

HalalChain

Islamic Finance Ecosystem on XRPL

NUS FinTech Summit 2026 Hackathon

Project Overview & Implementation Guide

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1. Vision Statement

A comprehensive Shariah-compliant financial platform where Muslims invest ethically, earn returns, automatically calculate Zakat, and distribute it to verified beneficiaries - all powered by XRP Ledger (XRPL).

The Problem We Solve:

- **For Investors:** Limited access to tokenized Islamic financial products (Sukuk, real estate) with transparent returns and automated Zakat calculation.
- **For Beneficiaries:** Inefficient Zakat distribution, lack of verification, and no transparency on fund usage and impact.

Our Solution:

An integrated ecosystem that combines ethical investment opportunities (tokenized Sukuk and real estate) with automated, transparent Zakat distribution - all using XRPL's cutting-edge features.

2. System Architecture Overview

HalalChain is built on a unified Decentralized Identity (DID) system that serves both investors and beneficiaries, creating a complete Islamic finance ecosystem.

Architecture Components:

Component	Description	XRPL Feature
Universal DID	Single identity for investors & beneficiaries	XRPL DID Standard
Investment Module	Tokenized Sukuk & Real Estate NFTs	Trust Lines + NFTokens
Zakat Engine	Automated calculation (2.5% of wealth)	Account Data + APIs
Distribution System	Smart matching & instant payments	Payment Channels
Returns Manager	Quarterly profit distribution	Escrow + Scheduled Payments
Transparency Layer	Immutable transaction records	On-chain Memos + Ledger

Two-Sided Platform Flow:

- **Investor Side:** Create DID → Buy tokenized Sukuk/Real Estate → Earn returns → Auto-calculate Zakat → Distribute to beneficiaries
- **Beneficiary Side:** Create DID → Verify need status → Get matched with donors → Receive Zakat payments → Upload impact proof

3. Key Features & XRPL Integration

3.1 Universal Islamic DID (Decentralized Identity)

Purpose: One portable identity that works across all Islamic fintech platforms, eliminating repetitive KYC processes.

Key Attributes:

- For Investors: Shariah compliance status, KYC verification, accredited investor badge
- For Beneficiaries: Verified need status, Zakat eligibility, category (orphan, poor, debtor, needy)
- Shared: XRPL wallet address, credentials issued by Islamic Finance Authority

XRPL Implementation: Uses XRPL's native DID standard with account data storage for credentials.

3.2 Investment Module - Tokenized Sukuk & Real Estate

A. Sukuk Tokens (Islamic Bonds)

- Represents fractional ownership in Shariah-compliant projects (solar farms, infrastructure)
- Structured as cost-plus profit (no interest/riba)
- Example: Green Energy Sukuk - \$100K project, 5% annual profit, 2027 maturity
- XRPL Feature: Trust Lines for fungible tokens

B. Real Estate Tokenization

- Fractional property ownership using NFTs
- Example: Dubai office tower valued at \$500K, split into 100 fractions (\$5K each)
- Rental income distributed quarterly via XRPL payments
- XRPL Feature: NFTokens with metadata stored on IPFS

3.3 Automated Zakat Calculation Engine

Zakat is a mandatory 2.5% charity on qualifying wealth (Nisab threshold: ~\$7,000 equivalent in gold). Our system automatically calculates based on all XRPL holdings.

How It Works:

- Query investor's XRPL account for all assets (RLUSD balance, Sukuk tokens, real estate NFTs)
- Calculate total wealth in USD equivalent
- Apply Nisab threshold check
- Calculate 2.5% Zakat due
- Set due date based on Hijri calendar (lunar year)

3.4 Zakat Distribution with Smart Matching

Intelligent algorithm matches donors with verified beneficiaries based on preferences (geography, cause category).

Distribution Process:

- Donor specifies preferences (education, healthcare, orphans, etc.)
- System queries verified beneficiaries from DID registry
- Smart allocation across multiple recipients
- Instant XRPL payments in RLUSD
- Transaction memos include donor DID, category, timestamp for full transparency

3.5 Returns & Profit Distribution (Escrow)

Quarterly profits from Sukuk and rental income from real estate are automatically distributed using XRPL's Escrow feature.

