
SOFTWARE REQUIREMENTS SPECIFICATION

for

Decentralized Social Media Platform

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Abstract

Current social media platforms face growing concerns around centralization of control, user privacy, data integrity, content ownership, and transparency in governance. To address these issues, we propose a decentralized social media application leveraging blockchain, **self-sovereign identity (SSI)**. The application will allow users to own and control their identities, data, and creative content while interacting with a transparent, user-centric social platform. User profiles and social data will utilize decentralized identifiers and encrypted storage to give users sovereignty over their personal information. Content ownership will be represented by **non-fungible tokens (NFTs)** on the blockchain enabling traceable attribution and transfer of creative works. A decentralized **validation system** driven by community consensus will moderate content and reduce centralized points of control. Additional solutions like hashing for **plagiarism detection** of content, aim to maintain data integrity and build a fairer system for users. By decentralizing key aspects of social media infrastructure, governance, and content policy, this platform intends to address concerns around privacy, censorship, and copyrights in current social networks. The scope covers designing architecture, core features, and working flow for an open, transparent social ecosystem aligned with user interests. This SRS establishes technical requirements and developmental approaches to realize a next-generation decentralized social application.

Contents

1	Problem Statement	4
1.1	Problem Identification	4
1.2	Proposed Solution	5
1.3	Purpose	5
1.4	Project Scope	5
1.5	Target Users	6
2	Process Model	7
3	Overall Description	8
3.1	Aim	8
3.2	Blockchain Infrastructure	9
3.3	SSI Infrastructure	10
4	Product Perspective	11
4.1	Type of Users	11
4.2	Type of Posts	11
4.3	Software Interface	11
5	Working Flow Diagrams	12
5.1	SSI Ecosystem	13
5.1.1	SSI Profile Registration	13
5.1.2	Platform Registration and Login	14
5.2	Content Creation	15
5.2.1	Creating Post (NFT)	15
5.2.2	Viewership Access of Permium Posts	16
5.2.3	Transfer Posts	16
5.2.4	Post Validation & likes	17
5.2.5	Copyrights Handling	19

1 Problem Statement

In the landscape of modern social media platforms, several critical issues have emerged that significantly undermine user trust, data integrity, and content ownership. These issues include data centralization, content copyright disputes, content ownership ambiguity, limited user control over personal data, centralized content validation, and vulnerability to data manipulation. To address these pressing challenges, a new decentralized social media application leveraging blockchain technology is proposed.

1.1 Problem Identification

Data Centralization: Current social media platforms retain an excessive amount of user data within centralized servers, leading to concerns about user privacy, data breaches, and unauthorized access. Users lack control over their personal information, leaving them vulnerable to data misuse.

- **Content Copyright Issues:** Copyright infringement and intellectual property disputes are prevalent due to the ease of unauthorized content sharing. The lack of a robust system to verify content ownership and facilitate fair compensation for creators undermines the creative economy.
- **Content Ownership Transfer:** Existing social media platforms often lack clear mechanisms for transferring ownership of content. This hinders creators from monetizing their content or transferring ownership in a transparent and secure manner.
- **Limited User Control:** Users have minimal control over their personal data and how it's utilized by social media platforms. This lack of agency erodes trust and contributes to the ongoing debate on data ownership and user rights.
- **Centralized Content Validation:** Content validation processes are centralized, leaving room for bias, manipulation, and censorship. The determination of what content is permissible or valuable is controlled by a single entity, compromising the diversity of perspectives.
- **Data Manipulation:** The centralized nature of social media platforms makes data susceptible to manipulation, including fake accounts, misleading information, and orchestrated campaigns, influencing public opinion and discourse.

