TaniTrack Agrichain: Technical Deep Dive

Building a Hybrid Web3 Agricultural Marketplace

Project Overview & Goal

TaniTrack: Streamlining agricultural trade by securely connecting farmers and buyers.

Technical Goal:

- Combine robust off-chain data management with a seamless UX.
- Utilize on-chain financial integrity via Solana for secure transactions.
- Abstract Web3 complexities for non-technical users (farmers).

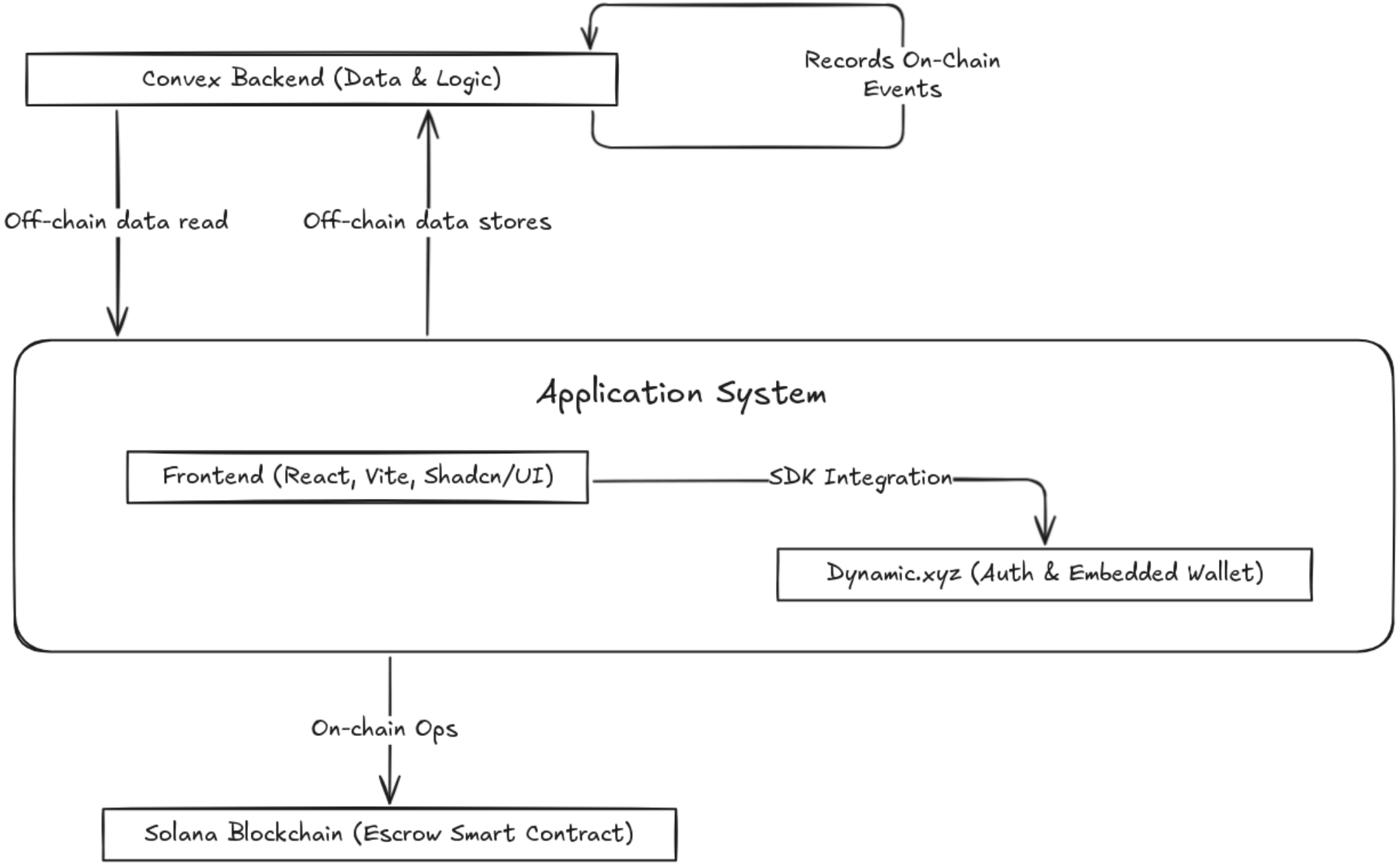
Technology Stack

- **Frontend:** React, Vite, TypeScript, Shadcn/UI, Tailwind CSS
- **Backend (Off-Chain):** Convex (Real-time Database & Serverless Functions)
- **Blockchain:** Solana (Anchor & Rust for Smart Contracts)
- **Authentication & Wallet:** Dynamic.xyz (Embedded Wallets)
- **Deployment:** Cloudflare Pages (Frontend), Convex Cloud
- **Dev Tools:** VS Code, AI (ChatGPT/Claude), Lovable (template generation)

