Welcome Home Property: Technical Specification Document

Version 1.1 | Chain Priority: Alkebuleum Mainnet
Development/Test Environment: Ethereum Sepolia Testnet

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1. Overview

Welcome Home Property is a blockchain-based real estate tokenization and investment platform built for **fractional property ownership**. It enables users to own and trade property shares as digital tokens recorded on the Alkebuleum blockchain. The system integrates **KYC verification**, **wallet-linking**, and a **web-based dashboard** with **admin and user portals**.

The solution uses **smart contracts** for asset registration, ownership tracking, and investment logic, alongside a **modular backend/API architecture** and **third-party plugins** (e.g. for KYC and wallet providers).

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2. Core Architecture

2.1 Blockchain Layer: Alkebuleum

- **Primary Network**: Alkebuleum Mainnet

- **Development/Testnet**: Ethereum Sepolia (for testing and simulation)

- **Smart Contract Language**: Solidity (EVM-compatible)

- **Consensus**: As defined by Alkebuleum's consensus mechanism (currently Proof-of-Authority or Delegated POS depending on mainnet configuration)

2.2 Asset Tokenization

- **Token Standard**:

    - **ERC-20**: For fractional ownership tokens

    - **ERC-721/1155**: For unique or bundled property tokens

- **Asset Registry Smart Contract**:

    - Registers properties

    - Maps fractional shares to investor wallets

    - Stores metadata (IPFS URI)

    - Tracks primary and secondary ownership

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3. System Modules

3.1 Smart Contracts

- **PropertyFactory.sol**

  - Deploys token contracts for new properties

  - Stores metadata hashes (IPFS link)

  - Maintains whitelist of KYC'd addresses

- **Marketplace.sol**

  - Facilitates buy/sell listings

  - Optional continuous auction model

- **OwnershipRegistry.sol**

  - Maps user addresses to token holdings

  - Queryable by frontend/backend API

3.2 Backend APIs

- **Language**: Node.js or Python (FastAPI)

- **Key Modules**:

  - User Auth & Session (OAuth 2.1 / JWT)

  - KYC Status & Identity Data Sync

  - Wallet Linking & Signature Verification

  - Property Data (IPFS upload, retrieval)

  - Admin Controls (token management, analytics)

3.3 Frontend Interface

- **Tech Stack**: React + TailwindCSS

- **Integrations**:

  - Web3 wallet connectors (MetaMask, WalletConnect)

  - KYC plugins (Sumsub/Trulioo/Veriff iframe integrations)

- **Views**:

  - **User Dashboard**: View owned tokens, buy/sell units, view income

  - **Admin Console**: Approve KYC, list new properties, monitor investor activity

4. Identity & KYC Flow

4.1 Verification Flow

1. User creates an account via email/phone login

2. Redirected to KYC plugin (iframe/API)

    o Upload ID (National ID, Passport, etc.)

    o Facial liveness check

3. KYC Plugin issues status webhook to backend

4. If verified:

    o System mints a **KYC NFT or flag**

    o Allows wallet linking and property investment

4.2 Providers (Plugin Integration)

- **Sumsub**, **Veriff**, or **Trulioo** via iframe or SDK

- Integration: OAuth token exchange and webhook callbacks

- Data stored: Minimal PII (with third-party retention); backend only stores status + wallet mapping

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5. Wallet & Account Linking

- **Wallet Linking via Signature Challenge**

    o User signs a message to prove wallet ownership

    o Backend links wallet to internal account

- **Supported Wallets**: MetaMask, WalletConnect, Brave Wallet

- **Wallet Connection Status** is stored with session

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6. Property Tokenization and Marketplace Logic

6.1 Asset Creation

- Admin uploads:

    o Property images, valuation, legal docs (IPFS)

- o   Token parameters (name, supply, price per unit)

- Smart Contract creates a new ERC-20 token representing fractional shares

- Ownership mapped to users post-KYC

6.2 Primary Offering

- Tokens are distributed at a fixed price to approved (KYC'd) addresses

- Purchase via web interface (USDC or native chain token e.g., $ALKE)

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7. Admin Dashboard Features

- KYC Review Queue

- Wallet & Transaction Monitor

- Property Upload Wizard

- Token Transfer Override (for compliance)

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8. Security and Compliance

8.1 Smart Contract Security

- Auditable Solidity code

- Use of standard libraries: OpenZeppelin

- Tests written with Hardhat + Foundry

- Contracts will be upgradeable (proxy pattern)

8.2 Data Security

- KYC data handled by third-party

- Access control via OAuth 2.1 / Keycloak

- IPFS for decentralized metadata storage

- HTTPS and TLS for all frontend/backend APIs

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9. Deployment and DevOps

- **Dev/Test**: Sepolia Ethereum Testnet

- **Mainnet**: Alkebuleum

- **CI/CD**: GitHub Actions, Docker, Vercel/Netlify

- **Monitoring**: Sentry + Smart Contract event logging

- **Backup**: Encrypted DB snapshots, IPFS mirror nodes

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10. Standards & References

- **ERC-20, ERC-721, ERC-1155** – Token standards

- **EIP-712** – Structured data signing

- **W3C Verifiable Credentials** – KYC token models

- **OAuth 2.1** – Session management and roles

- **IPFS** – Metadata hosting

Summary

Welcome Home Property is a blockchain-native, investor-friendly real estate platform built on **Alkebuleum**. It integrates **KYC**, **wallet-based ownership**, **smart contracts for asset logic**, and a modular tech stack (frontend, backend, APIs). Fractional investments are simplified through tokenization and user-friendly interfaces, with long-term roadmap plans to include governance, insurance, and decentralized finance layers.