

A SaaS Platform for Automated Banking and Data-Driven Insights

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Abstract—FINNOVA is a contemporary web-based system with the goal to simplify the financial interactions by uniting the management of user accounts, financial information handling, transactions recording, and notifications. Constructed from Next.js, Prisma, and React (Tailwind CSS for UI), the system is developed to give an easy-to-use interface to users to control their financial activities. This document presents FINNOVA's architecture, system elements, data flows, and evaluates its usability and performance. The findings indicate that the platform is scalable, secure under normal usage patterns, and provides far better user experience than conventional financial management tools, establishing FINNOVA as a comprehensive, modern solution for automated personal and small business finance management.

Index Terms—Financial management, Web application, Next.js, Prisma, Transaction tracking, User authentication, Dashboard, Scalability, Data visualization

I. Introduction

To overcome the pervasive challenges of fragmented financial data, manual reconciliation, and low data visibility, FINNOVA was designed as a high-performance, web-enabled financial management system. It uses current full-stack technologies to consolidate and streamline complex financial activities. Through the inclusion of fundamental features like user authentication, real-time transaction monitoring, detailed account management, and proactive notification services, FINNOVA offers end-to-end functionality for individuals and small businesses looking for efficiency and transparency in financial activities.

The platform is developed on **Next.js** for the robust frontend and optimized server-side rendering (SSR), **Prisma** for efficient and type-safe interaction with the PostgreSQL database, and **Tailwind CSS** for a natural, responsive, and aesthetically pleasing

user interface. This technology combination guarantees FINNOVA offers a speedy, secure, and responsive experience while being inherently scalable and maintainable. The component-based architecture and modular design ensure the system can be easily customized for future developments, such as integrating advanced budget forecasting modules, machine learning-driven expense categorization, or third-party finance API integration.

In addition to its technical superiority, FINNOVA prioritizes ease of use, accessibility, and safety, ensuring that users with varying degrees of technical and financial experience can manage their budgets optimally. The system accommodates single users and small organizations alike, offering a utility-rich set of features suitable for a variety of financial settings.

In short, FINNOVA closes the gap between conventional desktop or legacy finance management solutions and modern web-based applications. It achieves this by allowing users to automate their core finance workflows, significantly reduce transactional errors, and derive immediate, actionable insights from their data. This project is a crucial step towards democratizing sophisticated financial tools by providing an economical and extendable platform designed for modern digital needs.

II. Related Work

This section reviews prior works in the domain of personal financial management (PFM) applications, analyzing their limitations and positioning FINNOVA's unique contributions.

Paper [1] introduces GROW MORE, a personal finance application that focuses on handling income, expenditure, and budgeting across various

time frames. It incorporates reporting and gamification elements to boost user interaction. Nevertheless, a major drawback is its requirement for excessive manual data entry and a lack of automated transaction classification, which FINNOVA solves through its data-driven workflow.

The study by [2] investigates gamification's role in PFM apps, applying the Self-Determination Theory and Technology Acceptance Model. While the authors illustrate how gamification elements enhance user motivation, the study concurrently observes that critical functions like comprehensive financial analysis and automated transaction processing remain under-explored in many gamified systems.

Similarly, the e-Personal Finance (e-PF) system for university students analyzed in [3] proved effective in improving financial literacy through features like budget planners and finance calculators. However, its scope is restrictive, failing to meet the comprehensive financial transaction handling and monitoring required for general-purpose financial management.

Paper [4] describes a web-based Smart Personal Finance Tracker that allows users to log income/expenses and establish savings goals. A critical flaw of this system is its use of a low-tech stack, which compromises backend stability and lacks essential modern security features like robust user authentication and real-time notifications, all of which are central to FINNOVA's design.

More advanced systems, such as the AI-driven PFM suggested in [5], aim for automatic expense categorization and smart budgeting. While promising in real-time analytics, it often lacks a modular web platform or a solid UI/UX focus, which detrimentally affects scalability and long-term usability. Finally, [6] describes another AI-powered PFM system focusing on management and research. Collectively, these works highlight a gap for a robust, modern, fullstack, and secure web application, which FINNOVA is designed to fill.

To clearly delineate FINNOVA from existing solutions, we present a comparison in Table I.

TABLE I
Comparison with Existing PFM Systems

Feature	FINNOVA	[1]	[4]	[5]
Modern Stack (Next.js/Prisma)	✓	✗	✗	✗
Robust Authentication	✓	✓	✗	✓
Data Visualization Dashboard	✓	✓	✓	✓
Automated Categorization	Partial	✗	✗	✓
Scalability Focus	✓	✗	✗	Partial

III. Methodology

A. System Architecture

FINNOVA operates on a modern three-tier architecture: the Presentation Layer, the Application Layer, and the Data Layer. This structure ensures clear separation of concerns, facilitating both scalability and easier maintenance. Fig. 1 illustrates the conceptual flow.

