# Chain Stock

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*Abstract*—**The rapid evolution of financial technology has significantly transformed the landscape of retail investing and trading. Online trading platforms like Zerodha have set a new standard by offering commission-free trades, intuitive interfaces, and real-time market data. This research presents Chain Stock, a full-stack trading platform developed as a clone of Zerodha, designed to simulate the core functionalities of a modern brokerage system. The primary objective of the project is to explore the architecture, design principles, and real-time capabilities required to build a scalable and user-friendly trading application. Chain Stock offers features such as user authentication, live market data integration, a virtual trading engine, portfolio tracking, and responsive charting tools. The platform is built using a modern technology stack incorporating React.js for the frontend, Node.js for backend services, and Web Sockets for real-time data streaming. Emphasis is placed on usability, security, and modular architecture to ensure a seamless user experience and educational value. This paper outlines the methodology adopted in developing Chain Stock, evaluates its performance against existing trading solutions, and discusses the challenges encountered during implementation. By replicating the structure of an established trading platform while introducing improvements in user experience and system design, Chain Stock serves both as a practical fintech prototype and as a valuable educational tool for developers and investors alike.**

*Index Terms*—**Blockchain, Decentralized Finance (DeFi), Smart Contracts, Crypto Payments, IPO Bidding, Fintech, Ethereum, Immutable Ledger, Chain Stock.**

## I. INTRODUCTION

The increasing integration of technology into the financial sector has transformed the way individuals interact with markets. Online trading platforms have emerged as powerful tools that offer users direct access to stock exchanges, portfolio management systems, and financial analytics—all from a single interface. One of the most influential platforms in this space is Zerodha, which has revolutionized stock trading in India through its discount brokerage model, clean user interface, and feature-rich ecosystem.

Inspired by Zerodha's impact, this project—Chain Stock—aims to build a comprehensive and educational stock trading simulation platform. The goal is to replicate core functionalities of platforms like Zerodha while introducing user-friendly features, modular system design, and real-time data capabilities. Chain Stock is not just a clone, but a technical exercise in understanding the structural and operational requirements of modern fintech applications.

At its core, Chain Stock offers a simulated environment for users to engage in trading activities using virtual capital. It provides functionalities such as real-time stock price tracking, order execution, portfolio analysis, and chart-based technical indicators. The platform is developed using a modern web development stack, including React.js for the frontend, Node.js for backend services, and APIs for market data integration. The system is designed to be secure, scalable, and responsive—ensuring a seamless experience for users across devices.

This research paper documents the process of designing and developing Chain Stock, from the initial concept and requirement analysis to implementation, testing, and evaluation. It highlights the technical challenges encountered, the solutions adopted, and how industry standards guided the development. Ultimately, the project serves as a valuable learning model for aspiring developers and fintech enthusiasts, while also contributing to the growing body of knowledge on building robust financial platforms.

## II. LITERATURE SURVEY

The increasing complexities of global financial systems and the growing concerns around transparency, trust, and accessibility have fueled the exploration of blockchain technology as a

transformative force in fintech. Blockchain offers decentralization, immutability, and peer-to-peer interaction, making it an ideal candidate for reshaping how financial transactions are executed and recorded. Several foundational works have laid the groundwork for integrating blockchain into finance. These works span from the original conception of cryptocurrencies to more recent applications in decentralized finance (DeFi), Know Your Customer (KYC) processes, and stock trading infrastructure.

The table below summarizes some of the most influential contributions:

| Author | Title | Contribution |
|---|---|---|
| Satoshi Nakamoto | Bitcoin: A Peer-to-Peer Electronic Cash System | Proposed the concept of a decentralized digital currency, introducing blockchain as a public, immutable ledger maintained by Proof-of-Work consensus. |
| Vitalik Buterin | Ethereum White Paper | Introduced smart contracts, enabling programmable business logic on the blockchain and setting the stage for decentralized applications (dApps). |
| J. Lee et al. | DeFi: A Disruptive Force | Analyzed how DeFi systems eliminate traditional intermediaries, such as banks and brokers, enabling peer-to-peer financial services. |
| R. Sharma | Blockchain in Indian Finance | Discussed the application of blockchain in the Indian financial ecosystem, particularly in clearing, settlement, and trade audits. |
| A. Patel et al. | Blockchain-based KYC | Proposed a decentralized approach to identity verification using blockchain for improved privacy, efficiency, and compliance with regulatory standards. |

