Kumandra: A fair decentralized storage network

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Abstract

There are many possible ways to achieve a decentralized storage solution but what this paper is trying to achieve is not only DSN(Decentralized Storage Network) but the value of the whole ecosystem. This paper proposes a decentralized storage system based on blockchain technology, and also IPFS which can make full use of the remaining space of personal hard disks of the users all around the world and provide a fair decentralized storage network for the storage providers. Storage provider will be decoupled into a storage pool. End-users that want to use the platform will pay and the storage fee will be given to the pool that actually stores the data from the uploader. In order to provide a fair solution to all storage providers, there is a solution that the system will randomly choose any pool or we can say it is load-balanced. All proofs and payment information are stored in the blockchain, which guarantees the security and credibility of the system.

1. Introduction

Over the past few years, with the continuous improvement of information technology, the demand for computing and resource storage has grown rapidly. People continuously explore new ways of computing and seek higher computing power and larger storage capacity. Cloud computing distributed computing tasks across resource pools of a large number of computers, enabling applications systems to acquire more computing power, storage, space, and storages as a service needed.

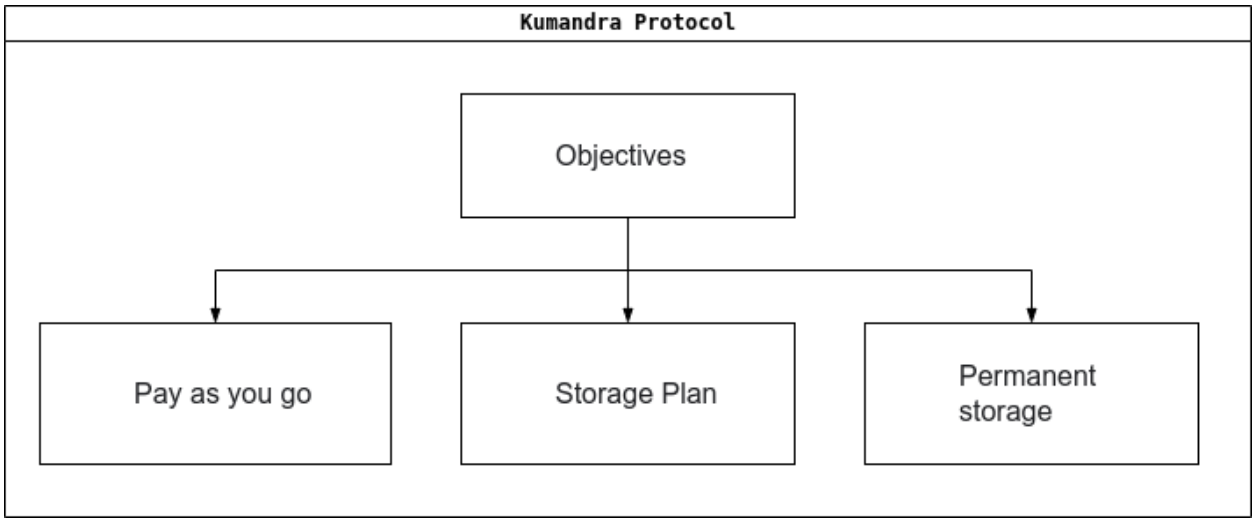
Cloud storage systems enable users to access massive amounts of storage at a cheaper price but come with a price. Users store their data only in one place and they don't have full control over their data. Most of the cloud storage companies currently still provide their own centralized storage space, and do not meet the requirements for storage resource integration and distributed storage.

This paper proposes a distributed storage scheme based on blockchain. The user uploads the data, and the system will randomly choose one cluster pool in the system as storage holder for the user. The user uses Kumandra Network Token to pay the storage fee to the cluster pool address. The reward will be locked until it reaches a certain block in Kumandra Network. If a user decides to store data on the network for 1 month, when the block reaches the 1 month timestamp. The cluster pool will get their storage fee reward and the user data will be unpinned until the network storage garbage collection runs. In that period, if the user decided to continue pinning, they need to continue the payment and the contract will continue..

2. Implementing Mechanism and Principle

The design of Kumandra Protocol is trying to be simple, explicit and anyone with spare storage capacity wants to rent it out for some reward and help the network to grow. Kumandra combines a set of technologies such as IPFS, IPFS-Cluster and Substrate to build a decentralized storage platform on top of a P2P network.

