MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Member-To-Member Payments with Blockchain Settlement

The Capstone Experience

Team MSUFCU

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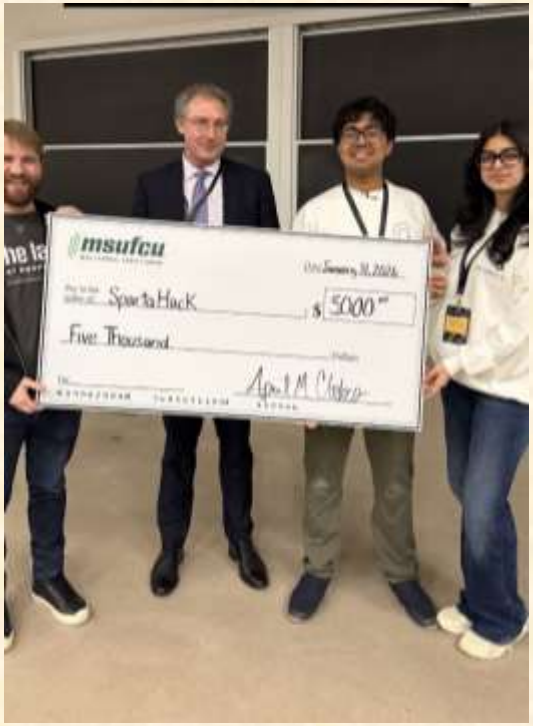
Spring 2026



From Students…
…to Professionals

Project Sponsor Overview

- Largest university-affiliated credit union
  - 36 Branches
  - $8.3 Billion in assets
- Banking with community focus
  - $1.1 Million toward local nonprofits
  - Checking, Savings, Loans, Insurance
  - M2M Payments



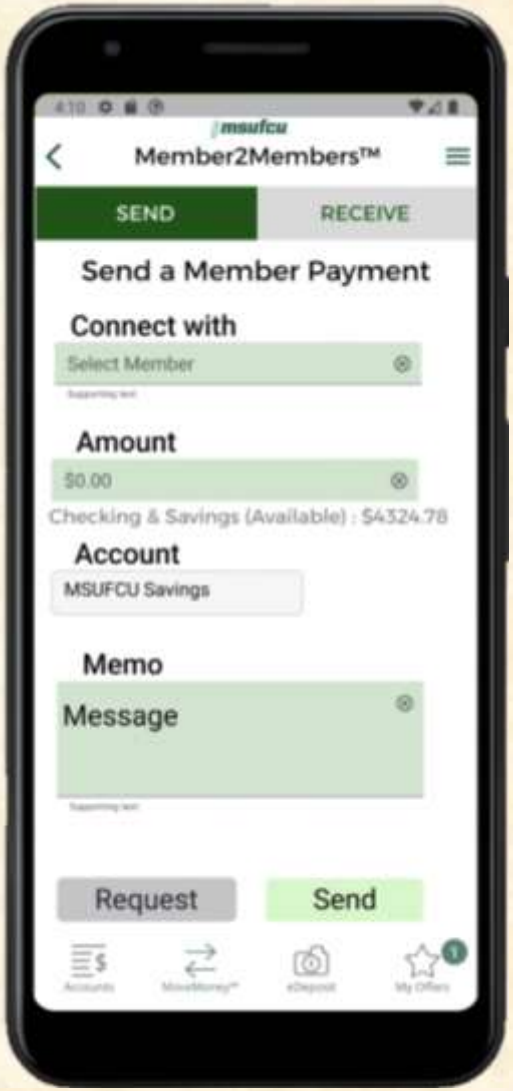
Project Functional Specifications

- Problem – Logs are Mutable and Lack Visibility
  - Transaction logs lack transparancy into settlement status and transaction history
  - Cannot easily track payments or concretely investigate disputes
- Solution – M2M Payments with Immutable Blockchain Settlements
  - Enable members to send or request payments from other members
  - Displays real-time transaction lifecycle status
    - (pending → settled)
  - Transactions settled on blockchain layer for immutable audit history
  - Provide Admin tooling for settlement monitoring, dipsutes and fraud resolution, and system health maintenance

