DeMedia

Decentralized Social Media Protocol

2023-234

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Introduction

What is a social media platform?

According to the Tufts University[1],

"Social media refers to the means of interactions among people in which they create, share, and/or exchange information and ideas in virtual communities and networks."




Research Problem

- Existing social media platforms do not allow users to govern the data they upload or share on their platforms. This has resulted in numerous disagreements among users, and major social media corporations use this user information to gain revenue while compromising the confidentiality of the user data to third parties.
- The current social media platforms have given rise to a number of issues that prompt the need for a new approach to decentralized social media.

Research Problem Contd.

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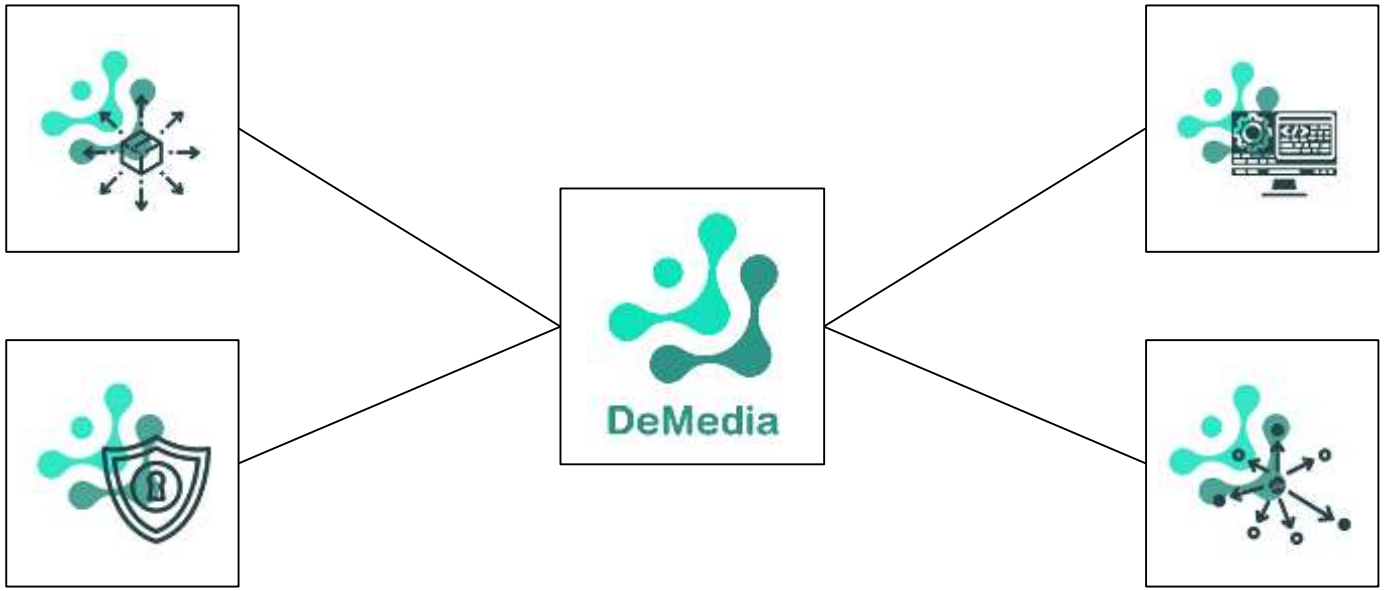
- In particular, the following issues have come to the fore:
  - How to implement decentralized protocol to support social media platforms?
  - How to ensure transparency in the flow of application data?
  - How to grant users true control over their own data?
  - How to provide a centralized application like user experience on a decentralized application?

Solution

- DeMedia - a protocol that facilitates the development of decentralized social media platforms.



Objectives

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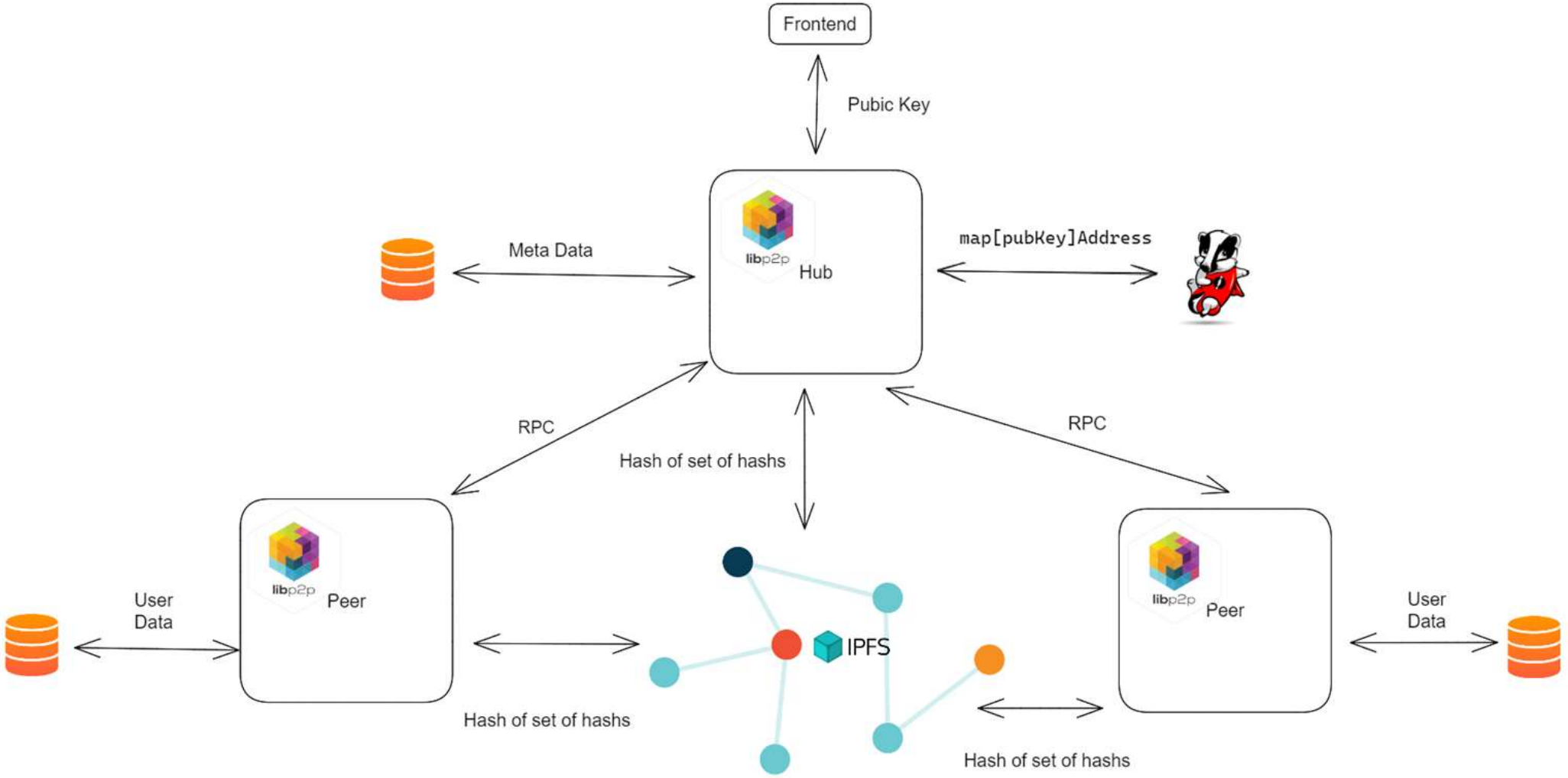
Implement a protocol that facilitates the development of decentralized social media platforms.

- Implement a peer-to-peer communication protocol
- Implement user data decentralization protocol
- Implement a mechanism for decentralized data integrity
- Implement a mechanism for decentralized data caching

Overall System Architecture

DeMedia



System Integration

- DeMedia protocol consist of the components mentioned in following sections and will integrate to one protocol.
- A demo social media platform is developed to demonstrate the implemented protocol.

PEER TO PEER COMMUNICATION

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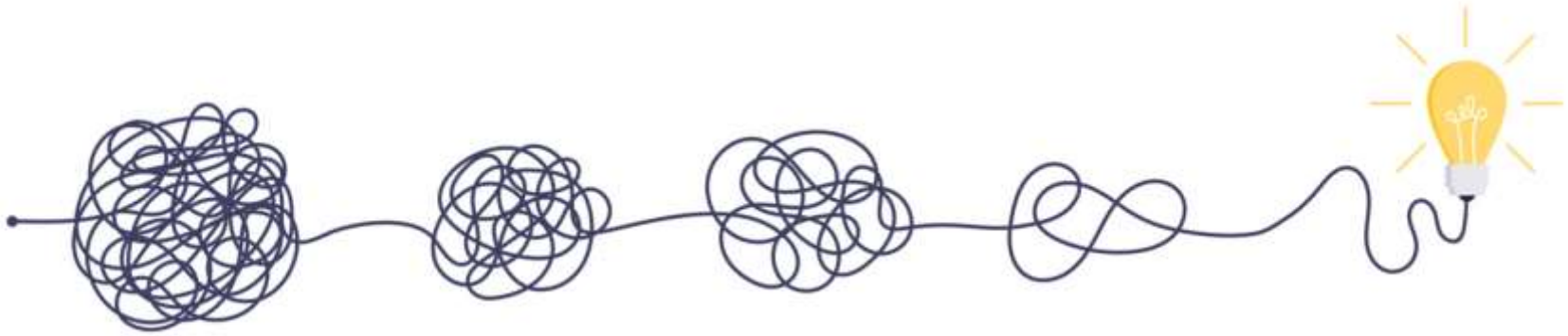
Introduction

- Successful projects in past
  - Skype [1]
  - Gnutella [2]
  - Kazaa [2]
  - eMule [3]
  - Torrent [4]

Research Problem

- What is the best way to communicate in peer to peer network ?
- How to scale peer to peer communication network ?
- How to implement general purpose peer to peer protocol ?



