

# Design and Implementation of a Secure Web-Based Investment Management Platform

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*Abstract— Digital investment platforms require more than simple authentication and data storage. Investors expect a guided workflow that helps them register, verify identity, evaluate opportunities, monitor transactions, and understand portfolio performance from a single interface. This paper presents the design and implementation of a Web-based real estate investment platform. The proposed system focuses on investor operations, including registration, login, mandatory Know Your Customer (KYC) verification, property discovery, return estimation using an Internal Rate of Return (IRR) calculator, investment recording, transaction tracking, analytical reporting, and profile management. The system is implemented using React with TypeScript for the frontend, Tailwind CSS for interface styling, Node.js with Express and TypeScript for the backend, and MySQL for persistent storage. Security features such as password hashing, token-based authentication, protected routes, and input validation are incorporated to improve reliability and compliance readiness. The final implementation demonstrates that a modular full-stack architecture can provide a smooth, secure, and maintainable investor experience. The work is intended as an academic and practical contribution to investor-facing web application design.*

**Keywords:** Real Estate Investment Platform, KYC Verification, Web Application, React, Node.js, MySQL, IRR Calculator, Transaction Tracking, Portfolio Analysis

## I. INTRODUCTION

Investor-facing web systems have become essential in modern digital financial platforms. While many platforms offer account creation and basic dashboards, the investor experience often becomes fragmented when key tasks such as verification, investment review, transaction monitoring, and analytical reporting are handled through loosely connected pages. Such fragmentation affects usability, user confidence, and operational clarity.

The present work focuses on the development of a dedicated Investor Module that supports the complete investor journey in a single web

application. Rather than emphasizing broad marketplace functionality, this project concentrates on the investor's operational workflow: onboarding, KYC completion, secure access, opportunity review, investment support, transaction visibility, and profile access.

The system aims to answer a practical question: how can an investor module be designed so that security, compliance-related steps, decision support, and portfolio visibility are integrated into one coherent user experience? To address this question, the project adopts a modular full-stack design and builds a working prototype with both functional and analytical features..

## II. PROBLEM STATEMENT

In many digital investment systems, investor activities are distributed across disconnected interfaces. A user may be able to register successfully but still face unclear next steps for identity verification. Similarly, available properties may be visible, but essential support functions such as return estimation, transaction tracking, and portfolio-level summaries are often weak or absent. These limitations reduce platform transparency and make the investment process harder for end users.

The main problem addressed by this project is the absence of a simple, secure, and integrated investor-side module that combines all major investor activities in one system. The problem includes the following sub-issues:

- Weak integration between login and KYC flow
- Insufficient visibility into investor transactions
- Limited decision support before investment
- Lack of analysis-oriented dashboards for investors
- Inadequate validation and security controls in user input workflows

This project addresses these concerns by implementing a guided investor interface with

protected access control, validation logic, database-backed transactions, and graphical analysis.

### III. OBJECTIVES

The main objective of this project is to design and implement a secure, user-centered Investor Module for a web-based real estate investment platform.

The specific objectives are:

- To provide secure investor registration and login
- To enforce mandatory KYC verification before access to protected investment features
- To display investment opportunities through a structured property listing interface
- To provide detailed property information with return estimation support
- To calculate estimated returns using an IRR-based interactive calculator
- To record investment and transaction data accurately in the database
- To provide dashboard summaries for investor activity
- To present analytical reports using graphical representations
- To enable profile viewing and controlled logout.

### IV. LITERATURE REVIEW

Digital financial systems increasingly prioritize user-centered workflows in order to improve trust, clarity, and adoption. Prior work in web-based financial interfaces shows that investors value systems that reduce complexity in onboarding and present important information in a structured, visual, and transparent manner. Systems with clear dashboards, guided workflows, and real-time feedback generally achieve better usability outcomes than systems with scattered navigation and low visibility into investor actions.

Identity verification has also become a central requirement in digital financial environments. KYC procedures are widely recognized as a core compliance and trust-building mechanism. In practical systems, KYC is not only a regulatory step but also a workflow control point that determines whether a user can proceed to sensitive or high-impact actions. Integrating KYC early in the investor journey therefore improves both platform integrity and user flow consistency.

