Reaching Scientific Consensus, The Decentralised Opportunity for Trust and Access

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Abstract

Introduction

"In economics, a public good is a good that is both non-excludable and non-rivalrous. For such goods, users cannot be barred from accessing or using them for failing to pay for them. Also, use by one person neither prevents access of other people nor does it reduce availability to others." **(Oakland, 1987)**

Non-excludability means it is made impossible to exclude and individual from consuming the good. It is possible tp create excludability by means of pay-walls and membership only access.

Non-rivalrous, is the accessibilty of a product or good that in the consumption does not affect the availability for subsequent use, In this manner a digital good can be classified as such.

Purpose, Intended Use and Audience

Before the internet distribution of academic articles to a global audience was extremely difficult, it required proof-reading, typesetting, printing and distribution. However since the ubiquity of the Internet the majority of tasks performed by publishers has shrunk enormously, in fact publishers now expect researchers to submit digital copies of their work tat require no further typesetting or processing and as for digital distribution printing has become unnecessary. Copying is now simple and free and worldwide distribution is instantaneous online. **(Taylor, 2012)**

The purpose of this project is to create a system for the publication of scientific articles which can be reviewed publicly where every reviewer is in possession of a digital signature for verification. The digital signature will be provided utilising the Metamask wallet browser extension and app, In order to log in to the web app and to verify identity to be able to review a wallet must be used, this wallet will cryptographically secure each users contributions and will allow for a token to be created as a rewards system for all contributions, review, publication. The contents of the website are distributed between all members of via IPFS a decentralised system, this is where the website will be hosted/distributed.

According to **(Chow & Birdwell, 2022)** There is an increased distrust in scientific research in many fields of study and the main purpose of this system is to remove the corporate structure of the current journal publication where in many cases corporations have been found to create and promote articles with bias towards certain priorities that suit the business opportunities of the corporation and not the actual scientific consensus.

Originally coined by Nick Szabo "Smart Contracts" are electronnc agreements that are immutable and transparent, deployed on a decentralised blockchain. Meaning they cannot be altered, automatically execute and everyone sees the terms of the agreement. By utilising the trust that smart contracts provide it will enable researchers to contribute, publish and peer-review articles removing the ability for manipulation and bias towards results, by moving the actions of reviewers amd researchers to a proof-of-work model on a blockchain. A side benefit to this is there will be no need for a subscription/fee based model for accessing research as the researchers themselves will own the rights to their own work by staking them on the blockchain.

"The European Universities Association (EUA) found that overall expenditure by 26 European countries was €597 million (£515 million) in 2017. But 75% of that – some €451 million – was spent on subscriptions to journals

published by the ‘big five’: Elsevier, Springer Nature, Wiley, Taylor & Francis and the American Chemical Society (ACS)” **(Mehta, 2019)**. From this It is clear that there is a necessity for Academic Journal Publishing Reform.

Goals and Requirements

Goals

To build a successful prototype and articulate the justification for this project to a universal understanding as to why this needs to exist.

Requirements

Exploratory Analysis

The first half of this section is research and an exploration of tech, leading to the developmental approach to be taken i.e. Agile, TDD etc.

Decentralised

According to **(IPFS, 2022)** Decentralisation is the downloading of a file or files from many locations that are not managed by a single organisation. The fundamental ethos behind decentralisation is the creation of a resilient internet where for instance if a service is under attack on the current centralised internet through a denial of service or ransomware attack the service could be disrupted, the modern internet relies on services like Amazon Web Services(AWS) to perform quick rerouting and load-balancing in such eventualities but again this is reliant on a single entity.

This property of having caches of content distributed globally allows for a protocol where the content can be addressed from anywhere including remotely with little to no internet access and from a location geographically closer to the device retrieving said content.

There have been many protocols proposed to achieve these fundamental goals.

Comparing technologies (IPFS, Zeronet, LBRY, BitTorrent)

peer 2 peer

Beaker Browser

dat protocol

Hyperdrive

Interplanetary File System

Kubo (Golang on IPFS)

Databases

Gun.js Gun.js, created by Mark Nadal,

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OrbitDB OrbitDB uses IPFS as a data store in a distributed, serverless p2p database.

ThreadDB

Distributed Hash Tables

Blockchain

What is blockchain

Ethereum

Ethers.js

Smart Contracts and Solidity

Metamask

Methodology

Development cycle?

Use Case Diagram

An Agile Approach with Kanban

Using Trello, Sprints

Test-Driven-Development

Continuous Integration/Development

Build – We will compile the code in this stage.

Test – We will test the code in this stage. We can save both efforts as well as time can be saved by performing the techniques of automation.

Release – In this stage, we will release the application in our GitHub repository.

Deployment – We will deploy the application to the production environment.

Validation and compliance – Your organization's needs determine the steps to validate a build.

Results

Discussion

Conclusion

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