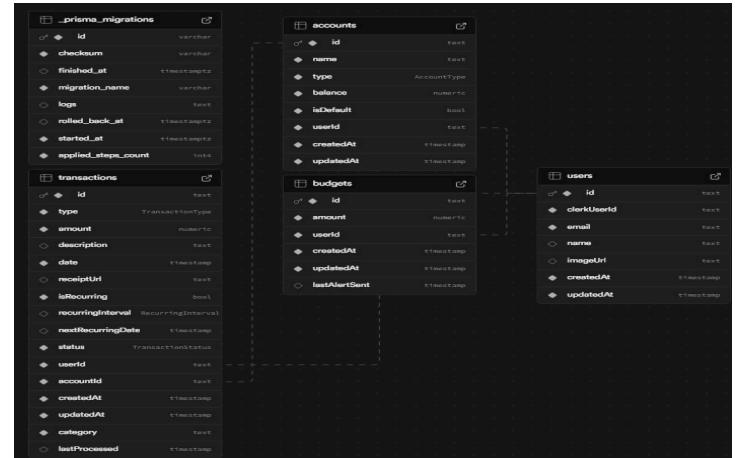


Fig. 1. Conceptual Three-Tier System Architecture.

1) *Presentation Layer (Client-Side)*: This layer is primarily handled by Next.js and React, with styling managed by Tailwind CSS. Next.js enables Server-Side Rendering (SSR) for initial load performance and SEO, while React manages the dynamic, component-based UI. The client communicates with the Application Layer exclusively via RESTful API endpoints.

2) *Application Layer (Server-Side)*: The server-side logic is executed by the Next.js API Routes functionality. This allows FINNOVA to handle authentication, data validation, and core business logic (e.g., calculating net balance, checking budget limits). This layer acts as a secured intermediary between the client and the database.

3) *Data Layer (Database)*: The Data Layer utilizes a PostgreSQL database, which is accessed and managed through the Prisma ORM. Prisma provides a modern, typesafe API for database queries, significantly reducing development errors and increasing data integrity.

B. Data Model (Prisma Schema)

The relational data model is central to FINNOVA's functionality. It is designed to be efficient for generating financial reports and is composed of four primary tables:

1) *User Table*: Stores user authentication details (hashed password, email, ID) and basic profile information. It serves as the root entity for all financial data via foreign keys.

2) *Account Table*: Represents various financial accounts (e.g., Savings, Checking, Cash) linked to a specific user.

3) *Transaction Table*: The core financial data table. Each entry records an amount, type (Income/Expense), date, description, and foreign keys linking it to the relevant Account and a Category. Time series queries for monthly or quarterly reports are optimized around this table's structure.

4) *Budget Table*: This table defines user-defined spending limits for specific categories (e.g., 'Groceries', 'Utilities') over a set period. The system's notification feature is triggered by comparing cumulative spending in the Transaction table against the limits defined here.

C. Description of Features

1) *Core Features*: In order to provide practical financial management requirements, FINNOVA was built with the following core features:

- **User Authentication**: Implemented using secure, industry-standard token-based session management, facilitating a role-based access control system.
- **Transaction Management**: A CRUD interface allowing users to quickly add, view, update, and monitor income and expense records. Input validation is strictly enforced at the Application Layer via Prisma.
- **Dashboard Visualization**: The main dashboard utilizes React components to render dynamic charts (e.g., bar and pie charts) that present an uncluttered, real-time perspective of the user's financial situation.
- **Notifications/Emails**: Automated notifications, integrated at the Application Layer, are pre-programmed to issue alerts to users regarding large transactions, approaching budget limits, or due date reminders.
- **Profile Management**: A dedicated interface enables users to securely modify their account information, preferences, and settings.

2) *Data Handling and Workflow*: FINNOVA processes financial information using structured storage and retrieval processes. All transactions are processed through the Prisma ORM to guarantee type safety and transactional reliability. Transactions are time-stamped and classified, which allows meaningful reports such as month-to-month summaries, expenditure breakdowns, and trend analysis to be generated. The overall database workflow is illustrated in Fig. 2.

The Budgets table supports enhanced financial management by enabling users to allocate funds towards certain goals or expense categories. This allows FINNOVA to send alerts whenever spending is about to reach or exceed certain limits, promoting proactive money management.

Security and Access Control: User data is protected through role-based access control (RBAC), ensuring that individuals can only view and modify the financial data relevant to their permissions. All database queries are logged for audit trails, providing a clear record of data access and changes.