Another relevant area of existing work concerns investor dashboards and portfolio reporting. Research and industry practice both suggest that summary views, transaction ledgers, and graphical performance reports improve user understanding and support better decision-making. Investors generally prefer quick access to totals, trend reports, and portfolio distribution data rather than manually interpreting raw records.

Modern web architecture studies further support the use of component-based frontend frameworks, API-driven backend services, and relational databases for such platforms. React and TypeScript are commonly adopted for interactive, modular user interfaces. Node.js and Express support efficient API construction, while MySQL provides structured relational storage for transaction-oriented systems.

Based on these observations, the current project adopts three major design principles:

- Guided onboarding with validation and KYC enforcement
- Transparent investment and transaction visibility
- Data-backed visual analysis for investor understanding

### V. RESEARCH GAP

Although digital investment applications commonly provide standard features such as authentication and listing views, fewer systems prioritize the complete investor workflow as a unified module. Many academic and prototype systems focus either on data entry or general marketplace screens, leaving the investor experience incomplete. The main research and implementation gaps identified are:

- KYC is often treated as a separate or loosely attached process rather than a core workflow gate
- Return estimation is not always integrated into the same screen where investment decisions are made
- Analytical reports are often designed for administrators rather than investors
- Transaction history is sometimes present but not visually connected to portfolio understanding
- Investor-side validation and usability are often less detailed than the backend data model

This project contributes by addressing these gaps in one connected investor-centered application. Its originality lies not in inventing isolated new technologies, but in integrating existing technical

mechanisms into a coherent investor workflow with security, analysis, and decision support.

## VI. PROPOSED SYSTEM

The proposed system is a web-based Investor Module that supports the following sequence:

1. Investor registration: Allows a new investor to create an account by entering personal and login details.
2. Secure login: Authenticates the investor using valid email and password for protected access.
3. KYC verification: Collects identity and income details with document upload for investor verification.
4. Dashboard access: Provides a summary view of the investor's activity, investment, units, and expected returns.
5. Property review: Enables the investor to browse available properties and view their detailed information.
6. Return estimation: Helps the investor estimate expected returns using the IRR calculator.
7. Investment execution: Allows the investor to select units and complete the investment process.
8. Transaction tracking: Displays all investment-related transactions with amount, date, and status.
9. Portfolio analysis: Presents graphical reports to help the investor understand trends, growth, and allocation.
10. Profile viewing and logout: Lets the investor view personal and KYC details and securely log out of the system.

## VII. CORE FUNCTIONAL MODULES

7.1 Authentication : The authentication module allows investors to register and log in. It validates user data, hashes passwords before storage, and generates tokens for authenticated access.

7.2 KYC Verification : The KYC module requires the investor to submit income details, document type, document number, and a document image. Until KYC is completed, the user cannot access protected investor features.

7.3 Property Listing and Details : The system displays property cards containing name, location, total asset value, price per unit, expected IRR, and image. A detailed property page expands this

information and includes the IRR calculator and investment action.

7.4 Investment and Transaction Tracking : Investments are recorded with investor ID, property ID, units, amount, and date. Corresponding transaction entries are also created and displayed on the transactions page.

7.5 Dashboard and Analysis : The dashboard shows total investment, property count, units, and expected returns. The analysis section adds graphical insight through trend reporting, IRR projection, and portfolio allocation.

## VIII. METHODOLOGY AND DESIGN APPROACH

The project follows a modular full-stack development methodology.

8.1 Requirement Analysis : The first phase identified the main investor needs:

- Secure onboarding
- Verification control
- Opportunity visibility
- Decision support
- Transaction tracking
- Profile transparency
- Graphical analysis

8.2 Functional Decomposition : The system was divided into manageable modules:

- Frontend pages and components
- Authentication services
- KYC processing
- Property management APIs
- Investment and transaction services
- Analytics services
- Relational database schema

8.3 Architecture Design : The architecture follows a three-layer design:



This separation improves maintainability, clarity, and extension readiness.

### IX. SYSTEM ARCHITECTURE

The application uses REST-style APIs between the frontend and backend. The frontend handles routing, protected pages, and user interaction, while the backend processes authentication, validation, business rules, and database communication.