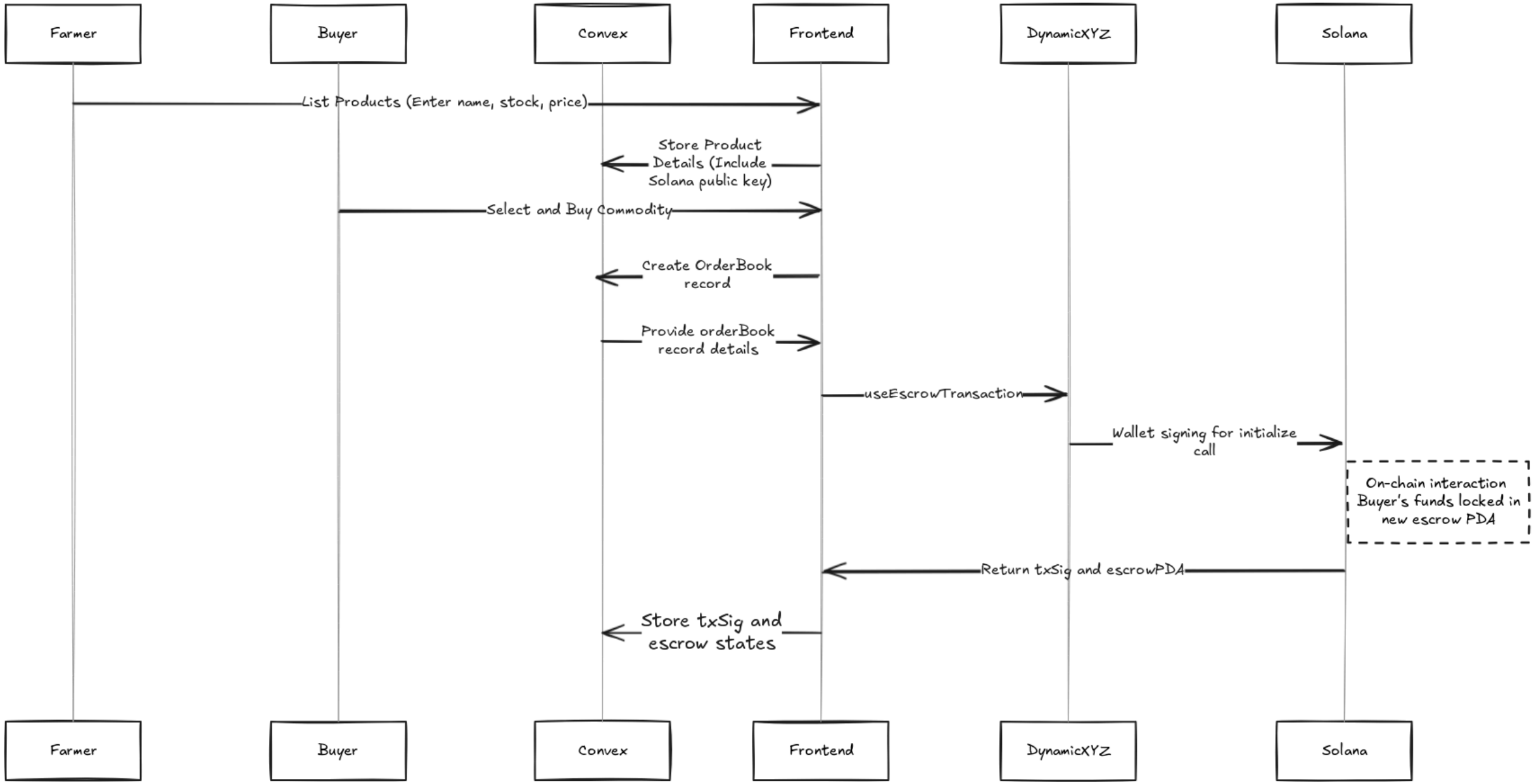
Key Technical Decisions

- **React + Vite + Shadcn:**
  - Robust and mature frontend tooling
- **Dynamic.xyz:**
  - Simplifies Web3 for non-technical users (e.g., farmers).
  - Robust auth and future potential for gasless transactions.
- **Convex + Solana Hybrid:**
  - **Convex:** Rapid development, real-time UX for off-chain data.
  - **Solana:** Security and trust for financial escrow.

