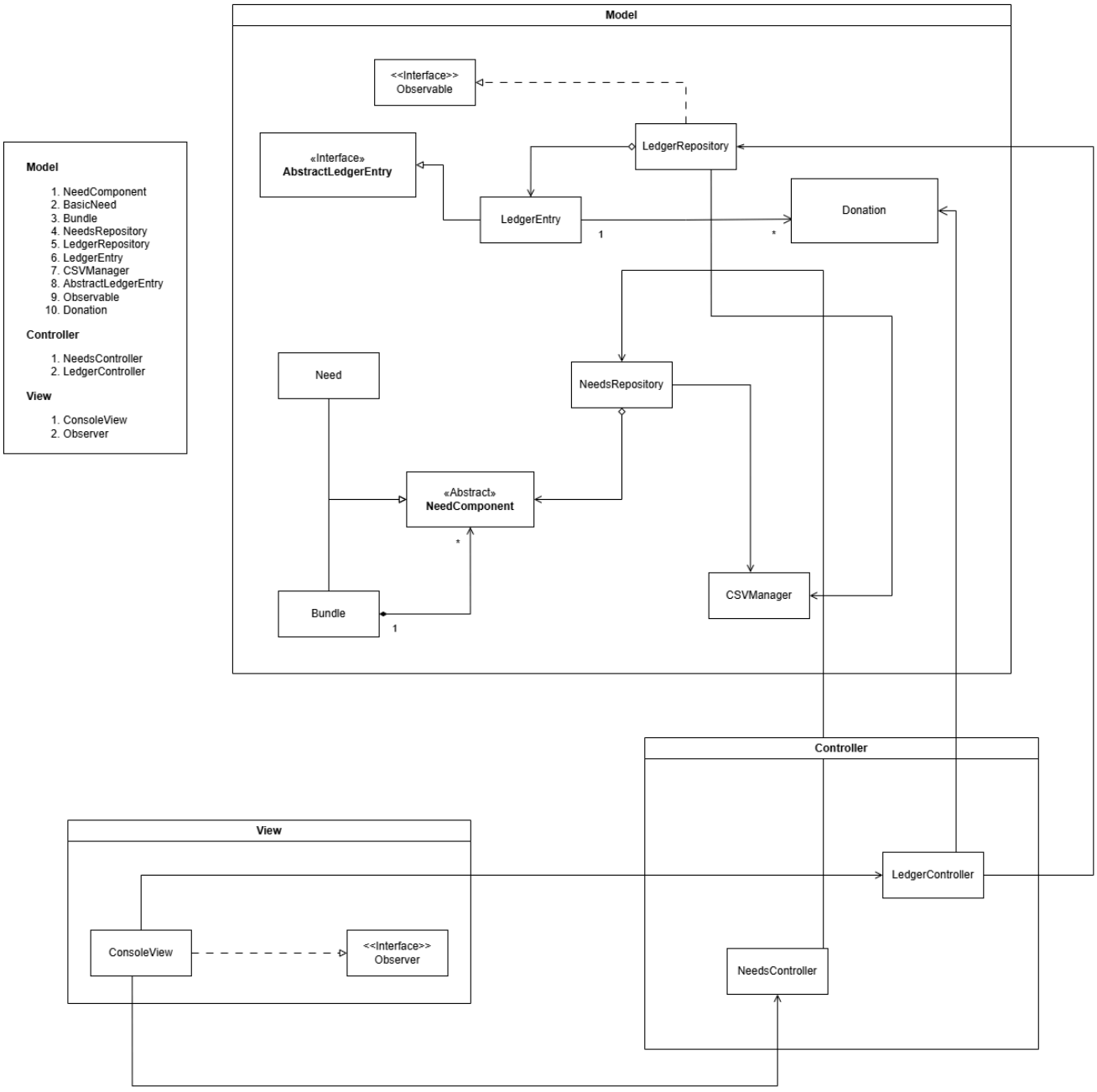
Repository Pattern allows for abstraction of the data access logic. All CRUD(Create, Read, Update, and Delete) operations are handled in one place, to keep our code organized and easier to maintain.

Dependency Injection allows for extensibility, since all of the objects being passed in any constructor will depend on the same interface, we can interchange the objects without any conflicts.