Sub Objectives

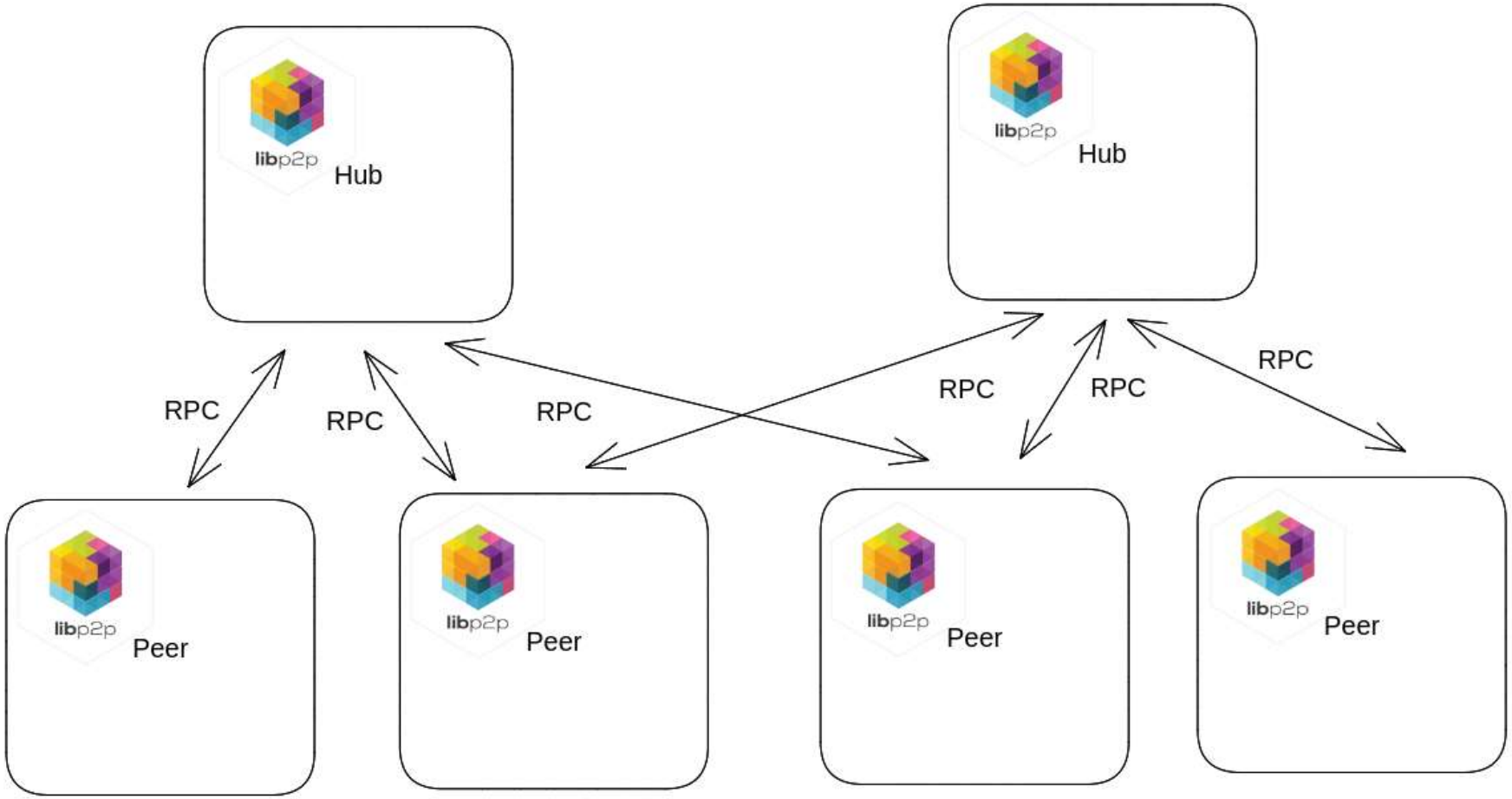
Design RPC style full duplex communication protocol

Use key-value store to keep track of peers

Utilizing third party storage providers for file sharing

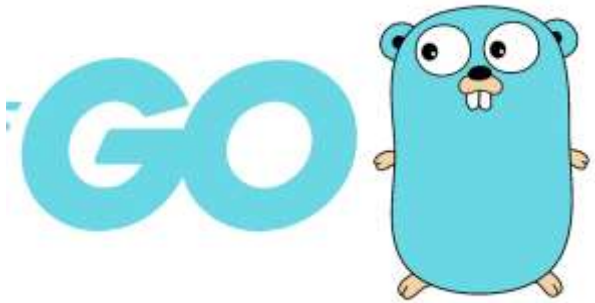
Implement protocol with flexibility for any kind peer to peer communication

System Architecture



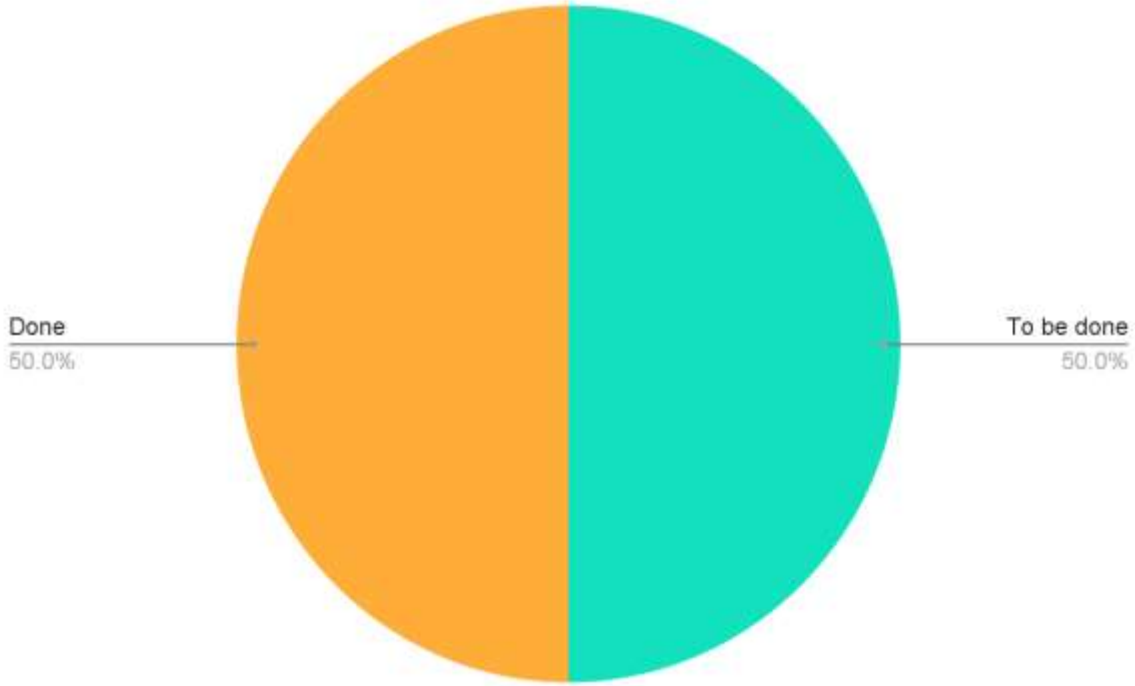
Technologies

DeMedia

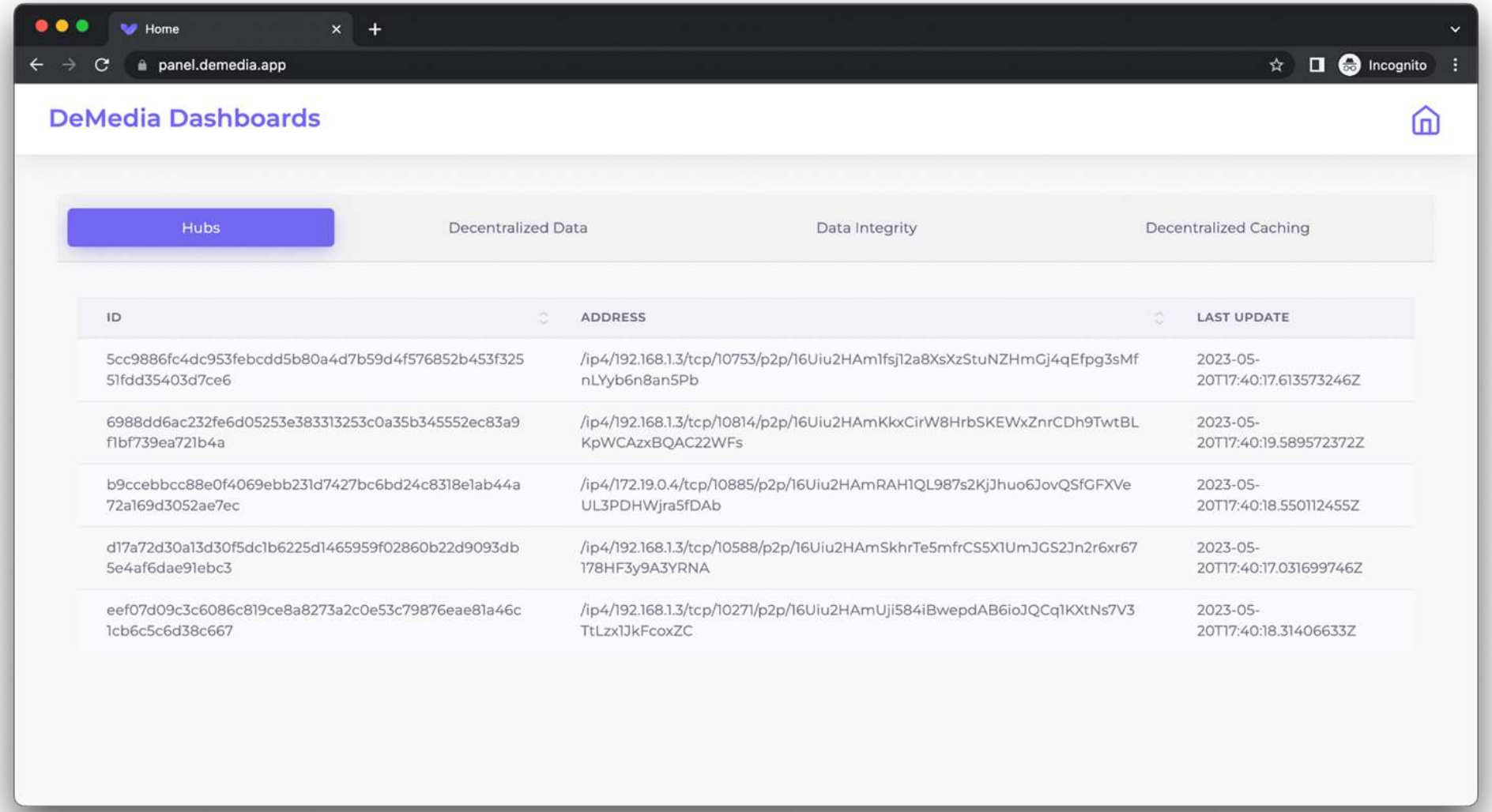


Progress of the Proposed Project

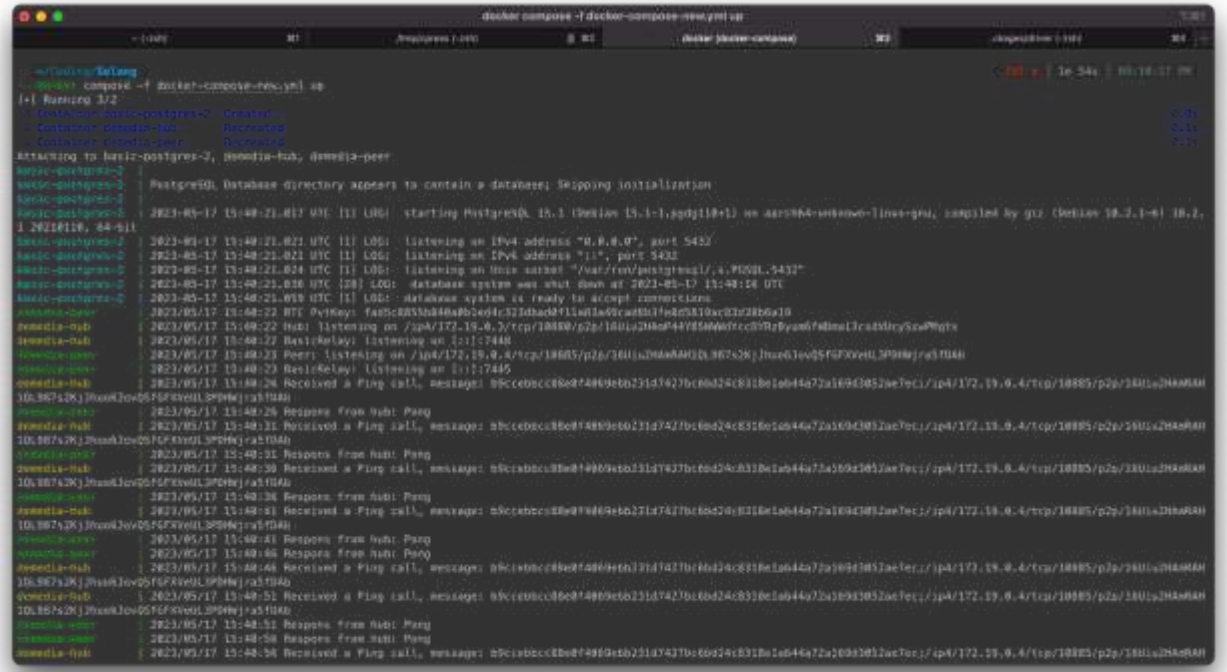
- Establish connection between peers and hub
- Implemented ping-pong scheme
- Implemented DNS resolver
- Implemented encryption layer