3. Kumandra objectives

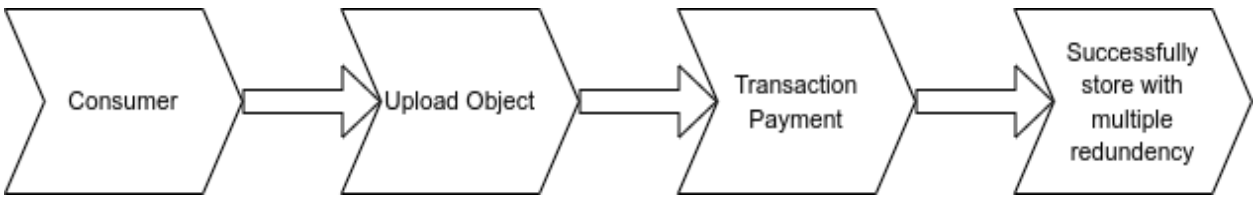


Kumandra Protocol is trying to solve these three problems and find a way to achieve this in a decentralized manner without bloating the storage provider hard drive, making everyone free to join and extend the network.

3.1. Pay as you go Model

Consumers upload their data such as “NFT, Videos, all kinds of objects” that they want to be replicated across the network but only the owner of the objects can do whatever they want with it. For example, “*Sell the data with an amount of token in order to view, Private used, Public used, or even transfer ownership of the data to somebody else*”.

Whenever consumers upload their data. The upload API from the system will randomly use one of the storage pools as their storage host. Consumers sign transactions and pay in token according to the bytes of the file, and time period they want to be pinned. The system will create a contract between the consumer and cluster-pool provider, and lock the storage fee from the consumer with the period of time according to the contract.

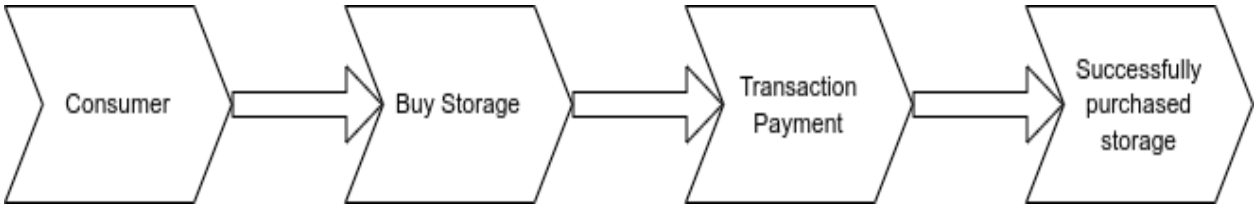


3.2. Storage Plan Model

Just like any other centralized cloud storage that provides storage to consumers. Kumandra also provides a ***Storage packaging plan***. Which means if storage consumers desire for long term usage and save costs and time. They can rent out storage with any **GB** or even **TB** whichever they want to. They just need to make a transaction with the amount of storage they want to buy and the system will create a contract between the consumer and the storage providers.

With this feature model, Storage consumers can save a lot of time and transaction fees, and also the cost of buying storage will decrease a lot. You don't have to sign a transaction everytime you upload an object. When you purchase the amount of storage you want to use. It already makes a contract between you and the storage provider, so whenever you upload a file, it is still going to make proof of verifying in the background.

In case you find yourself having a hard time understanding this concept, just remember this concept is similar to a normal centralized cloud storage provider but the difference between one is *centralized* and another is *decentralized*.



Any user that purchased any amount of storage from the network. They will get a free domain name that lasts according to the time period of their purchase. The domain name can be used as a website that can access all their **files**, **static website**, and also act as a **Human Readable Identifier** which means they can bind their wallet address with the name system and use it to replace wallet address on the Kumandra Dapp.

Similar to the `*pay as you go*` model, buyers are able to freely control all of their data. If the storage purchased by the storage consumer comes to an end of their contract time. Their data won't be deleted immediately, instead the system will verify the owner and let the consumer continue the storage contract or halt the contract. If the consumers decide to stop renting the storage, they have 48 hours to migrate all of their data to somewhere else before their data gets removed from the network. After 48 hours, the storage garbage collection will be run and all of their data will be removed from the network. If the consumer chooses to continue with the renting, the contract will be continued.

3.3. Permanent Storage Model

Some users prefer to store their NFTs or some files that need to be available forever. Consumers will pay once and the file will be available forever on the network.