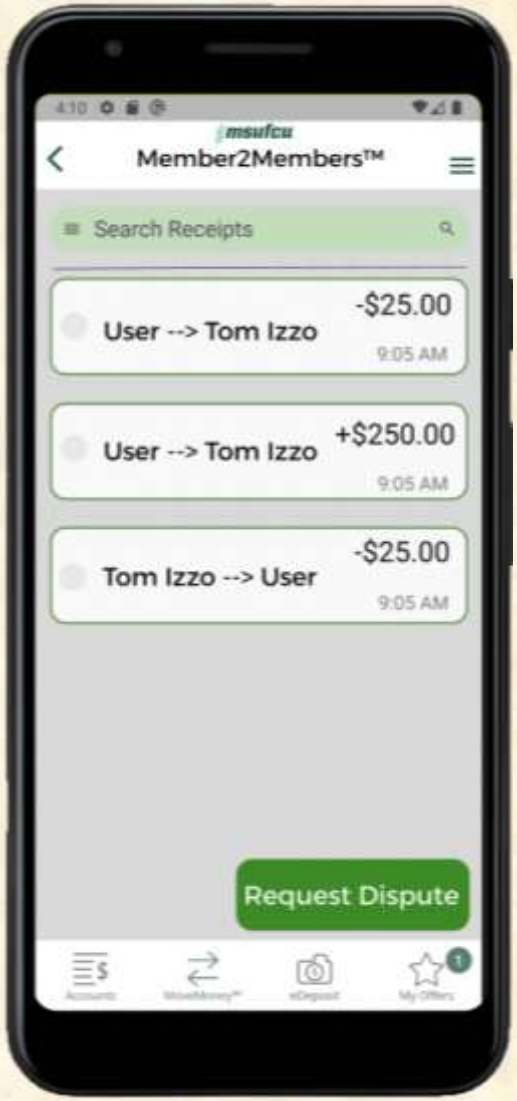
Project Design Specifications

- Website and Mobile App
  - Identical feel and design
- User
  - Send/Receive Payments
  - View Payment Status
  - Dispute Payments
- Admin
  - View all pending & blockchain-settled transactions
  - Research & Solve Disputes