1.2 Proposed Solution

The proposed solution is to develop a decentralized social media application that harnesses the power of blockchain technology to overcome the aforementioned challenges. This platform will incorporate the following key features:

- **Decentralized Data Storage:** Utilize blockchain's distributed ledger to store user data in a secure and tamper-resistant manner. This approach grants users greater control over their personal information and reduces the risk of data breaches.
- **NFT-Based Content Ownership:** Represent content as non-fungible tokens (NFTs) on the blockchain. This enables verifiable content ownership, secure transfer of ownership, and the possibility of monetizing content through tokenized value.
- **Self-Sovereign Identity (SSI):** Implement Self-Sovereign Identity principles to allow users to manage their profiles and authenticate themselves without relying on a central authority. This empowers users with control over their identity and reduces the risk of identity-related fraud.
- **Decentralized Validation System:** Establish a consensus-driven validation system where reputable users of the platform act as validators. Content approval and moderation decisions are made collectively, reducing bias and ensuring diverse perspectives.
- **Hashing for Plagiarism Detection:** Utilize hashing techniques to perform plagiarism checks on uploaded content. This ensures originality and helps maintain the integrity of the platform's content.

1.3 Purpose

The purpose of this project is to design and develop a decentralized social media platform that gives users control over their data and online identity. The platform aims to leverage decentralized infrastructure like blockchain and peer-to-peer networks to create a transparent, user-owned ecosystem for social interaction online.

1.4 Project Scope

The scope of this project includes the design, development, and deployment of a decentralized social media application that addresses the identified challenges. The platform's architecture will integrate blockchain technology, NFT standards, SSI protocols, consensus mechanisms, and content validation algorithms. Additionally, the development process will involve creating user-friendly interfaces for content creation, user profiles, and interactions, ensuring accessibility and ease of use.

By creating a decentralized social media application that addresses data centralization, content ownership, user control, and content validation, this solution aims to revolutionize the social media landscape, fostering a more secure, equitable, and transparent digital environment for users, content creators, and consumers alike.

1.5 Target Users

The target users for the platform can be segmented into the following categories:

- **General social media users:** These represent the majority of end-users who will interact with the platform for socializing, sharing updates, expressing themselves through posts/media etc. They want an intuitive user experience comparable to existing platforms but with greater transparency and control.
- **Tech-savvy users:** This segment of users deeply cares about privacy and decentralized systems. They are willing to tolerate a higher learning curve and experiment with new paradigms like self-sovereign identity. Attracting these early adopters is key.
- **Content creators:** For creators like bloggers, artists, influencers etc. the platform offers new models of monetization and owning their follower base. The incentives system enables earning from popularity.
- **Organizations:** Enterprise use cases could emerge in the long term as organizations adopt decentralized identity and social interactions. The platform provides the infrastructure.

2 Process Model

Building this social media platform will follow an Agile/Scrum model because:

- **Handles changing requirements** - A decentralized social platform will likely have fluid requirements that evolve over time based on technology and user feedback. Agile allows continuously incorporating these changes.
- **Focused iterative delivery** - Scrum sprints enable focused development and testing of bite-sized increments, enabling faster delivery compared to long release cycles.
- **User-centric development** - Iterative sprints allow frequently eliciting user feedback to ensure the platform meets user needs.
- **Predictability via sprints** - Sprint planning and burndown charts provide greater visibility into progress compared to other models.

3 Overall Description

The proposed decentralized social media application is an innovative solution designed to revolutionize the landscape of social media platforms by addressing critical challenges that have plagued traditional centralized networks. Leveraging the power of blockchain technology, this platform aims to create a user-centric, secure, and transparent digital ecosystem that empowers users, content creators, and consumers while mitigating the shortcomings of existing social media models.

3.1 Aim

The primary aim of the decentralized social media application is to establish a paradigm shift in the way individuals interact, share content, and engage in online communities. By adopting decentralized principles, the platform aspires to achieve the following goals:

- **Content Ownership:** Introduce a robust system of content ownership through the use of NFTs. This mechanism ensures that creators have verifiable ownership of their content and enables them to transfer the NFT to other users.
- **User Control and Self-Sovereign Identity:** Enable users to manage their online identities independently through Self-Sovereign Identity (SSI) principles. Users will have the authority to authenticate themselves without reliance on a central authority, enhancing security and privacy.
- **Decentralized Validation and Moderation:** Establish a decentralized validation system driven by consensus among reputable users. This approach eliminates single-point validation, reduces bias, and ensures diverse perspectives in content moderation and validation.
- **Content Integrity and Plagiarism Prevention:** Utilize hashing techniques for plagiarism detection, ensuring that the content shared on the platform is original and authentic. This maintains the integrity of the platform's content and enhances the user experience.
- **Censorship Resistance and Data Manipulation Prevention:** Minimize the potential for censorship and data manipulation by decentralizing content validation and moderation. This preserves freedom of expression and guards against orchestrated misinformation campaigns.