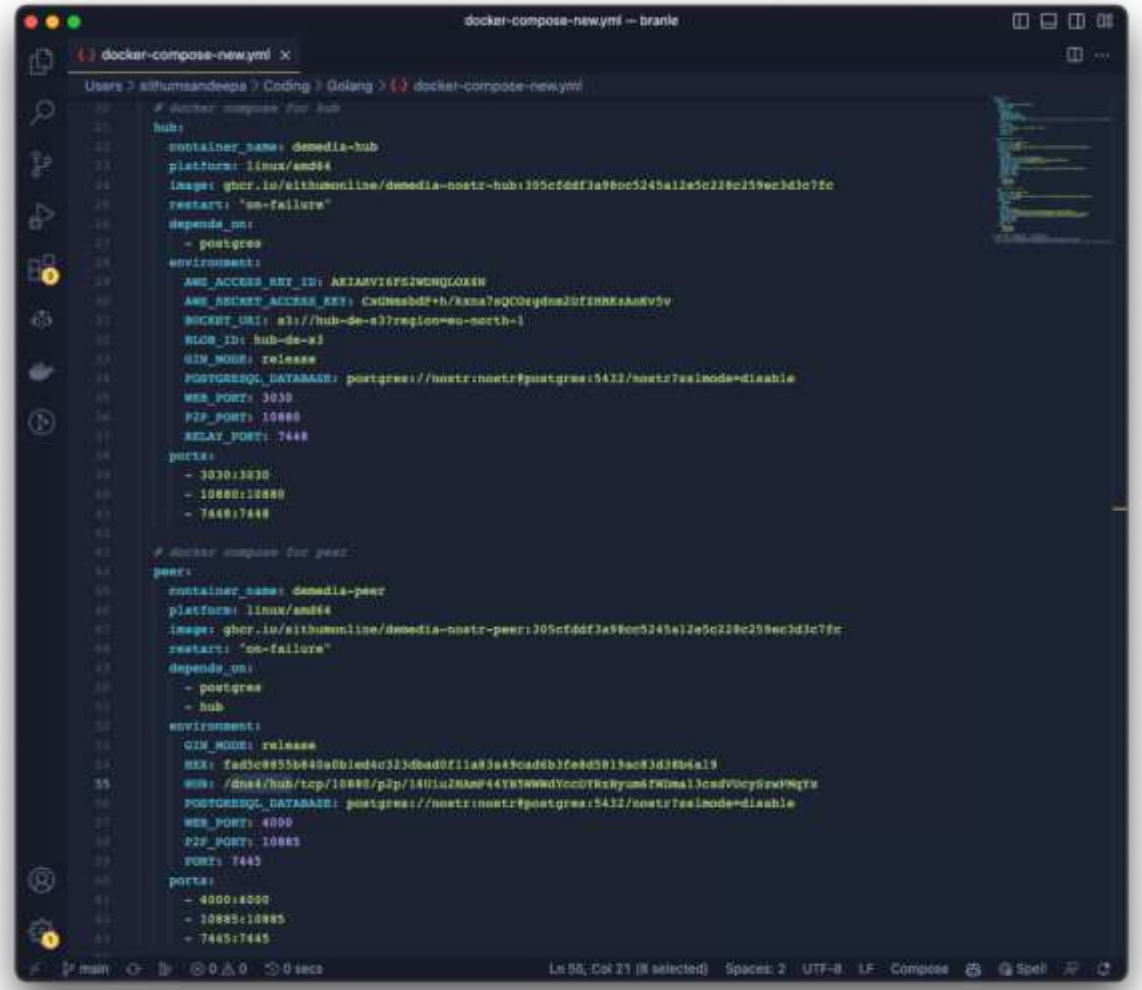


Progress of the Proposed Project Cont'd



Progress of the Proposed Project Cont'd

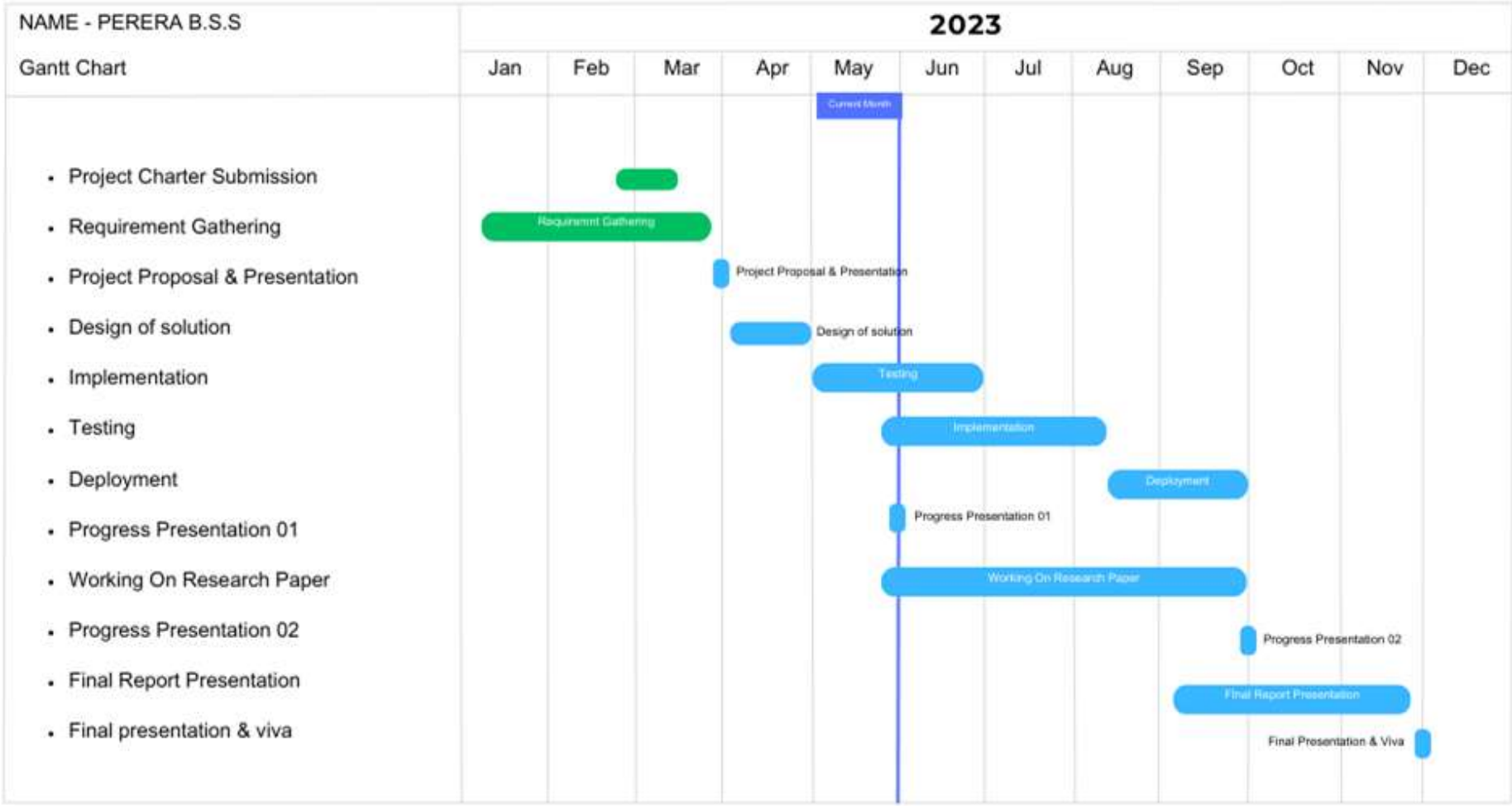




Future Implementation

- Tracing and Observability
- BadgerDB for keep map of connections
- Proper logging
- Unit and stress testing

Completion Of The Project



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USER DATA DECENTRALIZATION PROTOCOL

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Introduction

- The primary goal is to grant complete data ownership control to the user.
- Presently, numerous decentralized social media platforms exist in the market[1].
- A significant proportion of these platforms are blockchain-based[2].
- While many researches have been done on decentralizing social media[3],
- Most of them are done using blockchain, which is not an optimal solution[4].

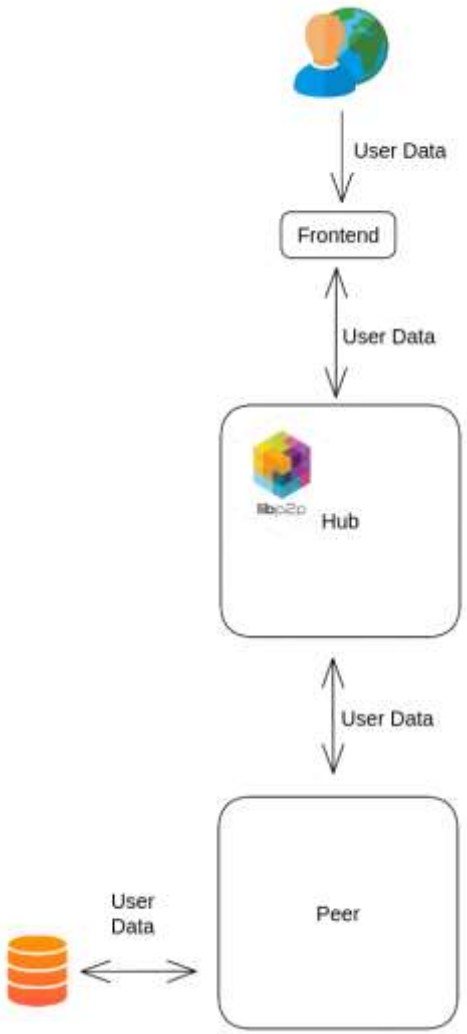
Research Problem

- What measures can be taken to provide users with complete ownership of their data?
- What potential solutions exist for overcoming the limitations of blockchain when using it to store large quantities of data?
- What enhancements can be made to current decentralized social media networks?