Early prototypes revealed tight coupling between UI and logic, these were then handled through interface abstractions. Dependency inversion was applied to allow testing and future integrations with external API's or databases.

Rejected alternatives include direct database coupling in controllers and hard-coded UI bindings. Assumptions are 1 active donor per session and stable in memory data storage.

3 Subsystem Structure



- **Need Management Subsystem** – manages creation, retrieval, and status of Needs.
- **Bundle Management Subsystem** – groups related Needs using the Composite pattern.
- **Ledger Subsystem** – records donations, calculates totals, and ensures transaction integrity.
- **User Subsystem** – handles Donor, Admin, and general user operations.
- **UI / Controller Subsystem** – manages user interactions, events, and display updates.

4 Subsystems

4.1 Need Management

Class Need	
Responsibilities	Represents a single item of aid (description, cost, status).
Collaborators (uses)	LedgerEntry, Bundle, NeedRepository

Class NeedComponent	
Responsibilities	Common interface for Need and Bundle to support Composite operations.

Class NeedRepository	
Responsibilities	Handles loading, retrieving, and saving of Needs/Bundle data to the CSV file.
Collaborators (inheritance)	NeedsController, LedgerController

Class CSVManager	
Responsibilities	Handles the reading and writing of CSV data to the CSV file.
Collaborators (inheritance)	NeedsRepository, LedgerRepository

4.2 Bundle Management

Class Bundle	
Responsibilities	Composite that aggregates multiple NeedComponents. Calculates totals recursively.
Collaborators (uses)	NeedComponent, Need

Class NeedRepository	
Responsibilities	Handles loading, retrieving, and saving of Needs/Bundle data to the CSV file.
Collaborators (inheritance)	NeedsController, LedgerController, CSVManager

Class CSVManager	
Responsibilities	Handles the reading and writing of CSV data to the CSV file.
Collaborators (inheritance)	NeedsRepository, LedgerRepository

4.3 Ledger subsystem

Class LedgerEntry	
Responsibilities	Records all Donation entries and computes totals.
Collaborators (uses)	Donation, Need, Bundle

Class LedgerController	
Responsibilities	Handles add/update/view LedgerEntry actions.
Collaborators (uses)	LedgerRepository, ConsoleView, Donation

Class LedgerRepository	
Responsibilities	Handles loading, retrieving, and saving of LedgerEntry data into the CSV file.
Collaborators (inheritance)	LedgerController, CSVManager

Class CSVManager	
Responsibilities	Handles the reading and writing of CSV data to the CSV file.
Collaborators (inheritance)	NeedsRepository, LedgerRepository

Class Donation	
Responsibilities	Represents a single contribution (amount, donor, timestamp).
Collaborators	LedgerEntry, User

4.4 User Subsystem

Class User	
Responsibilities	Base class with shared info for all our users.
Collaborators (uses)	ConsoleView

Class Donor	
Responsibilities	Extend User, initiates donations.
Collaborators	Donation

Class Admin	
Responsibilities	Extend user management of system data.
Collaborators	NeedRepository, LedgerRepository

4.5 UI/Controller Subsystem

Class FundGoodDeedsApp	
Responsibilities	Entry Point, initialize UI and subsystems.
Collaborators (uses)	NeedController, LedgerController, ConsoleView

