White Paper: Stv0r - Decentralized Digital Nickname Management Platform on Sui

1. Introduction

In an era of increasing digitalization and growing interest in decentralized technologies, the concepts of digital identity and asset ownership have become paramount. Traditional systems for managing names and identifiers are often centralized, leading to issues with security, privacy, and true ownership. The **stv0r** project offers an innovative solution to these challenges by creating a decentralized platform for owning and trading digital nicknames as Non-Fungible Tokens (NFTs) on the high-performance Sui blockchain.

The goal of stv0r is to provide users with full control over their digital identifiers while ensuring a seamless and intuitive user experience, even for those unfamiliar with the intricacies of Web3. This is achieved through the integration of advanced cryptographic solutions like zkLogin and the utilization of native Sui standards such as Sui Kiosk to create a comprehensive ecosystem for digital nicknames.

2. Problem Statement and Solution

2.1. Challenges of Centralized Identity Management

- **Lack of True Ownership**: In centralized systems, users are not the true owners of their nicknames or identifiers. These assets are controlled and managed by central organizations, which can revoke or block them at any time.
- **Security Risks**: Centralized databases are attractive targets for hacking attacks, jeopardizing the confidentiality and integrity of user data.
- **High Barrier to Web3 Entry**: For many new users, the complexity of managing private keys, understanding the concept of gas fees, and interacting with smart contracts presents a significant hurdle to adopting decentralized applications.
- **Lack of Liquidity**: Digital nicknames in traditional systems are not liquid assets and cannot be easily traded or transferred.

2.2. The stv0r Solution

stv0r addresses these issues by offering a comprehensive decentralized platform based on the following principles:

- **True Ownership via NFTs**: Each nickname in stv0r is represented as a unique NFT on the Sui blockchain. This provides users with complete, immutable, and verifiable

ownership of their digital nicknames. Owners can freely transfer, sell, or use their NFT nicknames as they see fit.

- **Secure and User-Friendly Authentication (zkLogin)**: Integration with Sui's zkLogin allows users to log in using their existing Web2 accounts (e.g., Google, Facebook) without the need to manage complex private keys. zkLogin uses zero-knowledge proofs (ZKPs) to ensure privacy and security, linking Web2 identity to a Sui address without revealing personal information [1]. This significantly lowers the entry barrier for mass Web3 adoption.
- **Decentralized Marketplace (Sui Kiosk)**: To ensure liquidity and tradability of nicknames, stv0r utilizes the Sui Kiosk standard. Sui Kiosk is a native Sui decentralized protocol for asset trading that allows users to list their NFTs for sale, set conditions, and conduct transactions securely [4]. This eliminates the need for centralized exchanges and ensures transparency and security for all trading operations.
- **Robust Move Smart Contracts**: All platform logic, including nickname minting, management, and transfer, is implemented as smart contracts in the Move language. Move is a secure and efficient programming language for blockchains, designed with asset security and formal verification in mind [3]. This guarantees the reliability and predictability of the platform's operation.
- **Gasless Transactions for Users (Enoki)**: Integration with Enoki by Mysten Labs allows stv0r to sponsor transactions for its users [2]. This means end-users do not need to worry about paying gas fees for each operation, making interaction with the platform as comfortable and accessible as possible, especially for blockchain newcomers.

3. System Architecture

The architecture of stv0r is divided into three main components:

3.1. Move Smart Contracts

Smart contracts are the foundation of the platform and are deployed on the Sui blockchain. They define the logic for creating, managing, and interacting with NicknameNFTs. The main `nickname_nft.move` contract includes:

- **`NicknameNFT`** : A data structure representing a unique nickname as an NFT. It contains a `UID` (unique Sui object identifier), the `nickname` itself (string), `owner` (owner's address), `created_at` (creation timestamp), `image_url` , and `description` .
- **`NicknameRegistry`** : A global registry that stores all registered nicknames. This prevents nickname duplication and ensures their uniqueness within the system. The registry is a shared object, accessible to all network participants.

- `AdminCap` : An administrative rights object that grants privileged access to certain contract functions, for example, for initialization or managing system parameters.
- **Minting Functions**: `mint_nickname_nft` allows users to create new NicknameNFTs, verifying their uniqueness through the `NicknameRegistry` .
- **Transfer Functions**: `transfer_nft` ensures secure transfer of NicknameNFTs between users.
- **Query Functions**: Provide methods to retrieve information about nicknames, such as `get_nickname` , `get_owner` , `get_created_at` , and `nickname_exists` .
- **Events**: The contract emits events, such as `NicknameNFTMinted` , allowing external applications (e.g., marketplaces) to track state changes and index data.

3.2. Frontend Application

The stv0r user interface is developed using React and TypeScript, providing a modern, responsive, and intuitive experience. The frontend interacts with Sui smart contracts via `@mysten/dapp-kit` and other Sui SDK libraries.