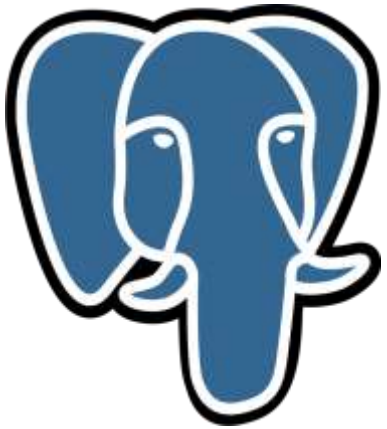
Sub Objectives

- Enable user to control user data
- Utilizing user device to store user data
- Improving limitations in current decentralized social media platforms
- Making user data highly available

System Architecture

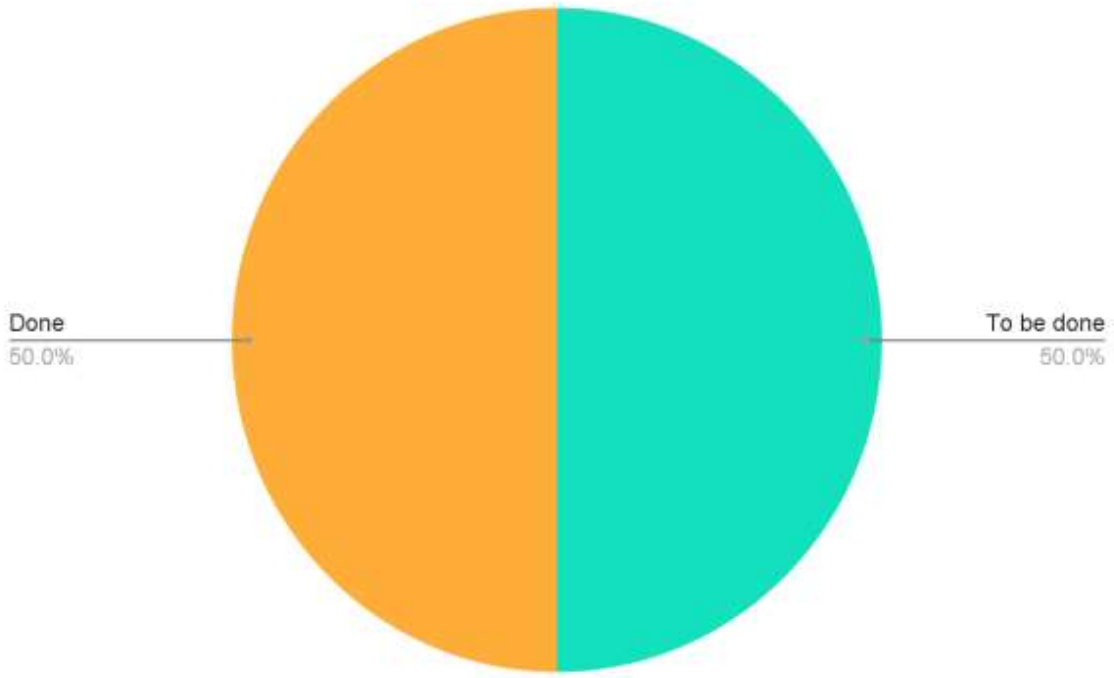


Technologies

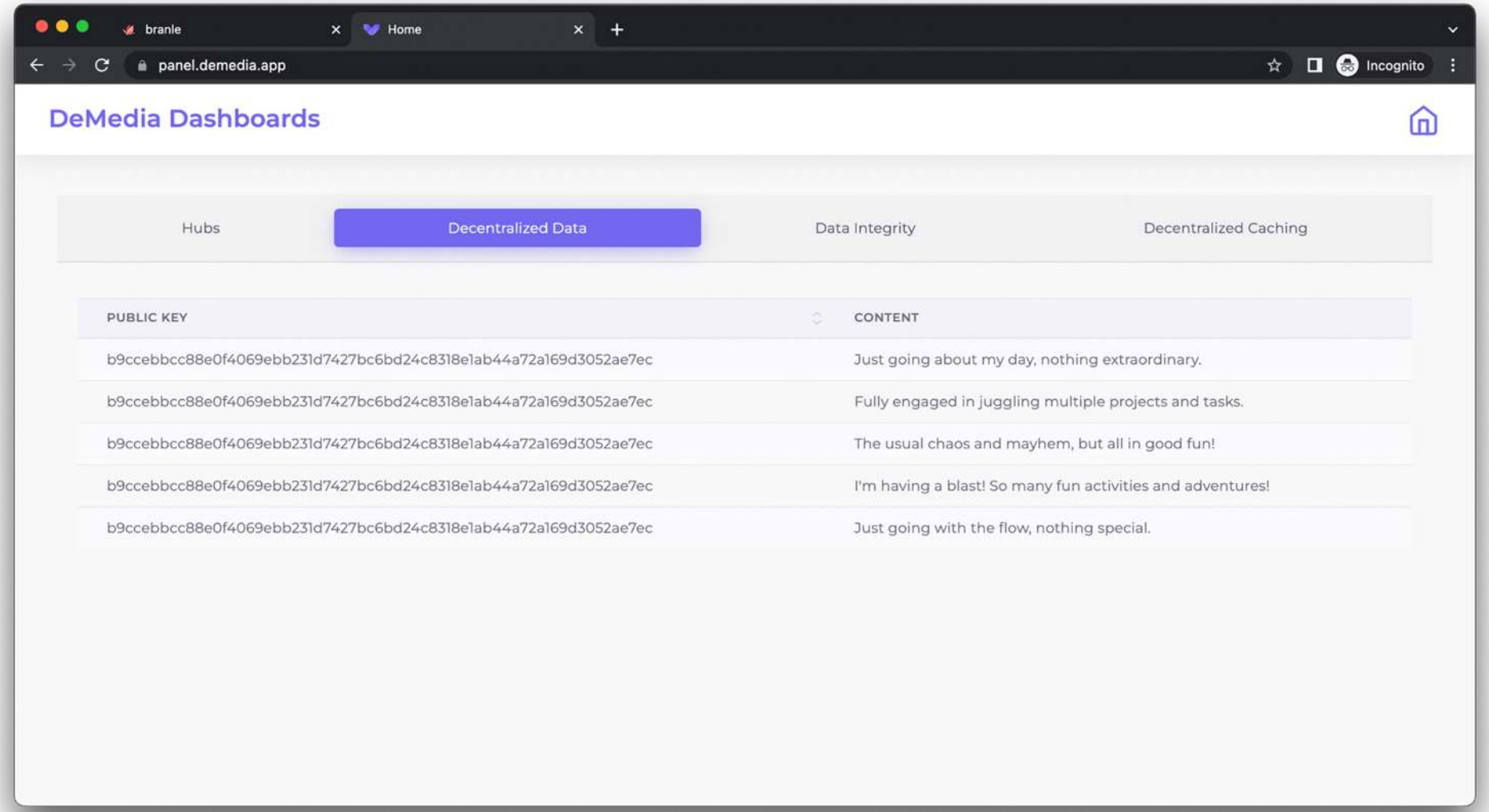


Progress of the Proposed Project

- Implemented the establishment of connection with hubs.
- Implemented the content creation as a user.
- Implemented the uploading of content to hubs.
- Implemented the handling of locally stored data.



Progress of the Proposed Project Cont'd



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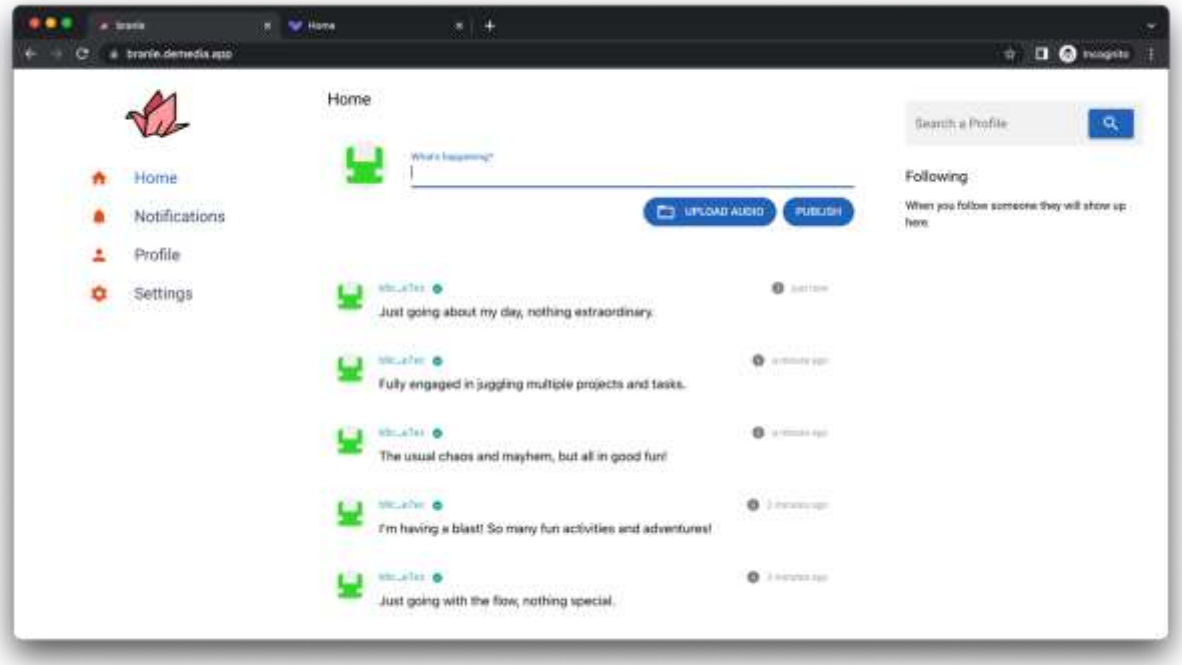
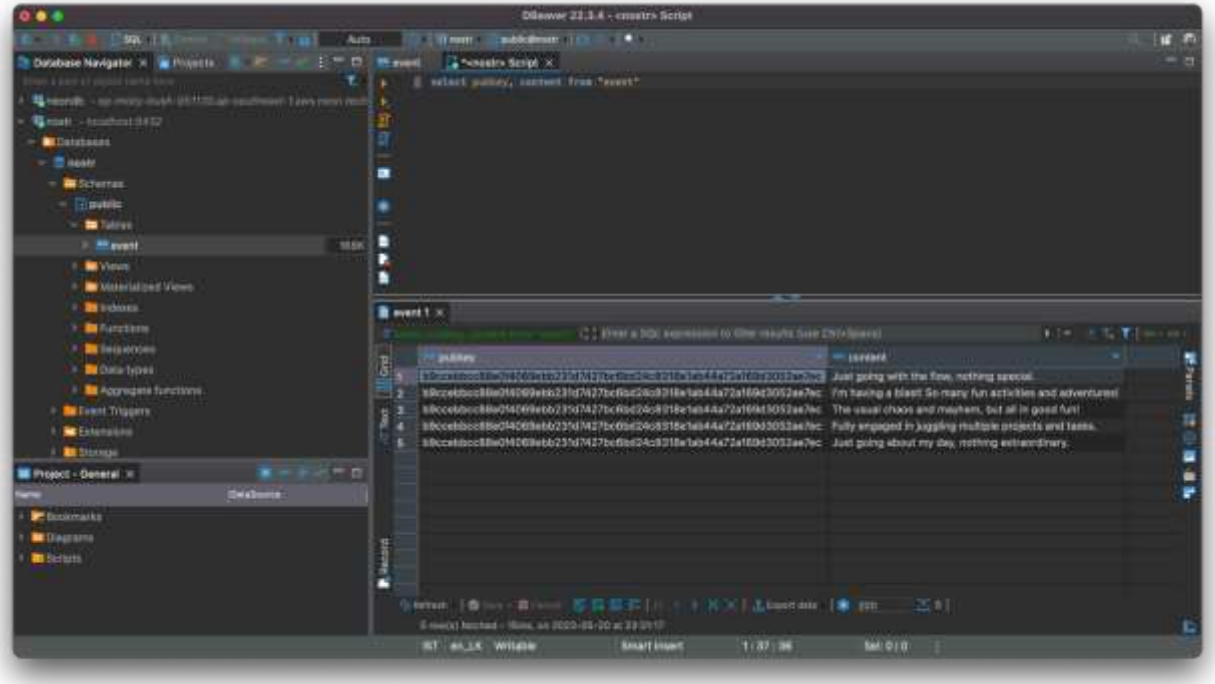
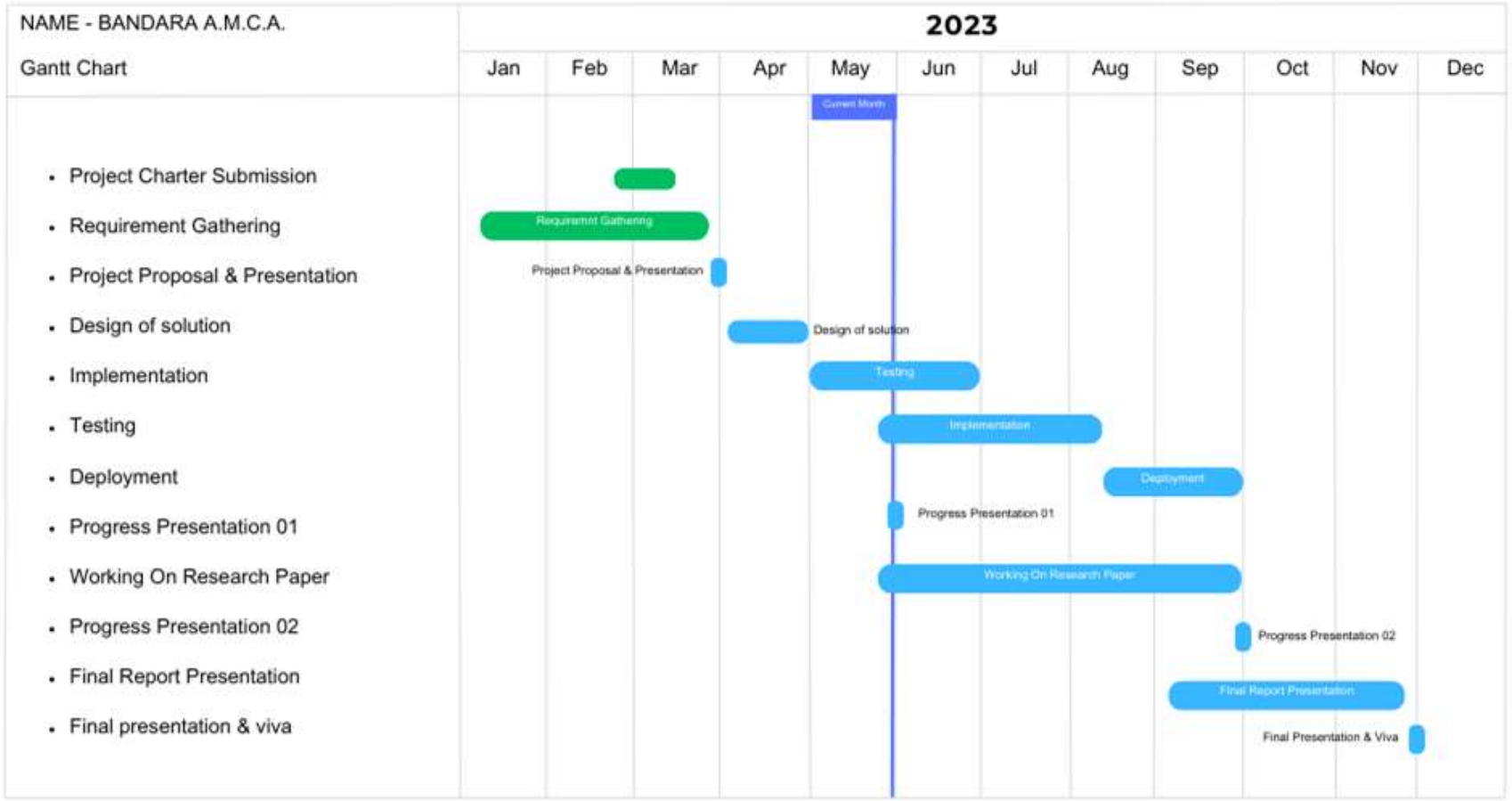