Process:

- Calculate each investor's share based on token holdings
- Create XRPL Escrow transactions scheduled for quarter-end
- Automatic release of funds on the scheduled date
- Full transparency via on-chain records

3.6 Summary: XRPL Features Used (Critical for Scoring)

XRPL Feature	Our Use Case	Rubric Impact
DID Standard	Universal Islamic identity for investors & beneficiaries	High (30%)
Trust Lines	Fungible Sukuk tokens	High (30%)
NFTokens	Real estate fractional ownership	High (30%)
Escrow	Scheduled profit distributions	High (30%)
Payment Channels	Instant Zakat payments	High (30%)
RLUSD Integration	Stablecoin for all transactions	High (30%)
Memos	Transaction transparency & tracking	Medium (20%)

4. User Flows

4.1 Investor Journey (End-to-End)

1. **Onboarding:** Create Universal DID → Complete KYC verification → Link XRPL wallet
2. **Browse Investments:** View tokenized Sukuk (e.g., 'Solar Farm Sukuk - 5% return') and real estate NFTs (e.g., 'Dubai Office Tower')
3. **Invest:** Purchase 10,000 RLUSD worth of Sukuk tokens via Trust Line
4. **Earn Returns:** Receive quarterly profit (125 RLUSD) directly to wallet via Escrow
5. **Zakat Calculation:** System automatically calculates annual Zakat = 250 RLUSD (2.5% of holdings)
6. **Pay Zakat:** One-click payment → Select beneficiary category (education) → Instant distribution
7. **View Impact:** Transparency dashboard shows 'Your Zakat educated 5 children this year'

4.2 Beneficiary Journey (End-to-End)

1. **Onboarding:** Create Universal DID → Submit need verification documents
2. **Verification:** Local charity/mosque vouches for beneficiary → Status approved
3. **Profile Setup:** Complete profile (e.g., 'Single mother, 3 children, need: education')
4. **Matching:** Smart algorithm matches with donors who specified 'education' category
5. **Receive Zakat:** Monthly payments (500 RLUSD) arrive instantly via XRPL
6. **Impact Proof:** Upload receipts/photos (children's school receipts) to IPFS
7. **Transparency:** Donors see real-time impact updates

5. 48-Hour Build Plan

Strategic plan to build a complete, demo-ready MVP in 48 hours (Jan 7-9).

Day 1 (Jan 7) - Foundation Layer

Morning Session (12pm-4pm):

- Set up XRPL Testnet environment (wallets, faucet funding)
- Install xrpl.js SDK and dependencies
- Build DID creation system for both user types
- Set up PostgreSQL database schema (users, transactions, investments)

Evening Session (4pm-10pm):

- Implement Sukuk token issuance (Trust Lines)
- Create real estate NFT minting functionality
- Build investment purchase flow (RLUSD transactions)
- RLUSD integration for all payments

Day 2 (Jan 8) - Core Features

Morning Session (9am-1pm):

- Zakat calculation engine (query accounts, calculate 2.5%)
- Beneficiary matching algorithm (preferences + geography)
- Payment distribution system (XRPL Payment Channels)
- Transaction history & transparency dashboard

Afternoon Session (1pm-6pm):

- Build returns distribution module (Escrow for scheduled payments)
- Create investor dashboard (portfolio view, holdings, returns)
- Build beneficiary dashboard (payments received, impact reports)
- Impact reporting system (upload receipts to IPFS)

Evening Session (6pm-10pm):

- Frontend polish (React components, Tailwind styling)
- Deploy smart contracts to XRPL Devnet
- End-to-end integration testing
- Record demo video (3 minutes)

Day 3 (Jan 9) - Polish & Submission

Morning Session (6am-9am):

- Final bug fixes and edge case handling
- Create comprehensive README with architecture diagrams
- Ensure all XRPL contract addresses are documented
- Public GitHub repository setup
- **Submit to Devpost by 9am SGT (CRITICAL DEADLINE)**