3.2 Blockchain Infrastructure

- **Ethereum** provides a decentralized virtual machine (EVM) that executes smart contracts. These smart contracts enable the core functionality of the social media app including user profiles, content ownership tracking, and decentralized governance. Smart contracts will be written in Solidity and deployed to the Ethereum mainnet.
- Validation of transactions and smart contract execution is handled via **Ethereum's Proof-of-Stake** consensus mechanism. ETH miners compete to solve cryptographic puzzles and build the next valid block in the chain for rewards.
- Ethereum data is distributed and synchronized across thousands of nodes in a **peer-to-peer architecture**, ensuring high availability and fault tolerance. Nodes may be run by ordinary users to help support the network.
- The **InterPlanetary File System (IPFS)** provides decentralized storage of large files like images and videos which are referenced via hash pointers from Ethereum.

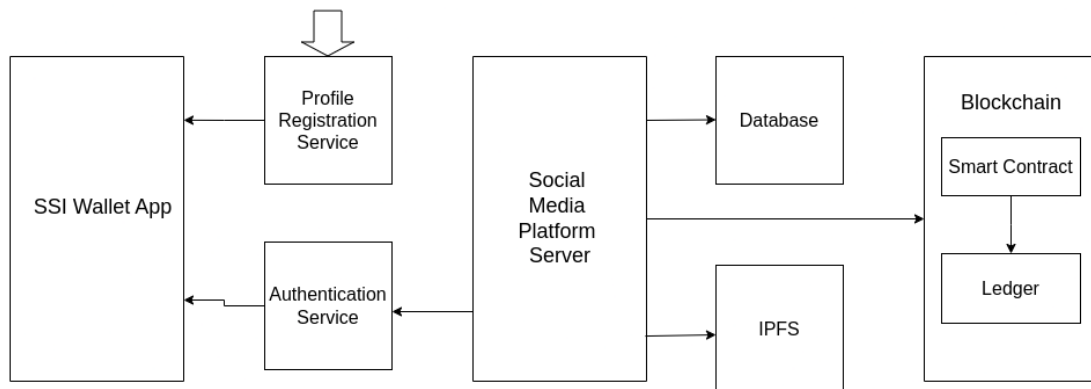


Figure 3.1: Project Architecture

3.3 SSI Infrastructure

Our decentralized social media platform employs Self-Sovereign Identity (SSI) principles using the Hyperledger Aries Project. Each user possesses a dedicated user agent that manages their Decentralized Identifier (DID) and verifiable credentials. Complementary social media agents collaborate with user agents to ensure secure interactions.

Users establish DIDs during registration, storing verifiable credentials in their digital wallets for attributes like their name and bio.

When engaging on the platform, user agents present verifiable credentials to relevant social media agents, verifying authenticity for secure sharing. This innovative SSI integration redefines identity management within our decentralized social media ecosystem.

4 Product Perspective

4.1 Type of Users

- **Normal Users:** These users will create content and post it on application.
- **Validators:** They are reputed users who not only can create content but can also validate the reported ones.

4.2 Type of Posts

- **Normal Posts:** These are the free post that anyone can see.
- **Premium Posts:** These posts are paid post/content, user need to pay some amount to view these.
- **Anonymous Posts:** These are the free posts but these posts will not display who posted it.

4.3 Software Interface

- **Wallet App:** Developed with React-Native using the Hyperledger Aries Project, enabling users to store profiles and authenticate to social media platforms.
- **Web Interface:** Built on React, providing users an interactive gateway to the application.
- **Smart Contracts:** The platform's operations will be supported by the Ethereum blockchain and powered by smart contracts written in Solidity.
- **IPFS:** IPFS will be utilized, leveraging Pinata IPFS service, for secure storage of all forms of posts (text, images, videos).