Future Implementation

- Integration of local storage with IPFS
- Tracing and Observability
- Data backup
- Unit and load testing

Completion Of The Project



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DECENTRALIZED DATA INTEGRITY

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Introduction

- Data integrity is a main aspect of any application. [1]
- Currently, there are various mechanisms available to maintain the integrity of data in decentralised application.
- In here, try to implement a proper data integrity mechanism on top of IPFS.

Research Problem

- How to maintain integrity of user data which saved on user device?
- What is the best mechanism for achieve user data integrity?
- How to ensure user data integrity using IPFS network? [2]

Sub Objectives

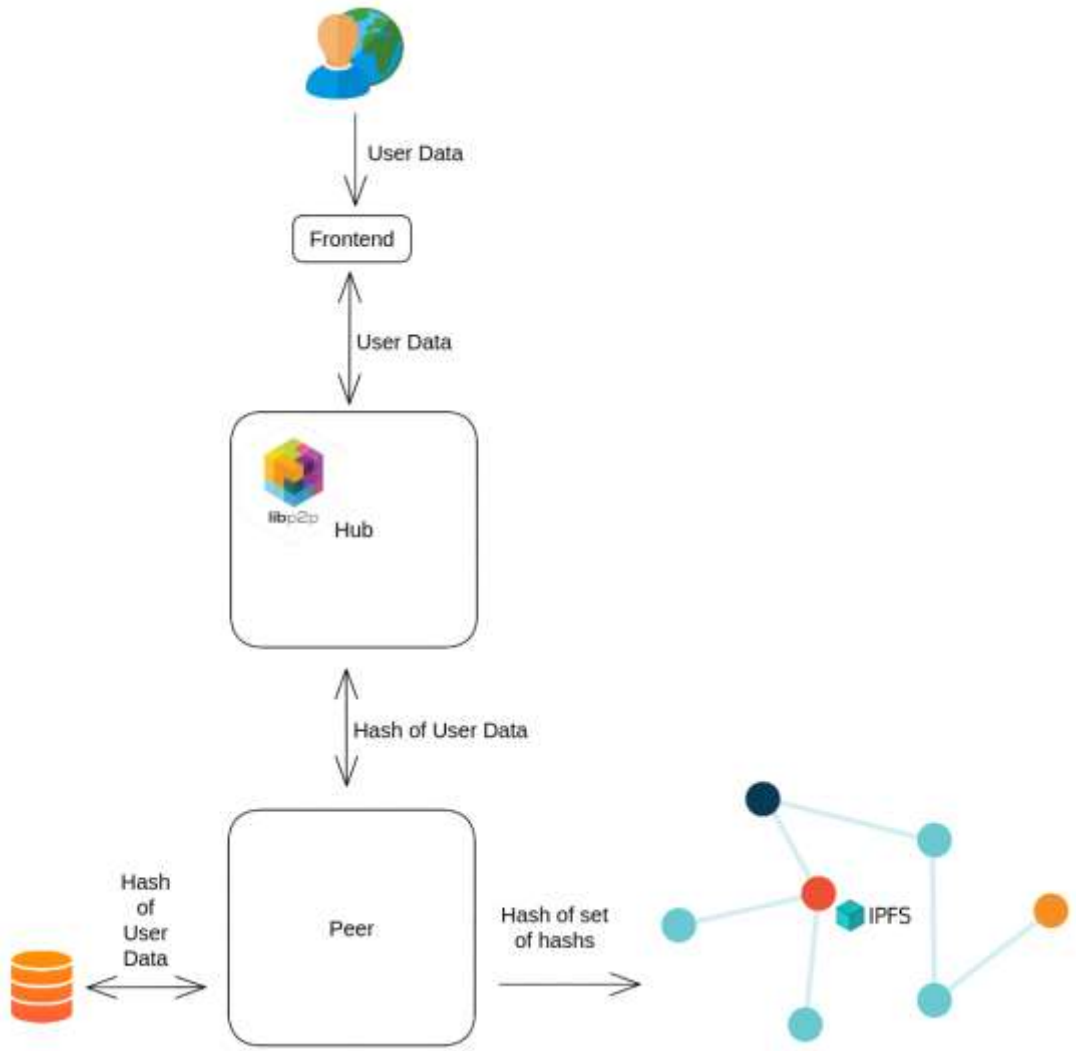
Ensure consistency in preparation for hashing and signing

Ensures the data security distributed across multiple nodes

Verify the authenticity of the data

Ensure that the data has not been altered or tampered with during storage

System Architecture



Technologies

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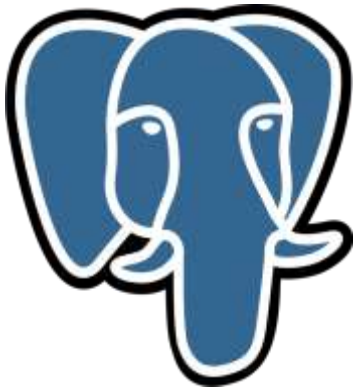
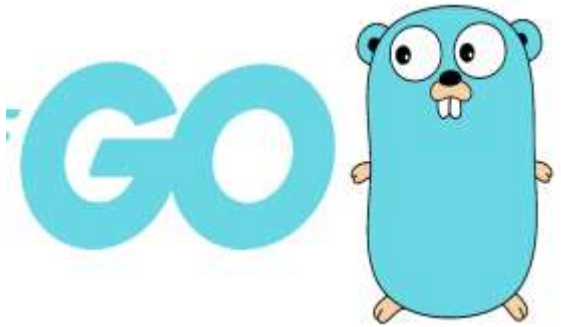
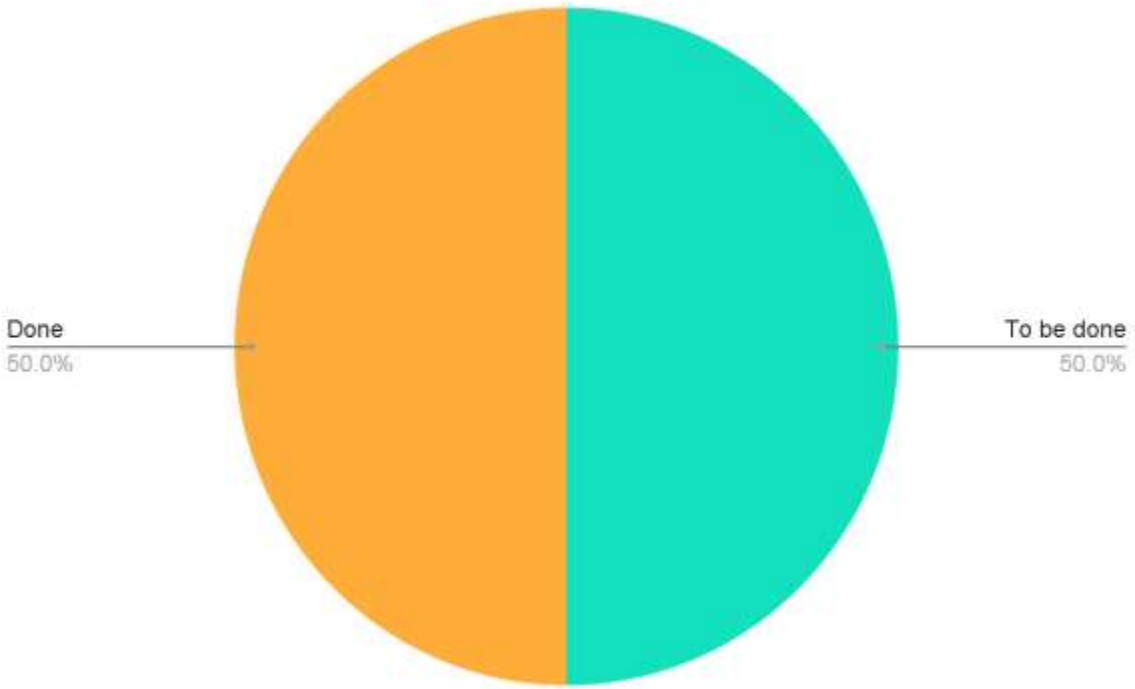


