

Loan Management System

Project Implementation Report

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1 EXECUTIVE SUMMARY

This document details the implementation of the Loan Management Application. The project successfully migrated a basic setup into a production-ready, scalable Angular application. Key achievements include full CRUD functionality for Loans, a robust modular architecture, global error handling, and strict adherence to WCAG 2.1 Level AA Accessibility standards.

2 TASK BREAKDOWN & STATUS

2.1 Task 1: Loan List Component (Completed)

Objective: Create a responsive loan list with filtering and sorting.

Implementation:

- Created LoanListComponent at /loans.
- Displayed all required fields (ID, Name, Amount, Rate, Status, Date).
- Implemented Client-side Filtering:
 - Status: Dropdown for Active/Pending/Closed.
 - Borrower Name: Search input.
- Implemented Client-side Sorting:
 - Sortable columns for Amount and Date with visual indicators ($\uparrow\downarrow$).
- Enhancement: Added ARIA labels for accessible sorting and filtering.

Key Files

- src/app/modules/loans/components/loan-list/loan-list.component.ts
(Logic)
- src/app/modules/loans/components/loan-list/loan-list.component.html
(Template)
- src/app/modules/loans/components/loan-list/loan-list.component.css
(Styles)

Loan Origination System							Home
Loans							Apply for Loan
Status:	Borrower Name:						
All Statuses	Search by name...						
ID	Borrower Name	Amount ↓	Interest Rate	Status	Created Date ↓	Actions	
1	John Doe	\$50,000.00	4.5%	Active	01/15/2024	View Delete	
2	Jane Smith	\$250,000.00	3.75%	Active	02/20/2024	View Delete	
3	Bob Johnson	\$75,000.00	5.25%	Pending	03/10/2024	View Delete	
4	Alice Williams	\$150,000.00	4%	Closed	12/05/2023	View Delete	
5	Charlie Brown	\$100,000.00	4.25%	Active	01/25/2024	View Delete	

Figure 2.1: Loans List UI

Loan Origination System							Home
Loans							Apply for Loan
Status:	Borrower Name:						
Active	john						
ID	Borrower Name	Amount ↓	Interest Rate	Status	Created Date ↓	Actions	
1	John Doe	\$50,000.00	4.5%	Active	01/15/2024	View Delete	

Figure 2.2: Loans List Filtering

2.2 Task 2: Loan Application Form (Completed)

Objective: Create a loan application form with validation.

Key Files:

- `src/app/modules/loans/components/loan-application/loan-application.component.ts` (Logic)
- `src/app/modules/loans/components/loan-application/loan-application.component.html` (Template)
- `src/app/modules/loans/components/loan-application/loan-application.component.css` (Styles)
- `src/app/modules/loans/components/loan-application/loan-application.component.spec.ts` (Unit Tests)

Implementation:

- Utilized Reactive Forms for robust state management.
- Implemented real-time validation for all fields.
- Refactored to support "Edit Mode" for existing loans.

The screenshot shows a web-based loan application form titled "Loan Application". The form is part of a system named "Loan Origination System", as indicated by the header bar. The main title "Loan Application" is centered above the input fields. To the right of the title is a link "← Back to Loans". The form consists of several input fields with validation requirements indicated by asterisks (*):

- Borrower Name *
- Loan Amount (\$) *
- Interest Rate (%) *
- Loan Term (Months) *
- Purpose *

Each field has a placeholder text and a validation range or example value. At the bottom of the form are two buttons: "Cancel" and "Submit Application".

Figure 2.3: Loan Application For Creating a Loan

Loan Application

Borrower Name *
Kyler Ren

Loan Amount (\$) *
1000 - 1000000

Amount is required

Interest Rate (%) *
0.1

Loan Term (Months) *
12

Purpose *
Select a purpose

Purpose is required

[Cancel](#) [Submit Application](#)

Figure 2.4: Loan Application Validations

Loan Origination System [Home](#)

Update Loan

Borrower Name *
Kyler Ren

Loan Amount (\$) *
2009

Interest Rate (%) *
0.1

Loan Term (Months) *
12

Purpose *
Refinance

[Cancel](#) [Update Loan](#)

Figure 2.5: Update Loan Form

2.3 Task 3: Loan Details & Performance (Completed)

Objective: Detailed view with optimizations and lazy loading.

Key Files:

- `src/app/modules/loans/components/loan-detail/loan-detail.component.ts`
- `src/app/modules/loans/components/loan-detail/loan-detail.component.html`
- `src/app/modules/loans/components/loan-detail/loan-detail.component.css`

Implementation:

- Lazy Loading: Configured in `src/app/modules/loans/loans-routing.module.ts`
- Performance: Used `onPush` change detection strategy.
- Calculations: Implemented monthly payment formula.