5 Working Flow Diagrams

5.1 SSI Ecosystem

5.1.1 SSI Profile Registration

USER REGISTRATION

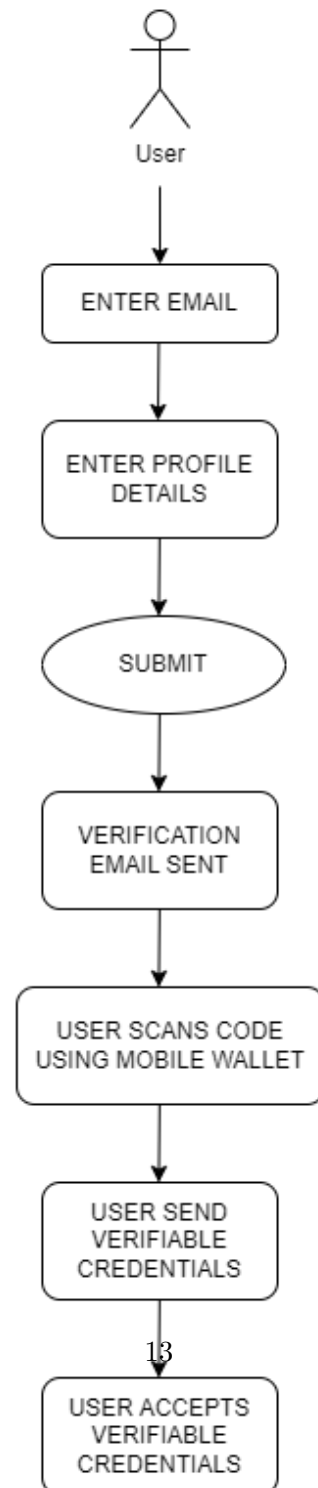


Figure 5.1: SSI Profile Registration

5.1.2 Platform Registration and Login