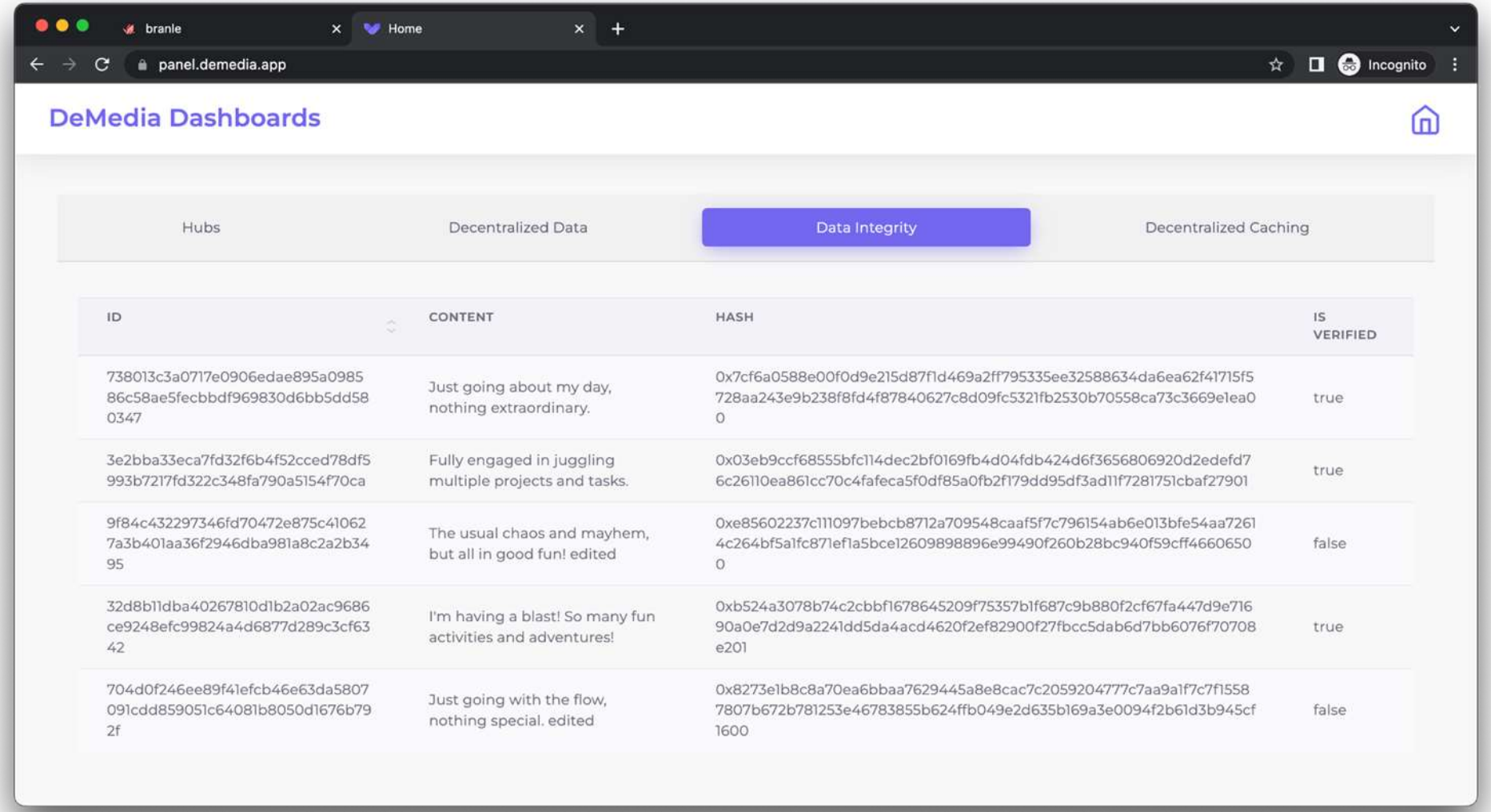


Progress of the Proposed Project

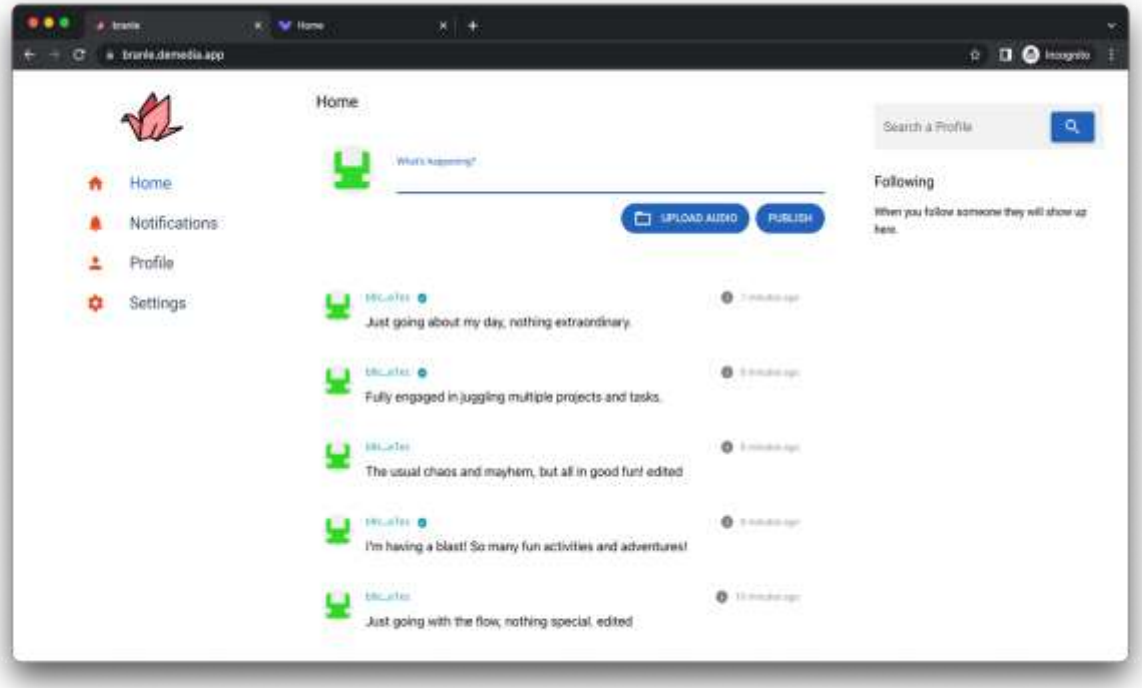
- Implemented hashing of data
- Implemented hashing of multimedia
- Implemented persist hashes on database
- Implemented verified flag