6. Technology Stack

Layer	Technologies	Purpose
Frontend	React + Tailwind CSS XRPL.js for wallet Chart.js for visualization	User interface Wallet integration Portfolio displays
Backend	Node.js + Express PostgreSQL XRPL Hooks (optional)	API server User data storage Automation
Blockchain	XRPL Testnet/Devnet Trust Lines (Sukuk) NFTokens (Real Estate) Escrow Payment Channels	Core transactions Token standards Scheduled payments Instant transfers
Storage	IPFS On-chain Memos	Metadata (property details) Transaction transparency
Identity	XRPL DID Standard Account Data	Universal identity Credential storage

Key Development Tools:

- **xrpl.js SDK:** Official JavaScript library for XRPL integration (<https://js.xrpl.org/>)
- **XRPL Testnet Faucet:** Get test XRP for development (<https://xrpl.org/xrp-testnet-faucet.html>)
- **IPFS Pinata:** For storing metadata (property details, Sukuk certificates)
- **React + Vite:** Fast frontend development

7. Demo Script (3 Minutes)

This is the exact script for the 3-minute demo video. Practice timing to stay under 3 minutes!

Opening (20 seconds)

'1.8 billion Muslims face two critical problems: limited access to Shariah-compliant investments, and inefficient Zakat distribution. HalalChain solves both on the XRP Ledger. Let me show you how.'

Part 1: Investment Flow (60 seconds)

Screen: Investor Dashboard

1. 'Meet Fatima - she creates her Islamic DID in seconds, completing KYC once'
2. 'She browses tokenized Sukuk backed by a solar farm, and fractional real estate NFTs in Dubai'
3. 'Fatima invests 10,000 RLUSD in the Green Energy Sukuk with 5% annual returns'
4. 'She receives Sukuk tokens instantly via XRPL Trust Lines - fully Shariah-compliant'
5. 'Quarterly returns of 125 RLUSD automatically hit her wallet via XRPL Escrow'

Part 2: Zakat Automation (50 seconds)

Screen: Zakat Calculator

1. 'At year-end, our system analyzes all of Fatima's XRPL holdings automatically'
2. 'It calculates her Zakat obligation: 2.5% of 10,000 = 250 RLUSD due'
3. 'Fatima selects her preference: Education for orphans in Southeast Asia'
4. 'Our smart algorithm instantly matches 5 verified beneficiaries through their DIDs'
5. 'With one click, 250 RLUSD is distributed instantly via XRPL Payment Channels'

Part 3: Impact & Transparency (40 seconds)

Screen: Beneficiary Dashboard

1. 'Meet Ahmad - a verified orphan student with an education-focused DID'
2. 'He receives 50 RLUSD monthly from multiple donors like Fatima'
3. 'Ahmad uploads his school receipts as impact proof to IPFS'
4. 'Fatima sees real-time impact: Your Zakat educated 1 child this year'
5. 'Every transaction is fully transparent via XRPL's immutable ledger'

Closing (10 seconds)

'HalalChain: Where ethical wealth creation meets transparent charity - all powered by XRPL's DID, tokenization, and instant payment features. Thank you.'

8. Why This Wins

8.1 Main Prize Rubrics Analysis

Criteria	Weight	Our Score	Reasoning
Use of XRPL	30%	■■■■■	Uses 6 core features: DID, Trust Lines, NFTs, Escrow, Payments, RLUSD
Completeness	30%	■■■■■	Full end-to-end flows for 2 user types with real transactions
Creativity	20%	■■■■■	Novel: First to combine Islamic investing + charity in one ecosystem
Business Potential	20%	■■■■■	Massive TAM: \$3.5T Islamic finance + \$1T annual Zakat market

8.2 BGA Bounty Alignment

Our project strongly aligns with the UN's Sustainable Development Goals (SDGs):

- **SDG 1 - No Poverty:** Direct Zakat distribution to verified poor and needy
- **SDG 8 - Economic Growth:** Enable SME financing through Sukuk and tokenized assets
- **SDG 10 - Reduced Inequality:** Financial inclusion for 1.8B Muslims globally
- **SDG 16 - Peace & Justice:** Transparent, immutable records prevent fraud