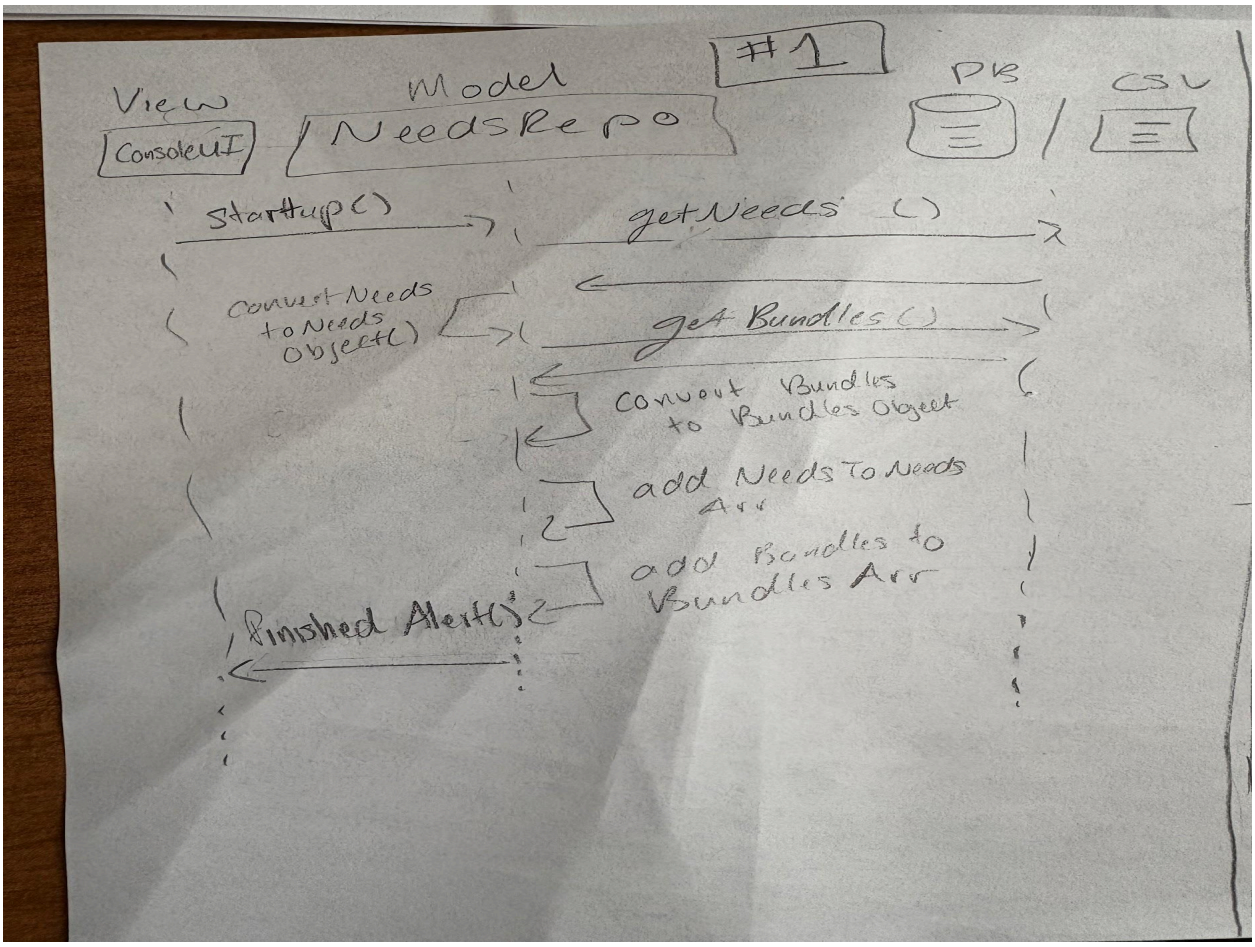
Class NeedController	
Responsibilities	Handles add/update/view Need and Bundle actions.
Collaborators	NeedRepository, NeedComponent, ConsoleView

Class LedgerController	
Responsibilities	Handles add/update/view LedgerEntry actions.
Collaborators	LedgerRepository, ConsoleView

Class ConsoleView	
Responsibilities	Observes data model changes to refresh the interface.
Collaborators	NeedController, LedgerController