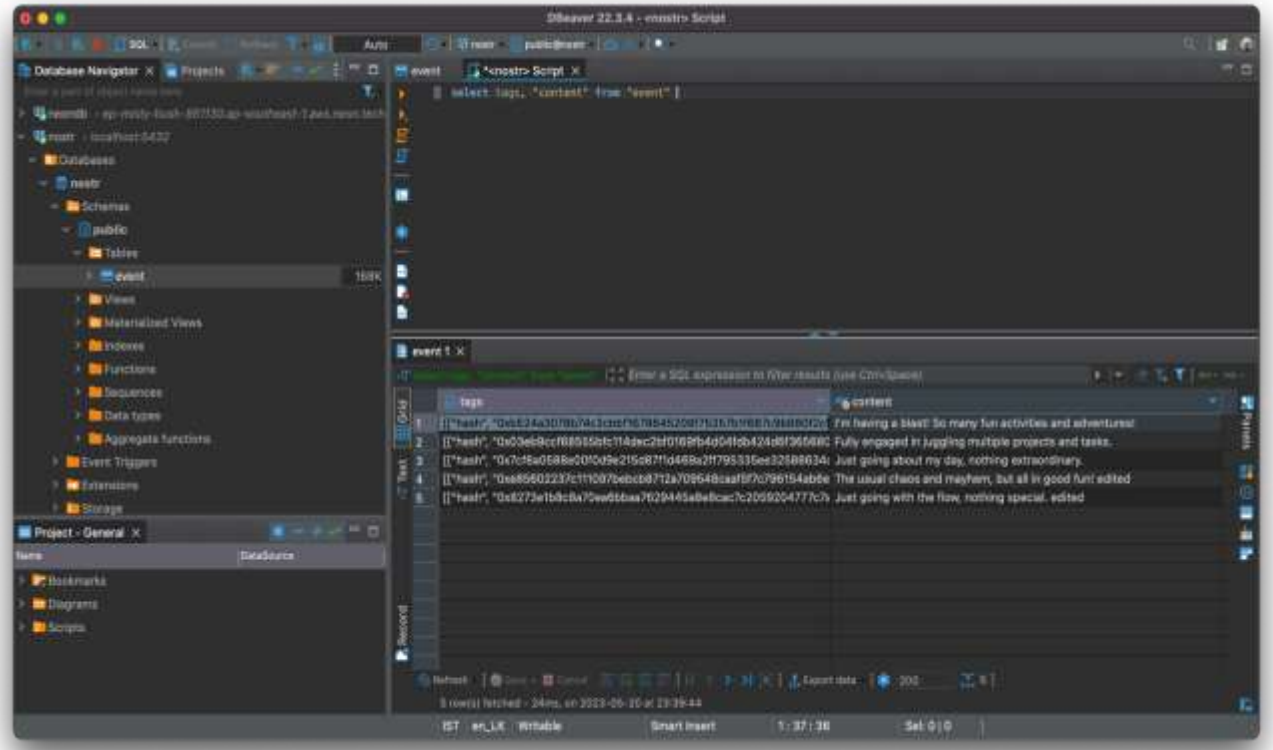


Progress of the Proposed Project Cont'd



Progress of the Proposed Project Cont’d

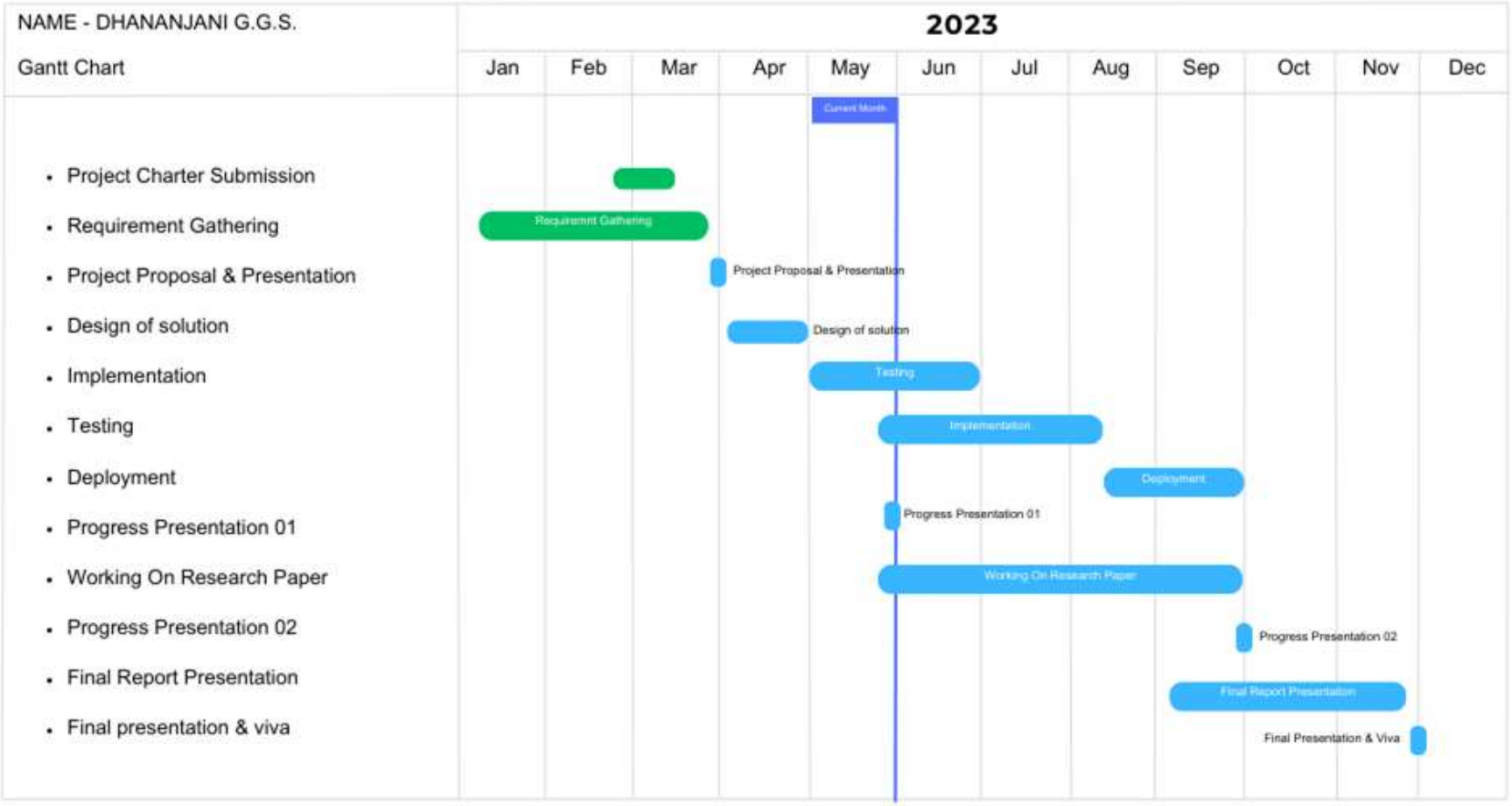




Future Implementation

- Publish master hash on IPFS
- Filter unverified content
- Allow purge unverified content
- Unit testing

Completion Of The Project



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DECENTRALIZED DATA CACHING

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Introduction

- “Caching your way to a decentralized social media experience that's fast and efficient”[1]
- Decentralized social media protocols that preserve data caching are essential for improving network performance, reducing traffic, and improving scalability, dependability, and cost effectiveness. They also increase storage optimization and reduce the cost of network operations. [2]
  - Ex :Diaspora, Scuttlebutt, Peepath, Steemit, Minds, Akasha
- There are many kind of decentralized storage networks [3]
  - Ex : Storj, Filecon, Arware , BitTorrent, IPFs (InterPlanetary File System)

Research Problem

- What is the most effective caching strategy for issues of caching mechanism?
- What we can do for minimize resource usage?
- Why we use IPFS to implement the caching mechanism?

Sub Objectives

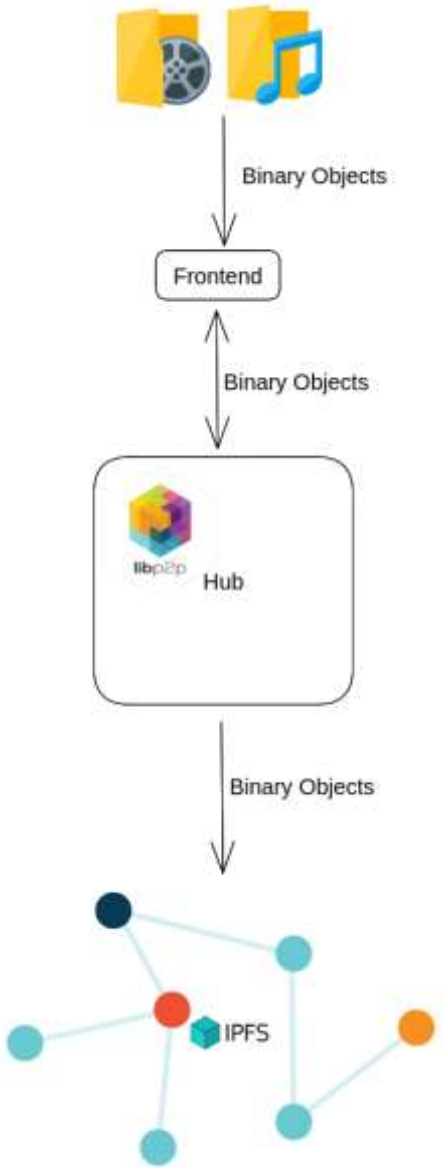
Integrating the caching mechanism with the IPFS

Reduce resource consumption in data storage

Improve Scalability, Efficiency, and Flexibility, Lower transaction fees

To evaluate the ease of integration and development efficiency

System Architecture



Technologies

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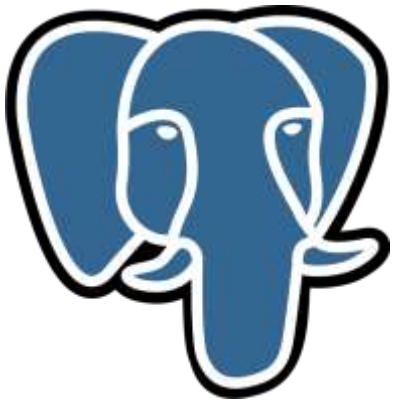
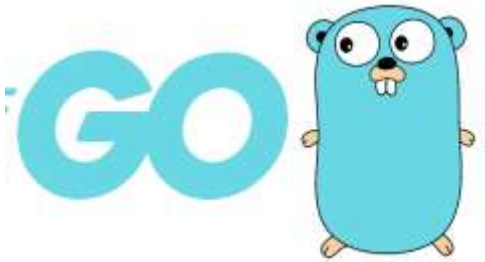
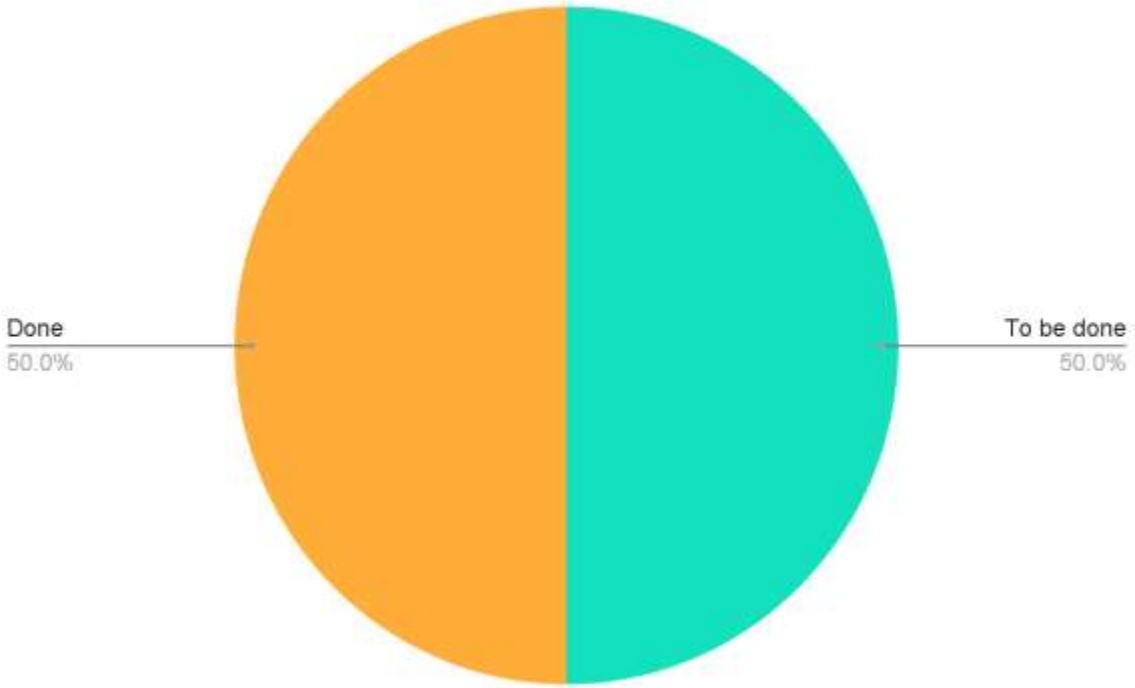