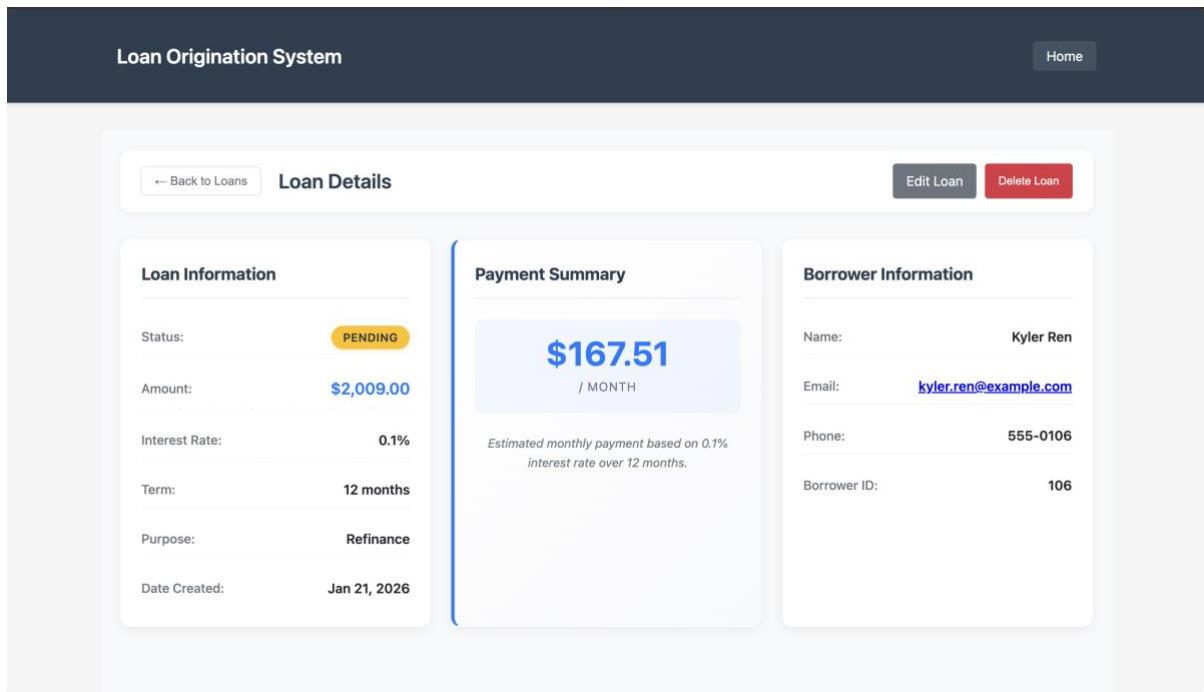


Figure 2.6: Loan Details Page with Monthly Payment Formula

2.4 Bonus Task 1: Error Handling (Completed)

Key Files:

- `src/app/core/handlers/global-error-handler.ts`
- `src/app/core/services/notification.service.ts`
- `src/app/shared/components/toast/toast.component.ts`

Implementation:

- Global error handler catches exceptions and displays user-friendly Toasts.

2.5 Bonus Task 2: Unit Tests (Completed)

Key Files:

- `src/app/core/services/loan.service.spec.ts`
- `src/app/modules/loans/components/loan-application/loan-application.component.spec.ts`

2.6 Bonus Task 3: Loading Interceptor (Completed)

Implementation:

- Tests verify API logic and Form validation constraints.
- Bonus Task 3: Loading Interceptor (Completed)

Key Files:

- `src/app/core/interceptors/loading.interceptor.ts`
- `src/app/core/services/loading.service.ts`
- `src/app/shared/components/spinner/spinner.component.ts`

Implementation:

- Interceptor tracks active requests and toggles the global spinner.

3 ADDITIONAL FEATURES & IMPROVEMENTS

3.1 Infrastructure & Standards

Core Services: `src/app/core/services/loan.service.ts`

Environment Config: `src/environments/environment.ts` , `set-env.js`

Architecture: Refactored into Core (Singletons), Shared (UI), and Feature modules.

Full CRUD Operations

- Delete Feature:
 - `src/app/shared/components/confirmation-dialog/confirmation-dialog.component.ts`
 - `src/app/core/services/dialog.service.ts`
- **Implementation:** Implemented safe deletion with a reusable Confirmation Dialog.

3.2 Accessibility (WCAG 2.1 AA)

- **Audit Scope:** All Component HTML files (`*.component.html`) and TypeScript logic for focus management.
- **Implementation:**

- **Focus Trapping:** ConfirmationDialogComponent.
- **Semantic Landmarks:** AppComponent (src/app/app.component.html).
- **ARIA Attributes:** Applied to tables, forms, and buttons across all modules.

4 TOOLS & TECHNOLOGIES USED

- Framework: Angular 15+
- Language: TypeScript
- State Management: RxJS (Observables, Subjects)
- Testing: Jasmine & Karma
- Build: Angular CLI

5 TESTING METHODOLOGY

- **Automated:** Unit tests run via ng test to verify logic in isolation.
- **Manual:** Verified all user flows (Create -> List -> Detail -> Edit -> Delete) in Chrome. Verified accessibility behavior using keyboard-only navigation.

5.1 How to Run Automated Tests

The application uses Karma as the test runner and Jasmine as the assertion framework. We have configured support for both Chrome and Microsoft Edge.

Command

Run the following command in the frontend directory:

```
npm run test or ng test
```

Note: This will attempt to launch both Chrome and Edge. You can modify karma.conf.js to select only one.

5.2 Troubleshooting

- Chrome: If you encounter Cannot start Chrome, set or check the CHROME_BIN environment variable.
- Edge: If you encounter Cannot start Edge, ensure Microsoft Edge is installed and EDGE_BIN is set if needed.
- For CI/CD environments, you may need to configure Karma to use ChromeHeadless or EdgeHeadless.

Microsoft Edge is being controlled by automated test software.

X

Karma v 6.4.4 - connected; test: complete;

DEBUG

Edge 144.0.0.0 (Mac OS 10.15.7) is idle

Jasmine 4.5.0

Options

9 specs, 0 failures, randomized with seed 58388

finished in 0.041s

LoanApplicationComponent

- amount field validity
- should call loanService.createLoan when form is valid and submitted
- form should be invalid when empty
- borrowerName field validity

LoanService

- should be created
- should retrieve loans from the API
- should create a new loan
- should retrieve a single loan by ID

Figure 5.1: Automated Test Run on Karma