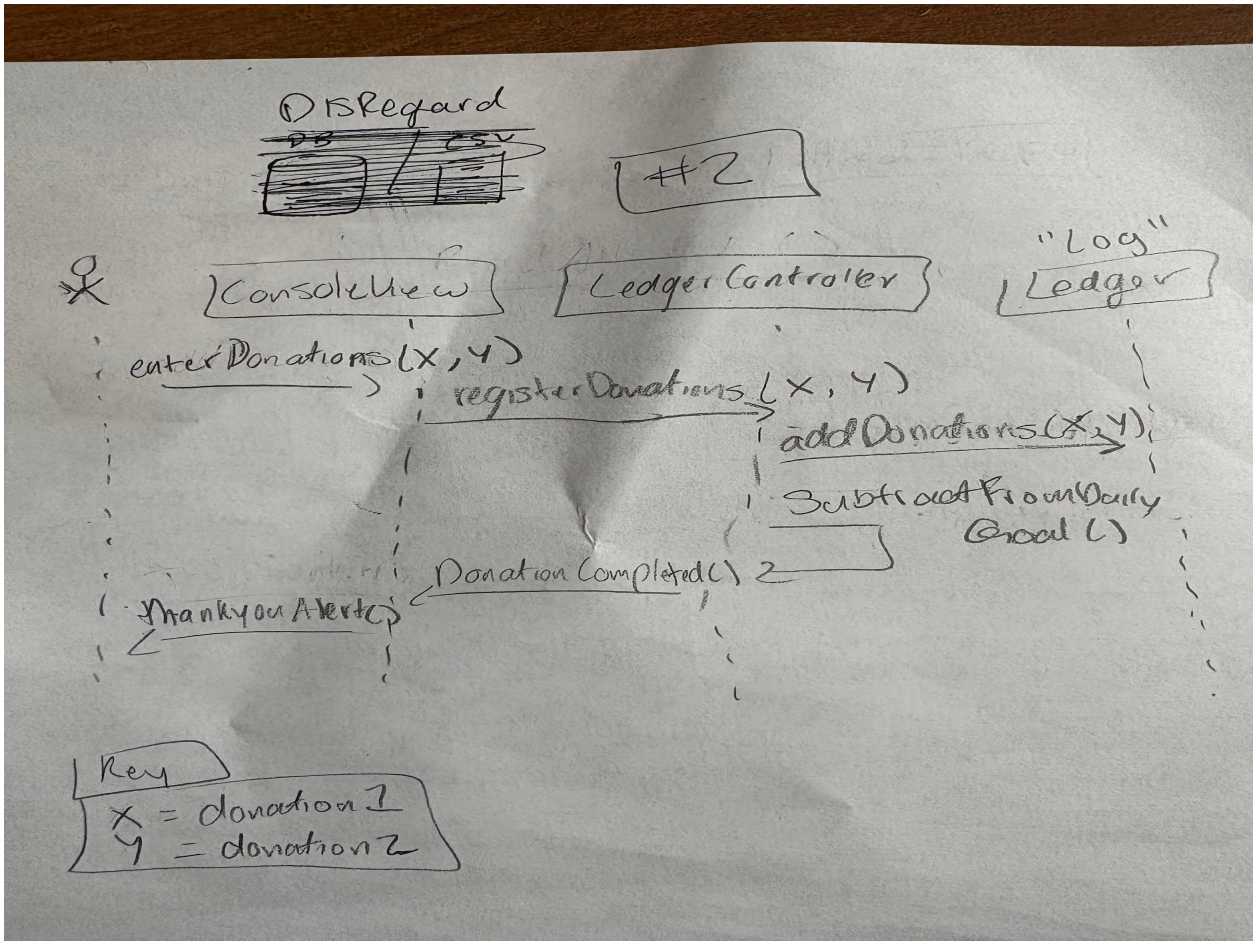
5 Sequence Diagrams

5.1 Description of labeled Sequence diagram #1 and (what feature / operation / scenario the diagram shows).



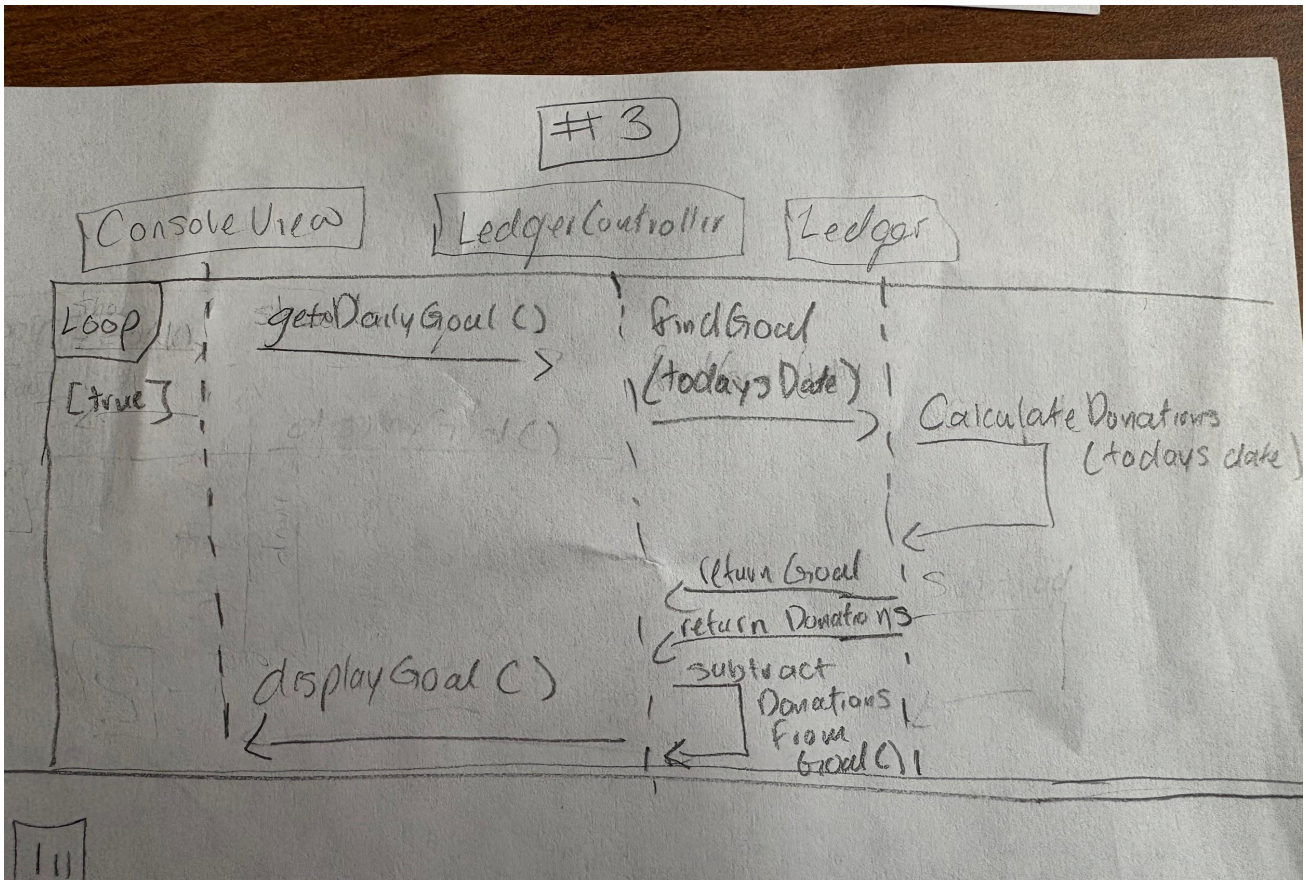
This diagram shows the initial startup of the CLI user interface. The ConsoleUI calls the startup method, NeedsRepo retrieves all the recorded needs/bundles from the CSV file, and converts each record into its respective objects for further manipulation. After adding all the objects to their respective arrays, NeedsRepo alerts the ConsoleUI that all of its operations are completed and the data is ready to display to the console. (In an ideal scenario, we will have the NeedsController between the ConsoleUI and NeedsRepo to respect the MVC architecture. - This is just our first draft.)

5.2 Description of labeled Sequence diagram #2 (what feature / operation / scenario the diagram shows).



This diagram shows the MVC architecture of adding entries to the Ledger (LedgerEntry) for data persistence. The user enters a donation in the ConsoleView, which is then registered in the LedgerController. The LedgerController handles appending the entry to the Ledger (LedgerEntry), then subtracts from the daily donation goal. LedgerController then notifies the ConsoleView that the donation has been completed. After receiving the notification, ConsoleView displays a thank you message to the user.

5.3 Description of labeled Sequence diagram #3 (what feature / operation / scenario the diagram shows).



This sequence diagram expands on the previously defined MVC architecture, giving some insight into the main loop. ConsoleView retrieves the daily goal from LedgerController. LedgerController then retrieves the total number of good deeds fulfilled on today's date from Ledger. During this, the Ledger (LedgerEntry) calculates the number of donations on today's date, then returns the goal and number of donations to LedgerController. After receiving the data, LedgerController subtracts the number of donations from the daily goal, then notifies the ConsoleView to display the current goal after all operations are completed.