The literature provides strong theoretical and practical foundations for the use of blockchain in transforming financial systems. Chain Stock builds upon these foundations by not only simulating a stock trading platform but also introducing core blockchain functionalities such as decentralized validation, smart contract logic, and transparent record-keeping.
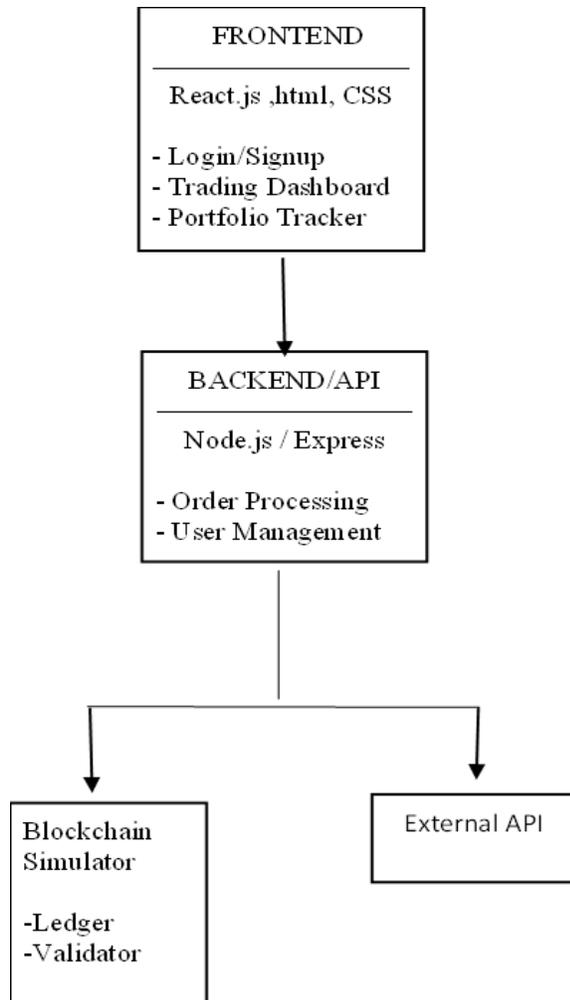
This dual-purpose platform functions as both a technical prototype and a learning environment, bridging the gap between current financial infrastructure and emerging decentralized financial paradigm.

## III. PROPOSED SYSTEM

A. Architectural Overview
The platform comprises three major layers:
- Frontend (React.js): Provides an intuitive UI/UX similar to leading platforms but backed by blockchain data.
- Backend (Node.js + Web3.js): Connects the frontend to smart contracts and Ethereum test net.
- Smart Contracts (Solidity): Automate payments, KYC approvals, IPO bidding, and maintain on-chain order books.

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┌─────────────────────────┐
│        FRONTEND         │
│ ─────────────────────── │
│   React.js ,html, CSS   │
│                         │
│  - Login/Signup         │
│  - Trading Dashboard    │
│  - Portfolio Tracker    │
└────────────┬────────────┘
             │
             ▼
┌─────────────────────────┐
│      BACKEND/API        │
│ ─────────────────────── │
│    Node.js / Express    │
│                         │
│  - Order Processing     │
│  - User Management      │
└────────────┬────────────┘
             │
      ┌──────┴──────┐
      ▼             ▼
┌───────────┐  ┌───────────┐
│Blockchain │  │External API│
│Simulator  │  └───────────┘
│           │
│-Ledger    │
│-Validator │
└───────────┘
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B. Functional Modules

1. User Registration & Blockchain-based KYC
- Each user is mapped to a blockchain wallet address.
- KYC is validated through a smart contract and stored as a cryptographic hash on-chain.
- Once verified, users receive a Soulbound Token (SBT) acting as a decentralized identity badge.

2. Decentralized Trading Dashboard
- Displays real-time market data from oracles.
- Each trade (buy/sell order) is validated by a smart contract and stored immutably.
- Users can audit their complete trading history via blockchain explorers.

3. Smart Payment Gateway (Crypto)
- Payments are done through integrated wallets (e.g., MetaMask).
- Accepts stablecoins pegged to INR/USD to prevent volatility.