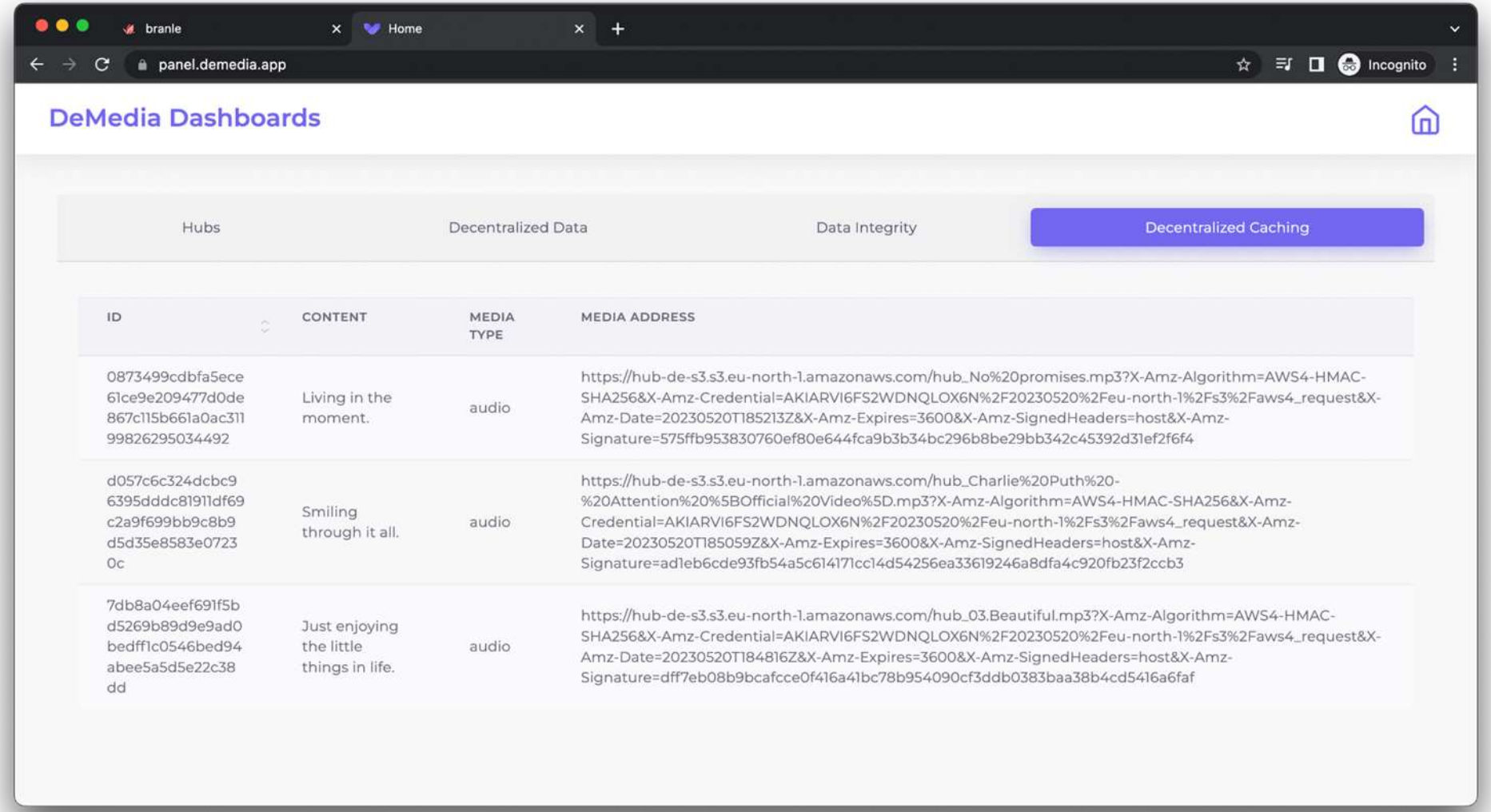


Progress of the Proposed Project

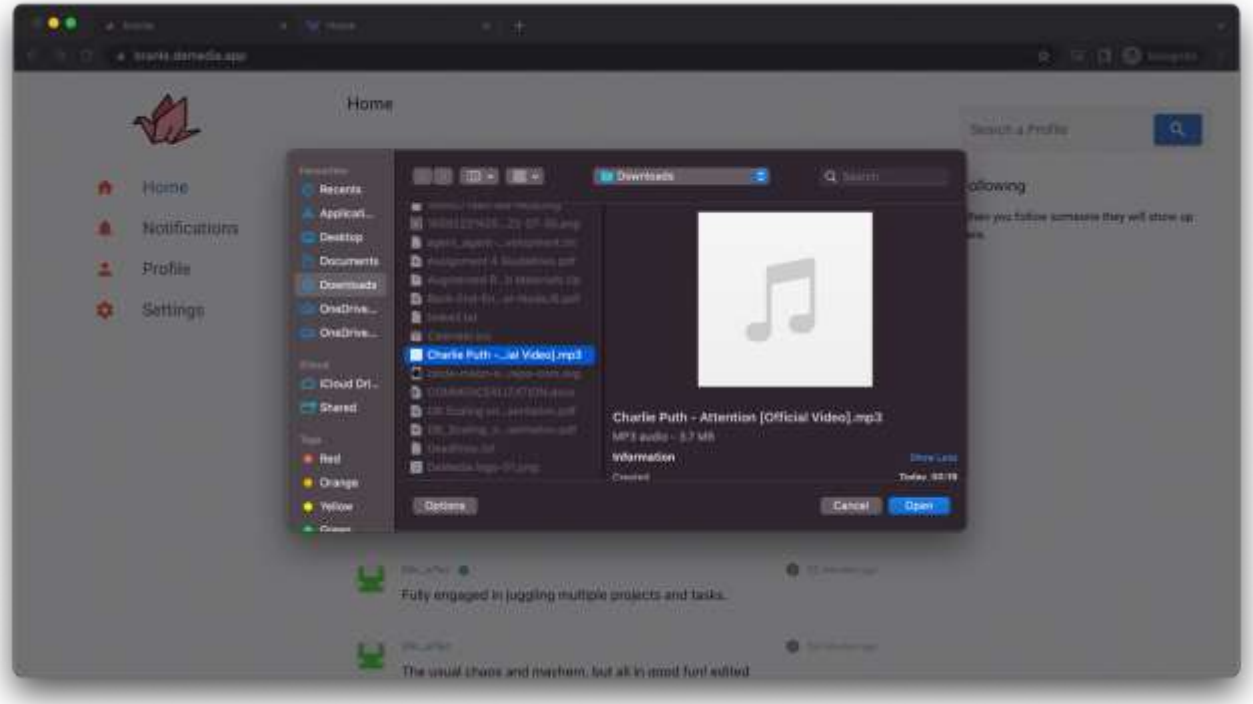
- Upload binary objects to cloud storage
- Retrieve binary objects from cloud storage
- Hash metadata of binary objects
- Keep map of binary objects content and users

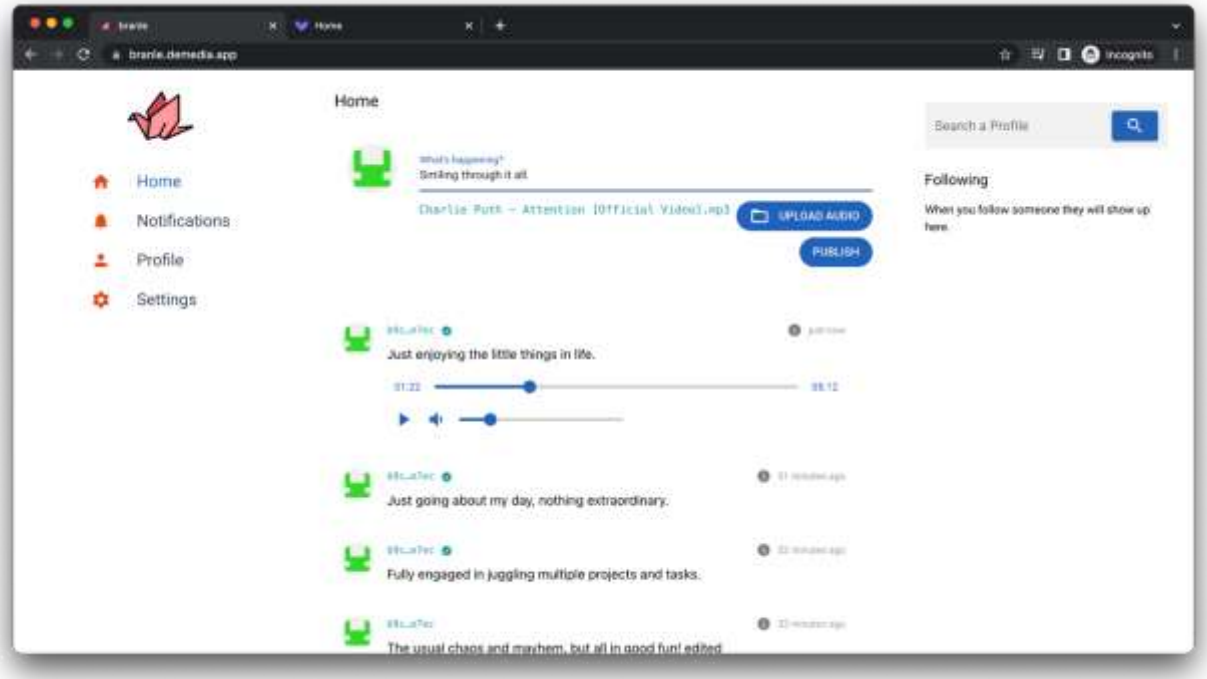


Progress of the Proposed Project Cont'd



Progress of the Proposed Project Cont’d

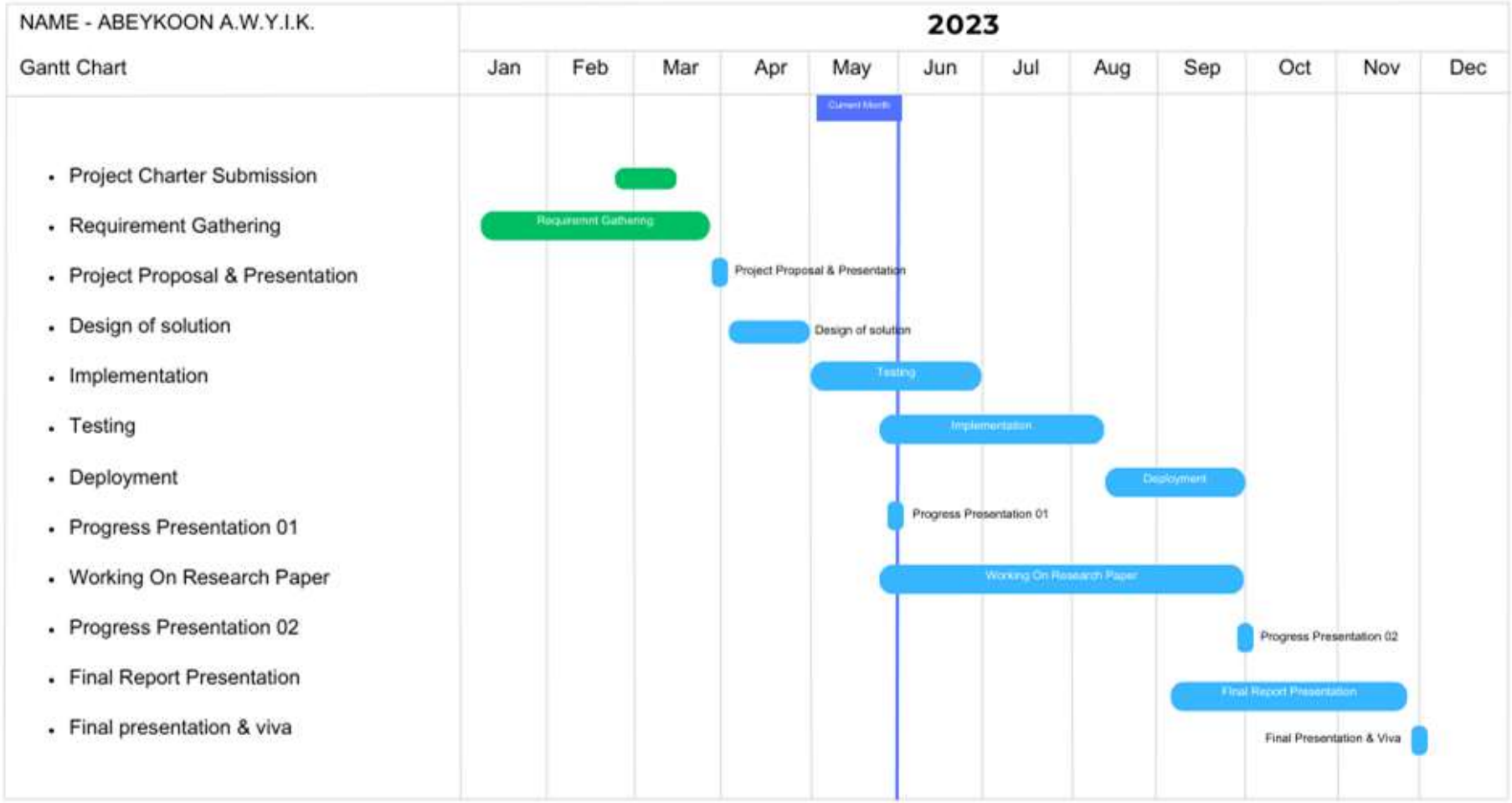




Future Implementation

- Utilize IPFS for cloud storage
- Verify binary objects content
- Allow to Purge binary objects
- Load and unit testing

Completion Of The Project



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Commercialization Plan

- DeMedia is slated to function as an open source protocol, facilitating the creation of decentralized social media platforms that are self-hosted.
- DeMedia will provide
  - A base model which can be utilized for free of charge.
  - Additionally 2 paid models will also available:
    - A membership model based on subscription, which can be governed by the host
    - An advertising-based revenue model that can also be governed by the host

Q & A

Thank You!

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Demo

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