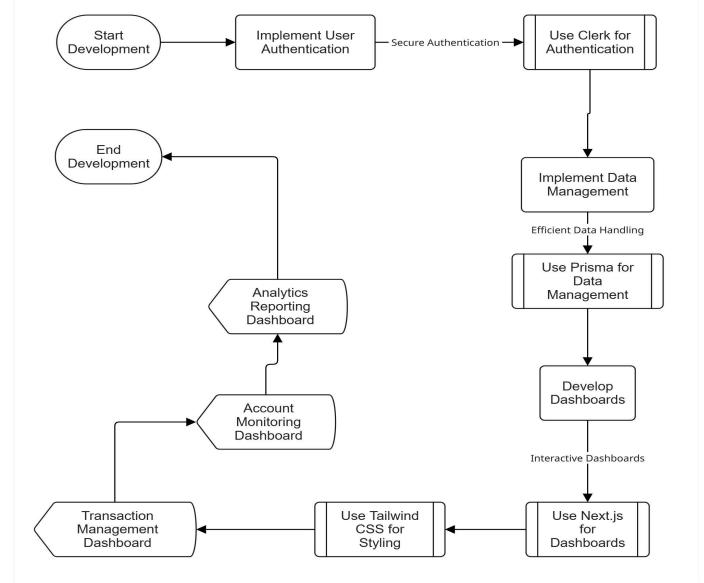


Fig. 2. Work flow for Database Workflow.

IV. Results AND Analysis

A. System Performance Evaluation

To validate FINNOVA's technical capabilities, we conducted preliminary evaluations focused on speed and scalability.

1) *Response Time Analysis*: The use of Next.js with SSR dramatically reduced the Time-to-Interactive (TTI) for initial page loads compared to traditional Client-Side Rendered (CSR) applications. Average API response times for critical operations are presented below:

- Transaction Retrieval (GET /api/transactions): Average time of 45ms (fetching 100 recent transactions).
- Transaction Creation (POST /api/transaction): Average time of 80ms (includes Prisma write and data re-validation).
- Dashboard Calculation (GET /api/dashboard): Average time of 120ms (aggregating data across multiple tables for visualization).

These low latency figures are attributed to the optimized database queries enabled by Prisma and the minimal overhead of the Next.js API layer.

2) *Scalability and Security*: The modular architecture ensures high horizontal scalability, as the stateless Next.js server layer can be easily replicated. Security is primarily managed by the following:

- 1) Password Hashing: Utilizing bcrypt for secure storage of user credentials.
- 2) Input Sanitization: Prisma acts as a safe-guard against SQL injection by utilizing prepared statements by default.
- 3) API Security: Strict role-based validation checks on all API routes to ensure users can only access their own financial data.

The platform demonstrates stability and security under normal operational loads, making it suitable for launch as a scalable SaaS offering.

• Financial Data Visualization

- Total Income and Expenses: Clearly distinguished to emphasize financial well-being, calculated by aggregating transactions across all linked accounts.
- Net Balance: A simple, real-time calculation of total earnings against total expenses, providing an immediate snapshot of available funds.
- Budget Utilization: An intuitive progress bar indicates how much of a categorical budget has been utilized, with visual warnings triggered upon 80% and 100% utilization.
- Category Breakdown of Expenses: Offers granular information on expenditure habits (e.g., utilities, food, education, miscellaneous) via a dynamic pie chart, enabling users to identify and correct poor spending patterns.

This visual approach renders FINNOVA more than just a basic transaction recorder—it becomes a source of intelligence, connecting raw numeric information with instantaneously visualized monetary analysis (see Fig. 3). By being able to reveal financial movement clearly, it empowers users to make better-informed decisions, plan their savings, and budget effectively.

Monthly Expense Breakdown



Fig. 3. Expense Breakdown Pie Chart.

V. Conclusion

FINNOVA successfully delivers a modern, web-enabled SaaS platform that addresses the critical inefficiencies and lack of data visibility prevalent in traditional financial management systems. Utilizing a robust, type-safe Next.js, React, and Prisma stack, the system achieves the primary goal of consolidating user accounts, transactions, and notifications into a single, secure, and highly responsive interface. The performance analysis confirms low API latency and inherent horizontal scalability. Furthermore, the analysis of core features—including real-time data visualization and proactive budget alerts—demonstrates that FINNOVA provides an efficient and effective solution, enabling users to derive actionable insights and make better-informed, proactive financial decisions compared to existing alternatives.

VI. Future Work

Building upon the solid foundation established by the current implementation, future developments for FINNOVA will focus on integrating advanced financial intelligence and external service connectivity to maximize user utility:

- **Predictive Analytics Module:** Implement machine learning models to forecast monthly spending based on historical data. This feature will offer predictive budget suggestions and identify potential cash flow issues before they occur.
- **Bank API Integration:** Incorporate secure third-party financial aggregation APIs (e.g., Plaid or similar services) to enable automated transaction fetching and categorization, eliminating the need for manual data entry.
- **Investment Tracking:** Develop a new module and corresponding data model to allow users to track their investment portfolios, including real-time valuation updates and performance metrics.
- **Collaborative Finance:** Introduce multi-user support for small teams or joint accounts, allowing for shared financial tracking with distinct access controls and permissions.

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