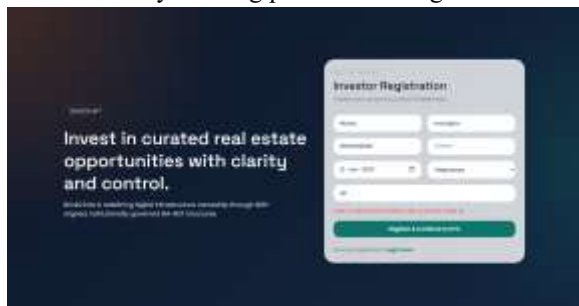
#### 9.1 Frontend Layer

The frontend includes the following major pages:

- i. Login: Allows existing users to enter email and password to access the system.



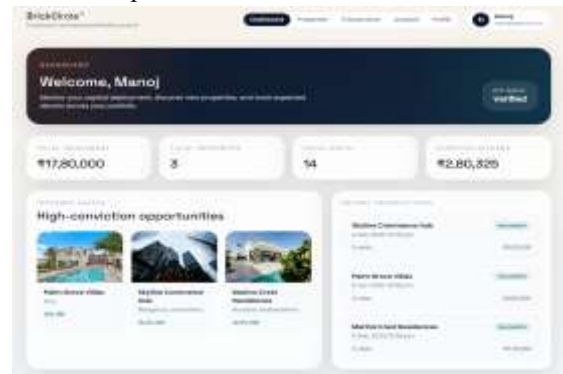
- ii. Registration: Allows new investors to create an account by entering personal and login details.



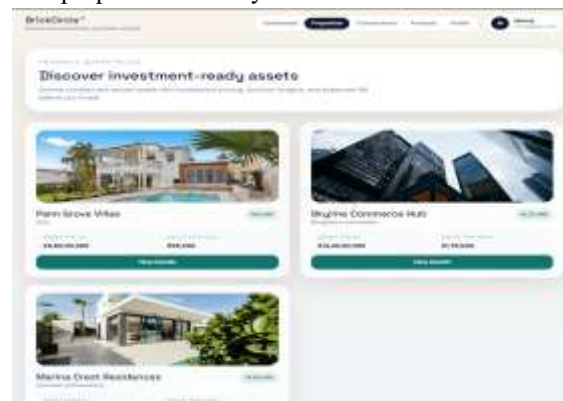
- iii. KYC: Collects investor verification details such as income, document type, document number, and document image.



- iv. Dashboard: Displays summary information like total investment, total properties, total units, and expected returns.



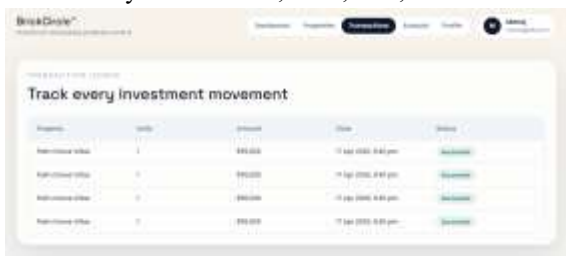
- v. Properties: Shows the list of available properties with key information for review.



- vi. Property Details: Displays complete property information along with IRR calculator and investment section.



- vii. Transactions: Shows the investor's transaction history with amount, units, date, and status.



- viii. Analysis: Presents graphical reports such as investment trend, IRR projection, and portfolio allocation.



- viii. Property listing and property detail retrieval: Provides property list and full details of selected property.
- ix. Investment creation: Records a new investment and updates related transaction and property data.
- x. Analysis report generation: Generates data for graphical reports such as trends, projections, and allocation.

## X. DATABASE DESIGN

The database was designed to support both operational workflows and analysis generation.

10.1 `investors` - Stores registration and account-level data such as name, email, mobile number, hashed password, address, state, date of birth, and KYC completion status.

10.2 `investor\_kyc` - Stores KYC-related data such as income, document type, document number, and document image location. A one-to-one link with investors ensures each investor has at most one active KYC record.

10.3 `properties` - Stores property information including descriptive fields, pricing, expected IRR, image references, and available units.

10.4 `investments` - Stores the details of each investment made by an investor in a property.

10.5 `transactions` - Stores transaction records related to investments, including status and timestamps.