6 Pattern Usage

6.1 Observer Pattern

Observer Pattern	
Observer(s)	ConsoleView(view layer), ReportView (optional)
Observable(s)	NeedRepository, Ledger
Notification Method	notifyObservers(), update()
Event Sources	Need status changes, Donation recorded

6.2 Composite Pattern

Composite Pattern	
Component	NeedComponent
Leaf	Need
Composite	Bundle
Client(s)	NeedController, FundGoodDeedsApp

6.3 MVC

MVC	
Model	Need, Bundle, Donation, LedgerEntry, LedgerRepository, NeedRepository
View	ConsoleView, FundGoodDeedsApp display components

Controller	NeedController, LedgerController
Glue/Contracts	Simple view models, using NeedComponent interface

6.4 Dependency Injection / Inversion (DI/IoC)

DI / DIP	
Abstractions	NeedComponent, (optionally ILedger, IRepository<T>)
Concrete Implementations	Need, Bundle, LedgerEntry, NeedRepository
Composition Root	FundGoodDeedsApp (wires controllers, repos, observers)
Consumers	Controllers, views using interfaces rather than concretes

6.5 Repository Pattern

Repository Pattern	
Repository	NeedRepository, LedgerRepository (in-memory R1; DB later)
Aggregate Root	NeedComponent and LedgerEntry
Clients	NeedController, Admin workflows

7 RATIONALE

The system is organized using the Model–View–Controller (MVC) architecture, the Composite pattern, the Observer pattern, the Repository pattern, and Dependency Injection, with clear separation of responsibilities among classes and concurrent updates across various interfaces.

Benefits, a huge separation of concerns. The Model layer includes classes such as NeedComponent, BasicNeed, Bundle, NeedsRepository, LedgerEntry, and LedgerRepository, which manage all data and business logic. The Composite relationship between Bundle and NeedComponent allows bundles to contain both basic needs and other bundles, providing a flexible way to represent complex financial structures without duplicating logic. Repositories isolate file storage and retrieval, allowing other components to focus on logic and presentation. The Controllers (NeedsController and LedgerController) coordinate data flow and enforce rules between the Model and the user-facing View. Importantly, the NeedsController manages the creation and validation of BasicNeed and Bundle objects.

Drawbacks, the MVC architecture requires a controller to be made for each view. In this case, if we add another logging element to the system, we would need to build a controller for it. The repository classes must contain lots of data validation from the CSV files, as the logs are the main source of truth. If they contain errors, then the system fails. The main drawback is that this design introduces more classes and relationships, which increases complexity and coordination effort.

10/10/2025 – Component vs. Composite

Chose Composite (NeedComponent → Need/Bundle) so totals and fulfillment logic work identically for single needs and groups. This avoids duplicate code and simplifies UI/controllers.

10/12/2025 – Central Ledger

Introduced LedgerEntry as the single source of truth for donations/transactions. Keeps financial logic cohesive and auditable. This hopes to prevent scattering donation math across controllers.

10/13/2025 – MVC Separation

Refactored to MVC where controllers handle orchestration, views only render, models encapsulate rules. This reduced coupling and made unit tests for business rules straightforward.

10/14/2025 – Observer for Live Updates

Added Observer so UI auto-refreshes on Need/LedgerEntry changes. This removed manual refresh calls from controllers and clarified responsibilities.

10/15/2025 – Repository Abstraction

Adopted Repository (NeedRepository) to isolate storage concerns. R1 uses in-memory lists; R2 can switch to DB without controller changes.

10/16/2025 – DI at Composition Root

Applied Dependency Inversion by wiring interfaces in FundGoodDeedsApp. Enables mocking NeedRepository/LedgerEntry in tests and future strategy swaps.

10/17/2025 – Donation Allocation Strategies (Future-proofing)

Defined a Strategy interface for bundle allocation. R1 defaults to Equal Split; left hooks for Priority/Single-Need strategies required by stakeholders.

10/18/2025 – Rejected Alternatives

Rejected controller-direct DB calls (tight coupling), and view-driven business logic (violates MVC). Also rejected hard-coded allocation rules (blocks future change).

10/19/2025 – Subsystems & Contracts

Locked subsystem boundaries (Need, Bundle, Ledger, User, UI/Controllers) and interfaces (NeedComponent).