- **Authentication**: `LoginForm` and `Register` components are integrated with zkLogin via `@mysten/enoki` , allowing users to log in with Web2 accounts. `RegisterEnokiWallets` manages the Enoki wallet registration process.
- **Nickname Management**: `NicknameManager` and `NicknameOwnershipManager` provide an interface for minting new nicknames, viewing, and managing the user's existing NFT nicknames.
- **Marketplace**: `Marketplace` and `SwapComponent` implement the trading platform functionality, using `kioskService.ts` to interact with the Sui Kiosk standard. Users can list their nicknames for sale and purchase nicknames from others.
    - **Challenges with Marketplace Implementation**: During the development of the marketplace, we encountered several challenges. Integrating with the Sui Kiosk standard, while powerful, required a deep understanding of its nuances, especially regarding `TransferPolicy` and handling different asset states (PLACED, LOCKED, LISTED). Ensuring seamless real-time updates for listings and purchases, as well as robust error handling for failed transactions, demanded careful design and iterative testing. The asynchronous nature of blockchain interactions and the need to provide immediate user feedback added complexity to the frontend development.
- **User Profiles**: `UserProfile` and `UserSearch` allow users to view other users' profiles and their nicknames.
- **Services**: The `src/services` directory contains modules abstracting blockchain interaction and external APIs, such as `nftService.ts` , `kioskService.ts` , `walrusService.ts` (for

Walrus integration, if used), and `sealService.ts` (for Seal integration, if used).

3.3. Sui Infrastructure

stv0r fully leverages the benefits of the Sui blockchain, including its scalability, low fees, and parallel transaction execution. Key Sui infrastructure components used by stv0r include:

- **Sui Client**: For interacting with the Sui network, sending transactions, and querying data.
- **zkLogin Service**: A service that generates zero-knowledge proofs, allowing users to authenticate with Web2 logins.
- **Enoki Service**: Provides an API for sponsoring transactions and simplified wallet management, lowering the entry barrier for users.
- **Sui Kiosk**: A native Sui standard for creating decentralized marketplaces and managing NFT assets.

4. Advantages and Innovations

4.1. For Users

- **Ease of Use**: Thanks to zkLogin and sponsored transactions, stv0r offers a Web2-like experience, eliminating the complexities associated with private key management and gas fees. This makes Web3 technologies accessible to a broad audience.
- **True Ownership**: Users gain full and immutable ownership of their digital nicknames as NFTs, which is not possible in centralized systems.
- **Security and Privacy**: zkLogin ensures a high level of security and privacy by using ZKPs to protect personal data.
- **Asset Liquidity**: The integrated marketplace based on Sui Kiosk provides users with the ability to easily buy, sell, and exchange their nicknames, turning them into liquid assets.

4.2. For Developers

- **Power of Move**: The use of the Move language ensures security, performance, and predictability of smart contracts, simplifying development and auditing.
- **Sui Ecosystem**: stv0r utilizes the rich Sui ecosystem, including its SDK, standards (Kiosk), and services (zkLogin, Enoki), which accelerates development and ensures compatibility.

- **Modularity**: Clear separation into smart contracts and frontend, as well as a modular code structure, facilitate further development and scalability of the project.

5. Future Development

The potential of stv0r is immense. In the future, the platform can be expanded to include:

- **Advanced Marketplace Features**: Adding auctions, nickname bundles, customizable storefronts.
- **Integration with Other Protocols**: The ability to use stv0r nicknames in other decentralized applications and games on Sui.
- **Social Features**: Adding chats, groups, and other social interactions related to nicknames.
- **Decentralized Governance (DAO)**: Transition to a decentralized governance model where NicknameNFT holders can participate in decision-making regarding platform development.
- **Support for Additional Web2 Providers**: Expanding the list of supported providers for zkLogin.

6. Conclusion

stv0r represents a significant step forward in decentralized identity and digital asset ownership. By leveraging the advanced technologies of the Sui blockchain, zkLogin, Enoki, and Sui Kiosk, the platform offers an unparalleled combination of ease of use, security, true ownership, and liquidity. stv0r not only solves the pressing issues of centralized systems but also opens up new possibilities for mass Web3 adoption, making digital nicknames valuable and accessible assets for everyone.

7. References

[1] zkLogin | Sui Documentation. Available at: https://docs.sui.io/concepts/cryptography/zklogin
[2] Welcome to Enoki. Available at: https://docs.enoki.mystenlabs.com/
[3] Sui Move Intro Course. Available at: https://github.com/sui-foundation/sui-move-intro-course
[4] Sui Kiosk | Sui Documentation. Available at: https://docs.sui.io/standards/kiosk
[5] Walrus Docs. Available at: https://github.com/MystenLabs/walrus-docs
[6] Seal Docs. Available at: https://github.com/MystenLabs/seal