This design supports dashboard aggregation, trend reports, property-wise summaries, and traceable transaction history.

## 9.2 Backend Layer

The backend exposes APIs for:

- i. Registration: Creates a new investor account after validating input details.
- ii. Login: Authenticates the investor and provides secure access using token-based login.
- iii. Current user retrieval: Fetches the logged-in investor's account details.
- iv. KYC submission: Stores investor KYC details and uploaded document for verification.
- v. Dashboard summary: Returns aggregated investor data for dashboard display.
- vi. Transaction listing: Fetches all transaction records related to the investor.
- vii. Profile retrieval: Retrieves investor personal details and KYC information.

## XI. IMPLEMENTATION DETAILS

### 11.1 Frontend Implementation

React with TypeScript was used to build a modular interface. Components were created for layout, forms, cards, navigation, and route protection. Tailwind CSS was used to design a responsive and consistent interface.

The analysis page includes a left-side report selector and three investor-facing graphs:

- Total investment trend by month or year
- Projected growth by IRR for the total portfolio or a selected invested property
- Portfolio allocation pie chart

The chart views are implemented with lightweight inline SVG rendering, avoiding unnecessary third-party chart dependencies.

### 11.2 Backend Implementation

Node.js with Express and TypeScript was used to create API endpoints. Major backend operations include:

- Password hashing with bcrypt
- JWT token generation and validation
- KYC file upload handling
- Dashboard aggregation queries
- Transaction joins across related tables
- Analysis data generation through grouped SQL queries

### 11.3 Security Implementation

Security-oriented implementation choices include:

- Storing hashed passwords rather than plain-text passwords
- Using token-based route protection
- Verifying authentication before protected operations
- Validating sensitive form fields on both client and server

## XII. RESULTS AND DISCUSSION

The final system successfully demonstrates the intended investor workflow. A user can register, log in, complete KYC, access the dashboard, browse properties, calculate expected returns, invest in a property, view transactions, and inspect analytical reports.

### 12.1 Functional Outcomes

The following outcomes were achieved:

- Successful registration and login workflow
- KYC-gated access to investor features
- Real-time investment amount and expected return calculation
- Stored investment and transaction records
- Dashboard-level aggregation of portfolio information
- Trend, projection, and allocation reporting
- Validated user input across core forms

### 12.2 Discussion

The implemented module demonstrates that investor experience improves when the workflow is unified rather than fragmented. KYC enforcement becomes clearer when tied directly to the navigation flow. Similarly, investment confidence is improved when calculation support and transaction visibility are built into the same environment.

The addition of investor-facing analysis also increases the practical value of the module. Trend charts support temporal understanding, IRR projection supports forward-looking interpretation, and allocation charts help users see how their investments are distributed.

## XIII. INNOVATION AND ORIGINALITY

This project does not claim that individual features such as login, KYC, or dashboards are independently new. The originality lies in how these features are combined into a single investor-centered workflow with validation, compliance control, decision support, and analytical visibility.

The distinctive aspects of the project are:

- Strict KYC-first access control in the user flow
- Integrated IRR calculator in the investment review screen
- Investor-focused analytics rather than only tabular records
- Dual-layer validation across client and server
- Modular full-stack implementation suitable for academic and practical extension

## XIV. LIMITATIONS

- Notification services
- Role-based multi-user administration
- Cloud-based secure file storage
- Advanced audit logging

## XV. FUTURE WORK

Future enhancement opportunities include:

- Integrating online payment processing
- Implementing email and SMS alerts
- Expanding analytical reports with filters and export options
- Deploying the platform on secure cloud infrastructure
- Adding advanced security measures such as two-factor authentication

## XVI. CONCLUSION

This paper presented the design and implementation of a web-based Investor Module for a real estate investment platform. The system was developed to improve the investor journey through secure onboarding, mandatory KYC verification,

structured property access, return estimation, database-backed investment recording, transaction visibility, and graphical analysis.

The results show that a modular architecture using React, TypeScript, Node.js, Express, and MySQL can effectively support investor-centered operations while maintaining clarity, security, and extendibility. The project is useful as both an academic contribution and a foundation for further practical development of investor-facing digital platforms.

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