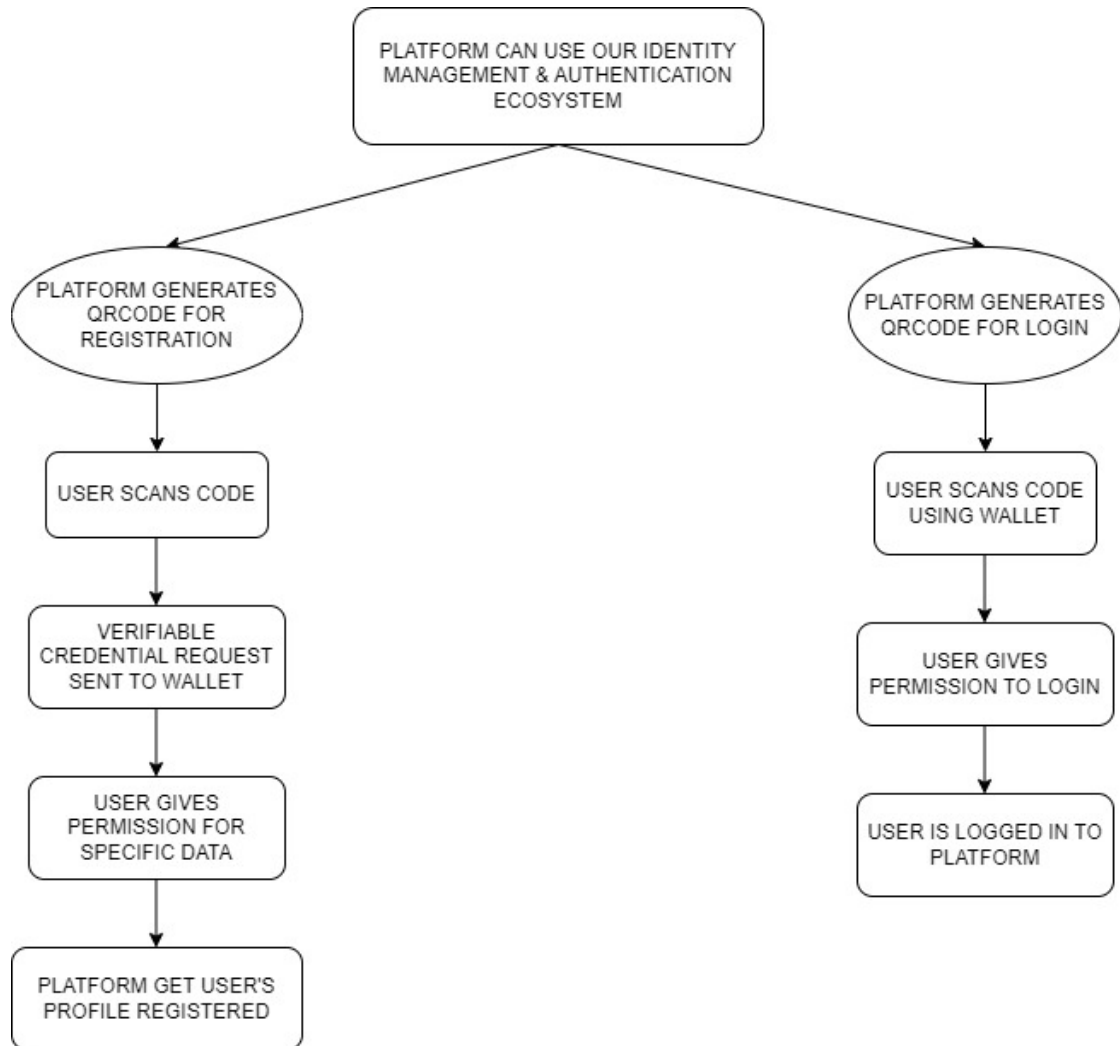


Figure 5.2: Platform Registration and Login using SSI Wallet

5.2 Content Creation

5.2.1 Creating Post (NFT)

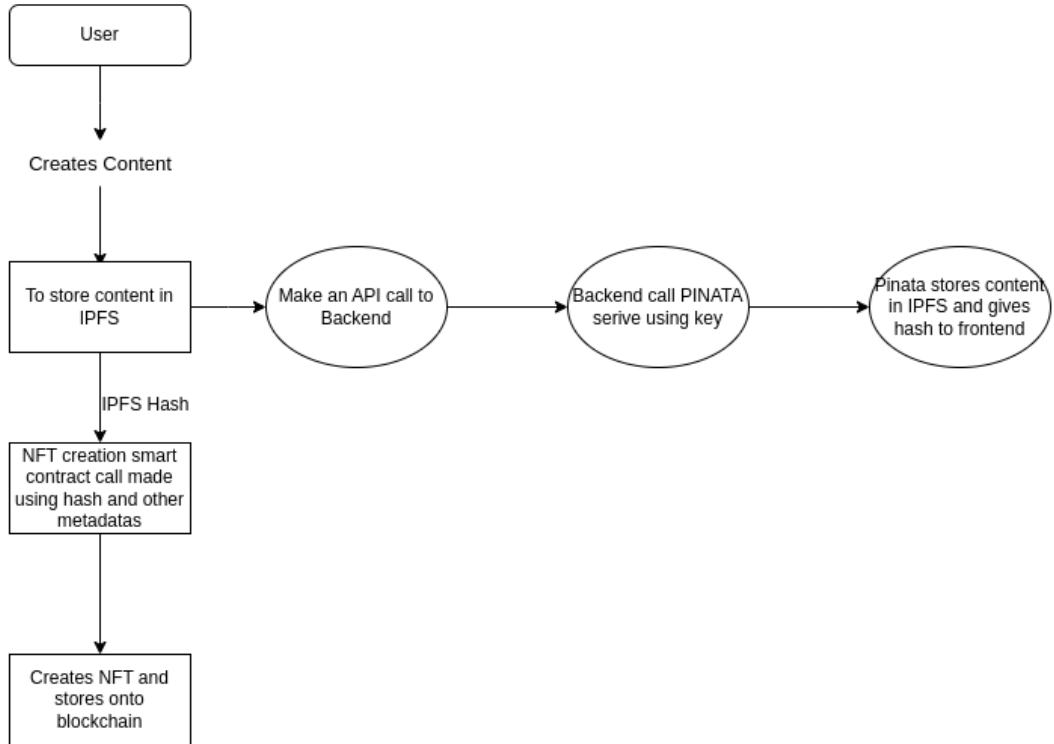


Figure 5.3: Creating Post (NFT)