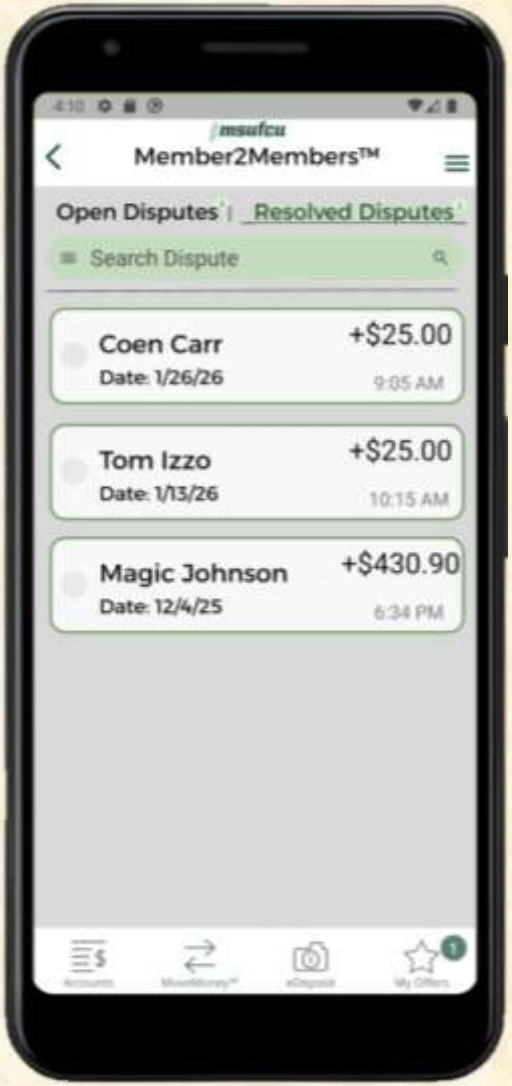
Screen Mockup: User – Send/Receive



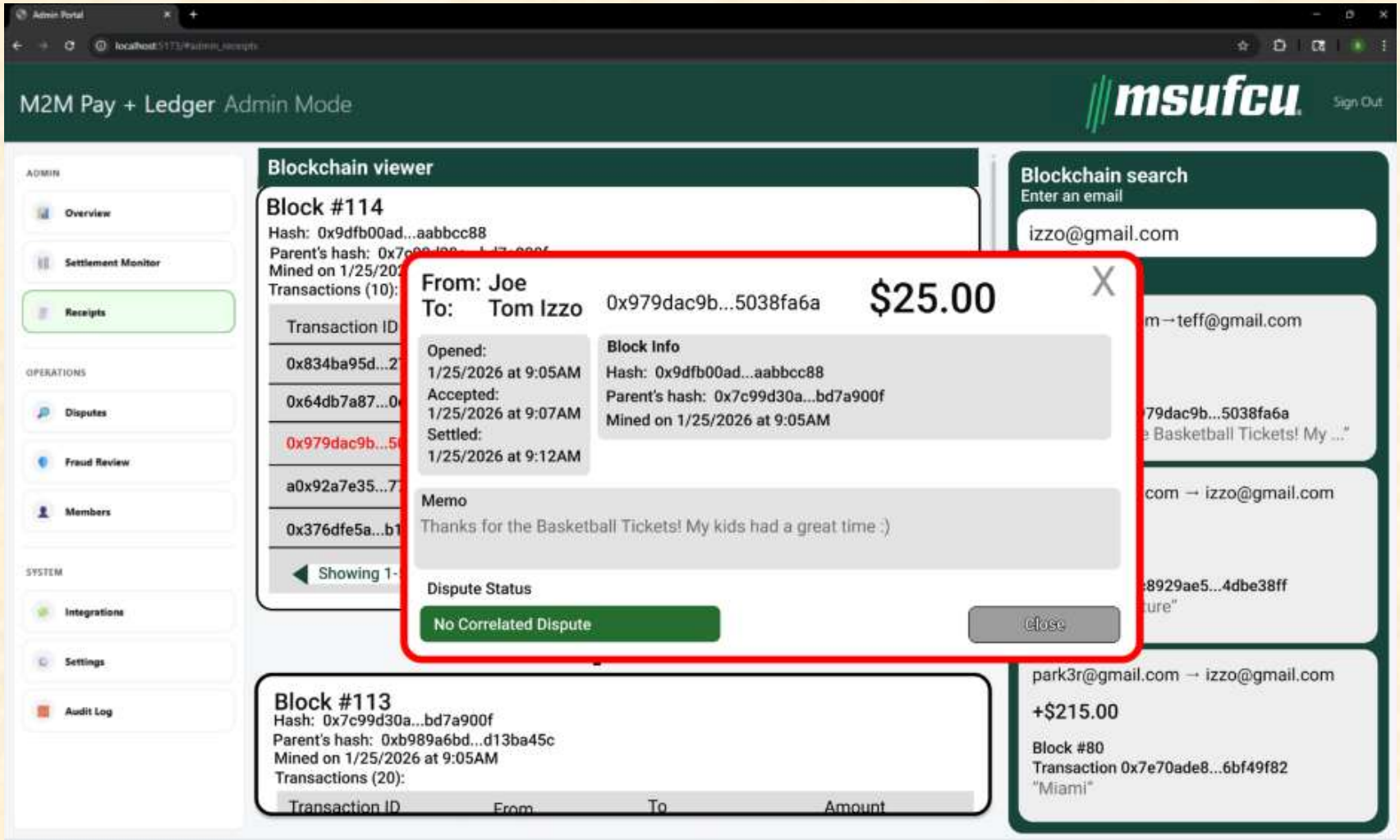
Screen Mockup: User - Receipts



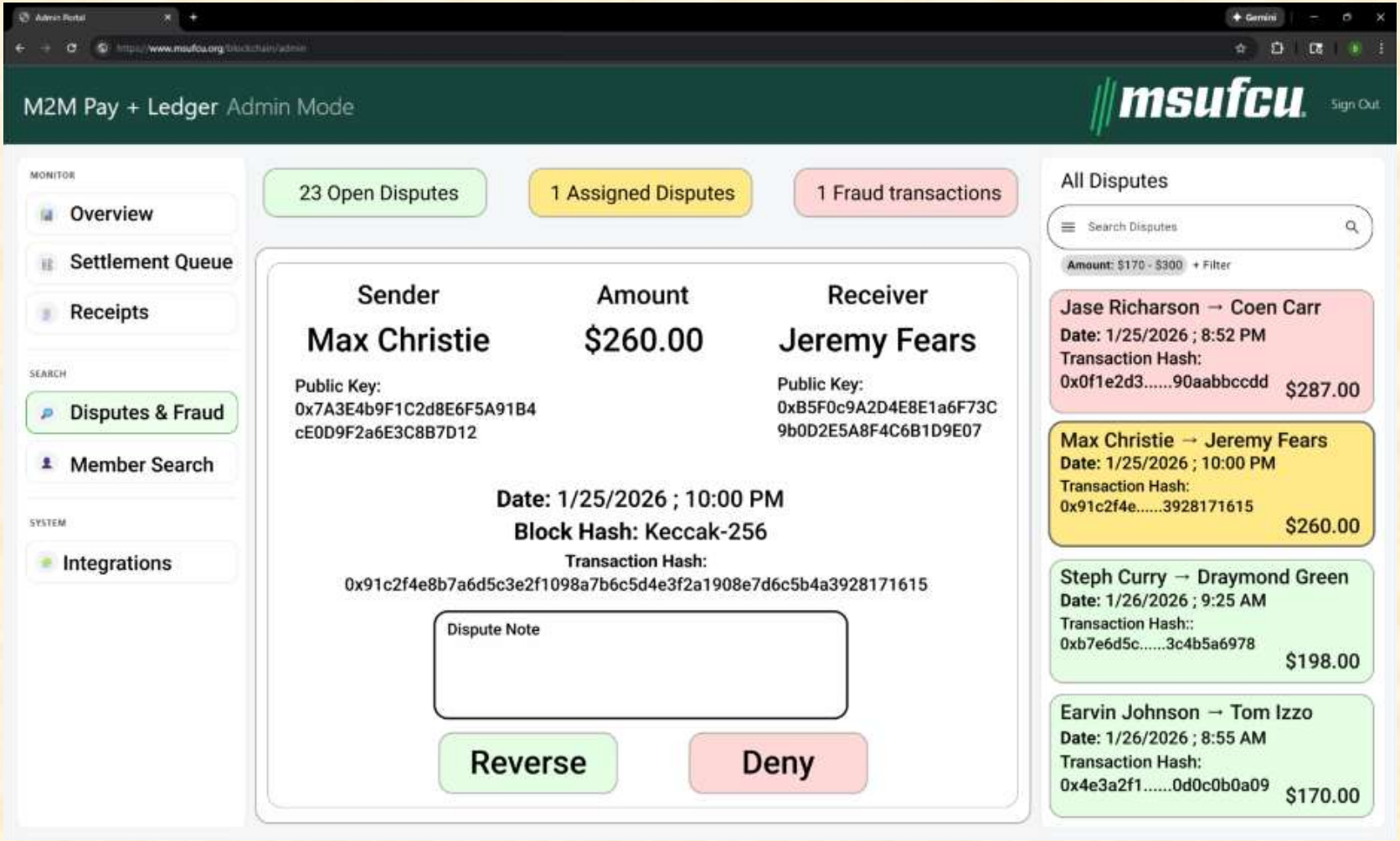
Screen Mockup: User - Disputes



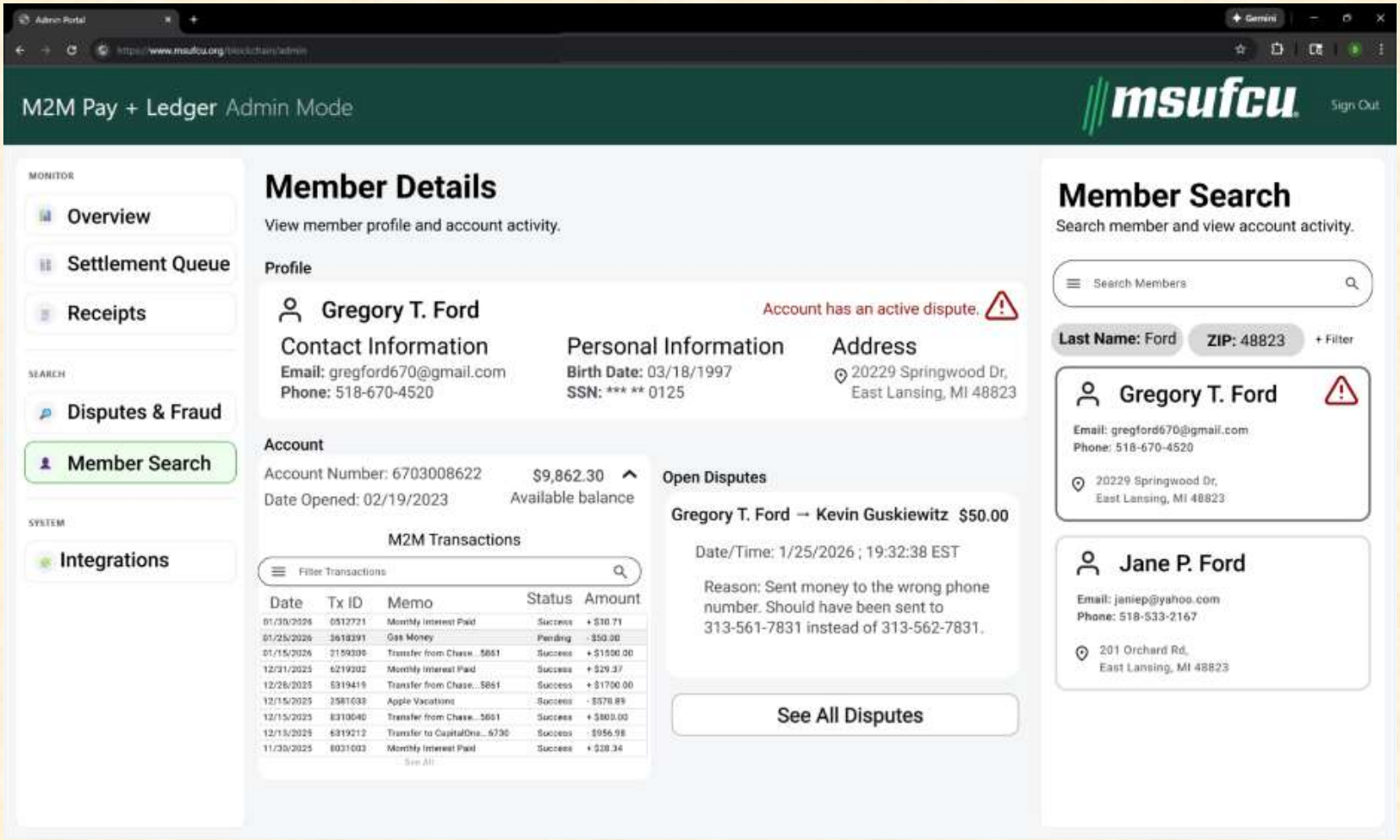
Screen Mockup: Admin - Receipts



Screen Mockup: Admin - Disputes



Screen Mockup: Admin – Members

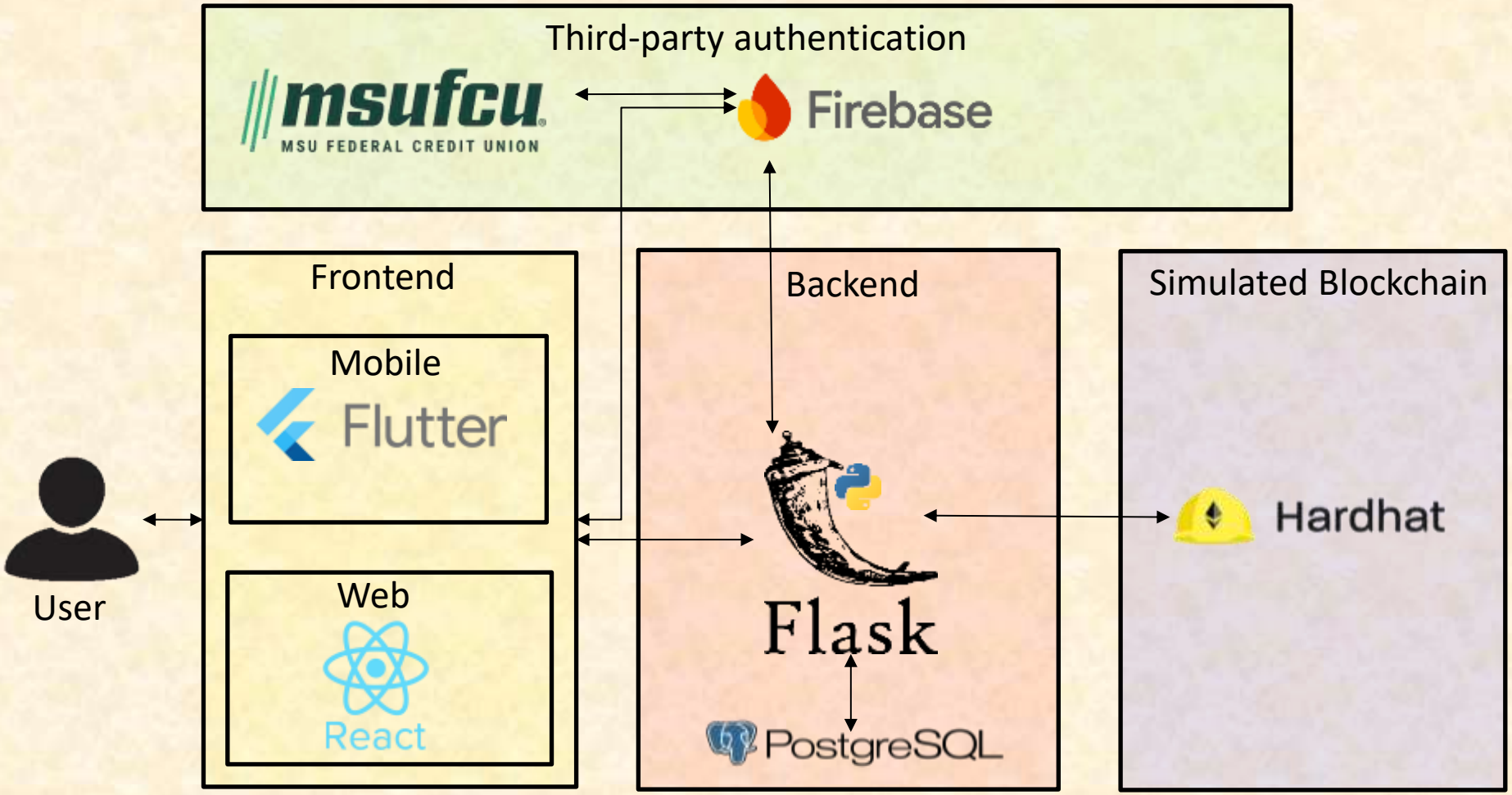


Project Technical Specifications

- React/Flutter
  - Web/mobile frontend
- Firebase
  - Zero-trust user authentication
- PostgreSQL Server
  - Transactions and user data
- Flask Server
  - Python backend
- Hardhat Server
  - Simulated blockchain for user transactions



Project System Architecture



Project System Components

- Hardware Platforms
  - Docker
  - DECS Server
- Software Platforms / Technologies
  - Firebase
  - Postgres
  - Flask
  - Hardhat
  - React/Flutter



Project Risks

- Risk 1: Blockchain/Postgres Out-of-Sync
  - Transaction database will be out of sync with Blockchain by design
  - Communicate through Web3 + Flask, clear admin logging
- Risk 2: Fragile Environment
  - Multiple services with points of failure → Cascading errors
  - Implement server health communication, startup dependencies, and shutdown protocols
- Risk 3: Blockchain Immutability vs. Transaction Reversals
  - Blockchain transactions are immutable, which conflicts with dispute resolutions for transactions
  - Blockchain settlements will not be deleted, equal-and-opposite transactions will be added to the chain and reference the original settlement
- Risk 4: Limited Auditing Experience
  - Team lacks knowledge of formal auditing procedures or standards
  - Contact MSUFCU's audit experts to learn about expectations

Questions?