BGA Bounty Rubrics:

Criteria	Weight	Our Strength
Social Impact	30%	Direct poverty alleviation + financial inclusion for 1.8B people
Technical Implementation	20%	Production-ready XRPL integration with 6+ features
Innovation	20%	First Islamic DeFi ecosystem combining investing + charity
Sustainability & Scalability	20%	Built on XRPL (low fees, high throughput), globally scalable
Presentation	10%	Strong emotional story + clear demo of real impact

8.3 Competitive Advantages

- ✓ **Comprehensive:** Only project combining investment + charity in Islamic finance
- ✓ **Deep XRPL Integration:** Uses 6+ core XRPL features (highest utilization)
- ✓ **Real-World Ready:** Addresses actual pain points in \$4.5T market
- ✓ **Demoable:** Clear, visual user flows that judges can see working
- ✓ **Emotional Appeal:** Story of Fatima helping Ahmad resonates universally
- ✓ **Scalable:** XRPL handles 1500+ tx/sec, built for global deployment

9. Resources & Next Steps

9.1 Essential XRPL Resources

- **Official XRPL Documentation:** <https://xrpl.org/docs.html>
- **xrpl.js SDK Reference:** <https://js.xrpl.org/>
- **DID Standard on XRPL:** <https://xrpl.org/decentralized-identifiers.html>
- **NFToken Documentation:** <https://xrpl.org/nftoken.html>
- **XRPL Testnet Faucet:** <https://xrpl.org/xrp-testnet-faucet.html>
- **Ripple Developer Relations:** <https://linktr.ee/rippledevrel>

9.2 Workshop Recordings (Jan 5-6)

- **Ripple Workshop (HIGHLY RECOMMENDED):** XRPL Developer Tools & Hackathon Resources - Maxime Dienger & Emma Nasseri
- Metacamp Workshop: Build Everything Onchain - Jonas Chen
- GSR Workshop: Stablecoins & DeFi - Aravind Srinivasan & Ray Pan
- Animoca Workshop: Intro to RWA & Tokenization - Caleb Lim

9.3 Islamic Finance Context

- Global Islamic finance assets: \$3.5 trillion (2024)
- Annual Zakat contributions: \$1 trillion globally
- Muslim population: 1.8 billion (24% of world)
- Growth rate: Islamic fintech projected at 18.2% CAGR through 2033

9.4 Immediate Next Steps (Team Action Items)

Priority	Task	Owner	Deadline
HIGH	Set up XRPL testnet wallets for team	Backend Lead	Jan 7, 12pm
HIGH	Create GitHub repo & project structure	Full Team	Jan 7, 1pm
HIGH	Divide tasks: Frontend/Backend/Smart Contracts	Team Lead	Jan 7, 2pm
HIGH	Watch Ripple workshop recording	All Developers	Jan 7 evening
MEDIUM	Design UI mockups (investor + beneficiary dashboards)	Frontend	Jan 7 evening
MEDIUM	Set up PostgreSQL database	Backend	Jan 7 evening
LOW	Prepare demo script (practice timing)	Presenter	Jan 8

9.5 Success Criteria

By submission deadline (Jan 9, 9am SGT), we must have:

- ✓ Working demo showing full investor flow (DID creation → investment → Zakat payment)
- ✓ Working demo showing full beneficiary flow (DID creation → receive payment → upload impact)
- ✓ All transactions recorded on XRPL Devnet with visible contract addresses
- ✓ 3-minute video demonstrating both flows
- ✓ Public GitHub repo with comprehensive README
- ✓ Deployed website (optional but recommended)

Final Thoughts

We are building more than just a hackathon project. We are creating a solution that could genuinely improve the lives of millions of Muslims worldwide - from helping investors grow their wealth ethically, to ensuring orphans get educated.

HalalChain represents the best of what blockchain can do: transparency, efficiency, and financial inclusion. By combining XRPL's cutting-edge technology with Islamic finance principles that have existed for 1400+ years, we're building something truly special.

Let's build something that wins - and more importantly, something that matters.

Good luck team! ■