5.2.2 Viewership Access of Permium Posts

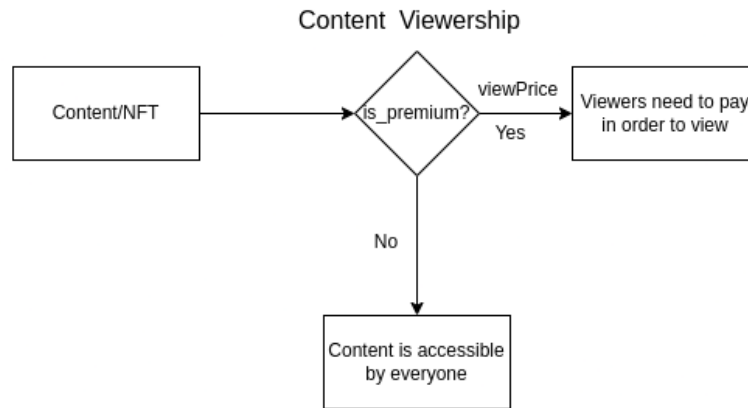


Figure 5.4: Viewership Access of Premium Posts

5.2.3 Transfer Posts

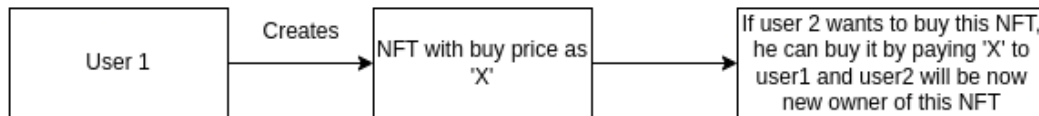


Figure 5.5: Transfer Posts