- Smart contracts ensure funds are only transferred when trading conditions are met.

4. IPO Bidding via Smart Contracts
- IPOs are launched as smart contracts with predefined conditions (price, lot size, max cap).
- Users submit bids directly to the contract.
- Allocation is automated and publicly verifiable— removing manipulation.

5. Immutable Transaction Ledger
- Every transaction (fund deposit, share purchase, etc.) generates a unique transaction hash.
- This ledger is viewable by users and auditors for transparency.

IV. ADVANTAGES

1. Real-Time Market Simulation
Chain Stock provides users with a live trading simulation environment using real-time or near-real-time stock data. This enhances learning and allows users to test investment strategies without financial risk.

2. Blockchain-Backed Transaction Logging
Unlike conventional simulators, Chain Stock integrates blockchain-inspired mechanisms to validate and record trade actions. This ensures transparency, immutability, traceability—mirroring how decentralized systems operate.

3. Educational Value
The platform serves as an effective tool for students, researchers, and beginners who want to learn about stock trading, blockchain integration, and fintech system architecture in a safe and interactive way.

4. User-Friendly Interface
Developed using modern frontend frameworks like React.js and Tailwind CSS, the UI is intuitive, responsive, and optimized for both desktop and mobile devices, improving accessibility and user experience.

5. Security-Oriented Design
Even as a simulator, Chain Stock follows secure design patterns such as encrypted login, token-based session management, and mock KYC handling—fostering awareness of real-world security practices.

V. FUTURE SCOPE

1. Integration with Live Stock Market APIs
Currently relying on simulated or delayed data, Chain Stock can be extended to connect with real-time

financial data providers (e.g., NSE, BSE, Alpha Vantage, or Polygon.io). This would allow users to interact with actual market conditions, providing a more realistic experience.

2. Deployment on Public Blockchain Networks

Future versions could implement real smart contracts on public blockchains such as Ethereum, Polygon, or Solana. This would enable real decentralized order validation, wallet-based login, and on-chain portfolio tracking—turning Chain Stock into a semi-decentralized trading platform or DEX prototype.

3. Smart Contract-Based Order Matching

A potential evolution of the platform involves deploying a fully decentralized order matching engine using smart contracts. This could automate trade execution and introduce user-defined trading logic through customizable smart contracts.

4. Mobile Application Development

To increase accessibility, a native mobile version of Chain Stock can be developed using React Native or Flutter, allowing users to learn and simulate trades on the go.

5. AI-Powered Trading Suggestions

Integrating machine learning models for predictive analytics and AI-driven portfolio suggestions can help users understand algorithmic trading, market sentiment, and risk assessment.

6. Gamification and Leaderboards

To enhance engagement and competition among users, features like virtual trading challenges, leaderboards, and achievements can be added. This would make the learning process more interactive, especially for students and beginners.

7. Advanced Financial Instruments

Future iterations can include support for derivatives (futures, options), mutual funds, ETFs, and cryptocurrencies—broadening the financial education scope of the platform.

8. Educational Integration

The platform can be integrated with MOOCs, university finance courses, or professional certifications to serve as a hands-on lab for financial literacy and blockchain technology education.

## VI. CONCLUSION

The development of Chain Stock, a prototype inspired by Zerodha, demonstrates the potential of integrating traditional stock trading interfaces with blockchain-inspired technologies. By simulating real-time trading functionalities and incorporating decentralized transaction validation principles, Chain Stock serves as both an educational tool and a proof of concept for hybrid fintech platforms.

The project successfully replicates key features of modern trading systems—such as live dashboards, secure user authentication, and portfolio management—while introducing blockchain elements like immutable trade logging and smart contract logic (simulated). This combination provides users with an accessible yet insightful experience that mirrors real-world stock market operations in a risk-free environment.

Moreover, Chain Stock contributes to ongoing discussions in financial technology by showcasing how blockchain can enhance transparency, security, and efficiency without sacrificing usability. The platform's modular architecture and extensible design open up numerous avenues for future research and development, including real-time API integration, full blockchain deployment, and AI-powered financial analytics.

In conclusion, Chain Stock stands as a promising initiative at the intersection of traditional finance and decentralized technology—highlighting how next-generation platforms can reshape user interaction, transparency, and trust in the financial ecosystem.

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