

## CryptoTrade: Modern Cryptocurrency Trading Platform

CryptoTrade is a comprehensive cryptocurrency trading platform that provides a seamless trading experience with real-time market data, secure user authentication, and robust portfolio management.

### Features

- **User Authentication:** Secure login and registration with password hashing and session management
- **Real-time Price Tracking:** WebSocket integration for live cryptocurrency price updates
- **Trading Functionality:** Execute buy and sell trades with intuitive interface
- **Portfolio Dashboard:** Track your assets, balance, and performance over time
- **Transaction History:** Detailed record of all your cryptocurrency transactions
- **Price Alerts:** Set custom alerts for price movements on your favorite cryptocurrencies
- **Responsive Design:** Works seamlessly on desktop and mobile devices

### Technology Stack

- **Frontend:** React with TypeScript, using ShadCN UI components and Tailwind CSS
- **Backend:** Node.js with Express server
- **Database:** PostgreSQL for persistent data storage
- **ORM:** Drizzle for type-safe database operations
- **Authentication:** Passport.js with secure session management
- **Real-time Updates:** WebSocket for live cryptocurrency price feeds
- **API Integration:** Connection to cryptocurrency market data APIs

### Technical Implementation

- RESTful API architecture for all data operations
- JWT-based authentication with secure HTTP-only cookies
- PostgreSQL database with proper relations between entities

- WebSocket server for real-time bidirectional communication
- Type-safe data handling with TypeScript and Zod validation
- Responsive UI with modern design patterns and accessibility features

### Getting Started

1. Clone the repository
2. Run npm install to install dependencies
3. Set up environment variables
4. Run npm run dev to start the development server
5. Access the application at <http://localhost:5000>

### Database Schema

The application uses a relational database model with the following main entities:

- Users (authentication and profile information)
- Wallets (storing cryptocurrency balances)
- Transactions (record of all trading activity)
- Alerts (user-defined price notifications)

### Security Features

- Password hashing using bcrypt with salt
- Session-based authentication with secure cookies
- Input validation on all API endpoints
- Protection against common web vulnerabilities

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This modern trading platform demonstrates best practices in full-stack development with a focus on security, performance, and user experience.