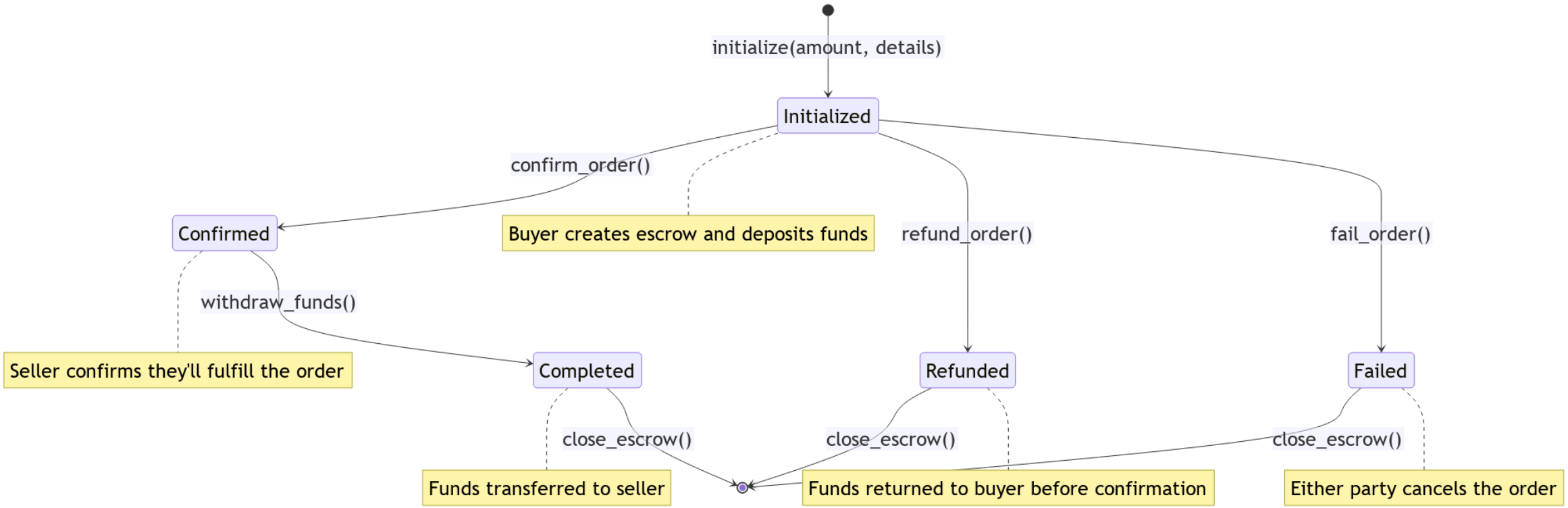
Architecture: The Hybrid Approach


Convex Backend (Data & Logic)
Records On-Chain Events
Off-chain data read
Off-chain data stores
Application System
Frontend (React, Vite, Shadcn/UI)
SDK Integration
Dynamic.xyz (Auth & Embedded Wallet)
On-chain Ops
Solana Blockchain (Escrow Smart Contract)

User Experience Flow


Farmer
Buyer
Convex
Frontend
DynamicXYZ
Solana
List Products (Enter name, stock, price)
Store Product Details (Include Solana public key)
Select and Buy Commodity
Create OrderBook record
Provide orderBook record details
useEscrowTransaction
Wallet signing for initialize call
On-chain interaction Buyer's funds locked in new escrow PDA
Return txSig and escrowPDA
Store txSig and escrow states
Farmer
Buyer
Convex
Frontend
DynamicXYZ
Solana

Agrichain Escrow Program: Overview


initialize(amount, details)
Initialized
confirm_order()
Buyer creates escrow and deposits funds
refund_order()
fail_order()
Confirmed
withdraw_funds()
Seller confirms they'll fulfill the order
Completed
Refunded
Failed
close_escrow()
close_escrow()
close_escrow()
Funds transferred to seller
Funds returned to buyer before confirmation
Either party cancels the order