5.2.4 Post Validation & likes

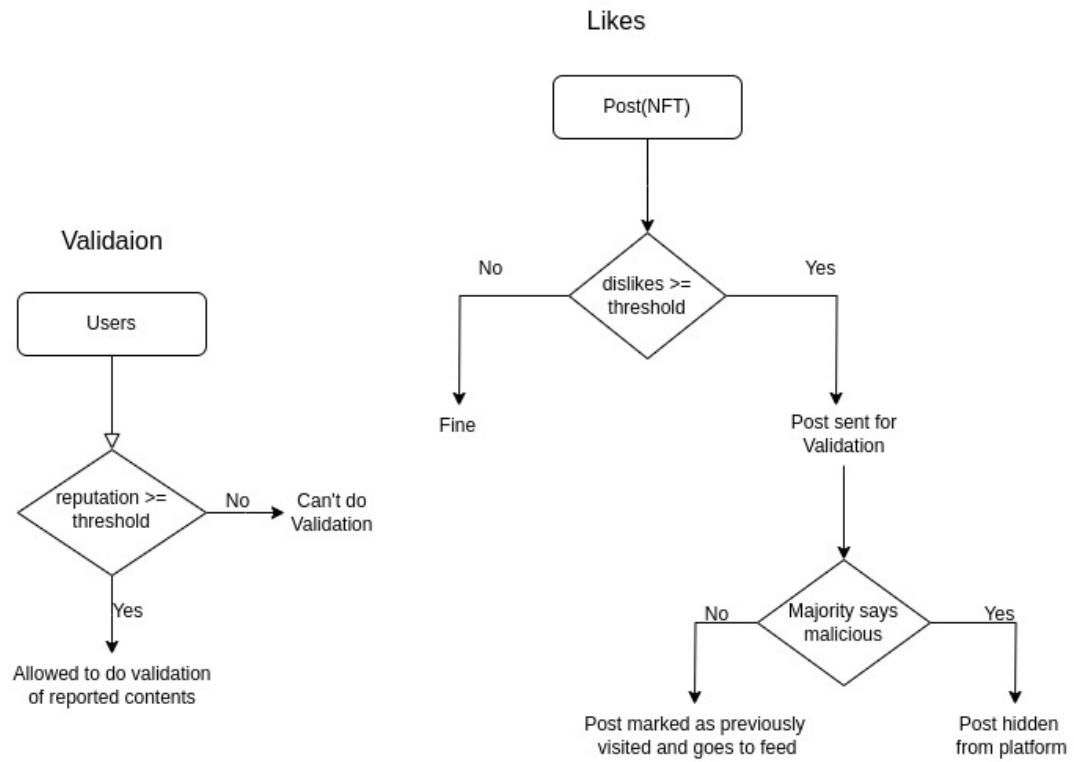


Figure 5.6: Post Validation & likes

5.2.5 Copyrights Handling

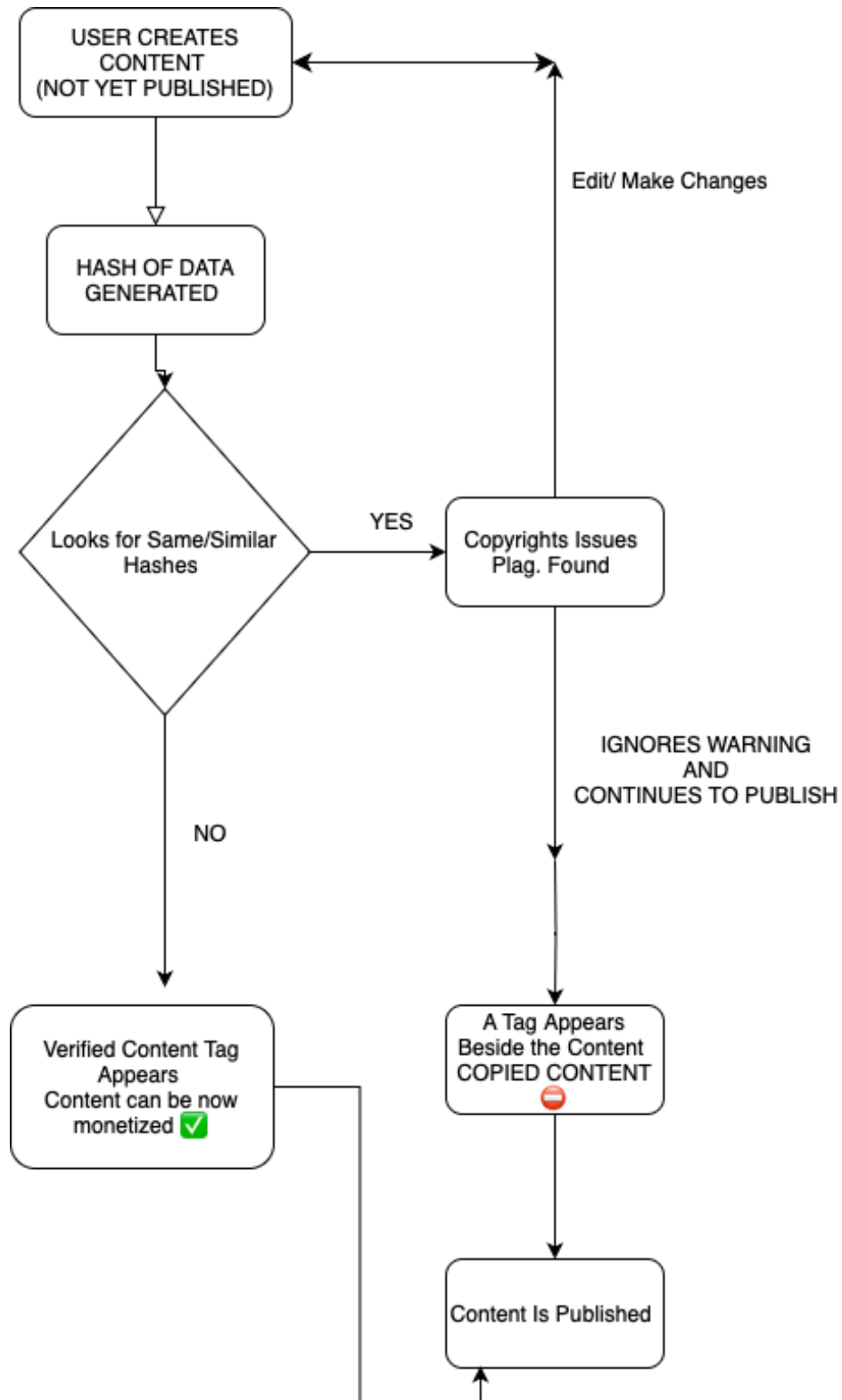


Figure 5.7: Copyrights Handling