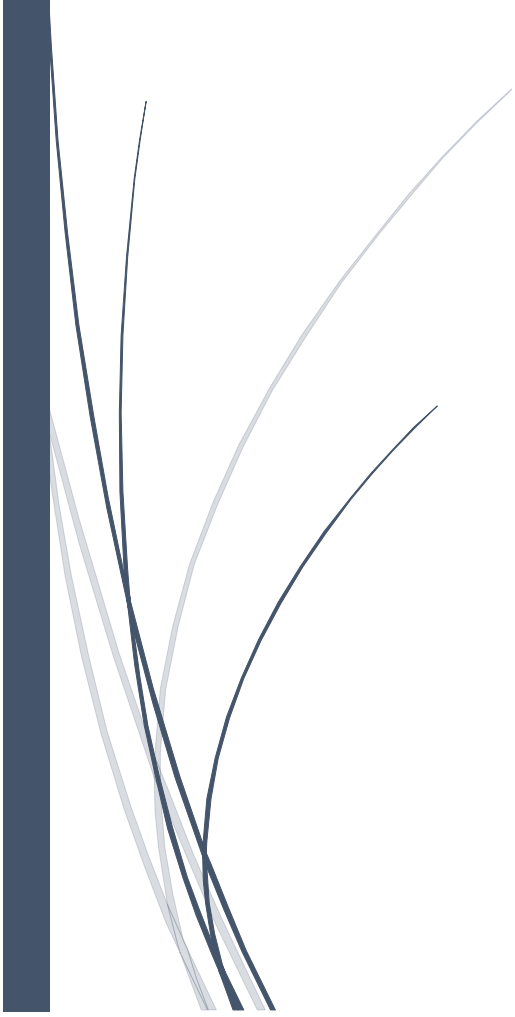
3/13/2023

MalJusT Ethereum Template

Project Proposal



Pheta Theoha
202001498CSE

Contents

Introduction

Using the undeniable power of blockchain technology and the distributed database architecture of FileCoin, the main objective of this project is to attempt to solve one the biggest costs incurred by sizable organizations with enormous amounts of data. This proposal can be seen as a way to fully explicate how this project has the potential to break the tedious and costly rut that is the traditional backend database hosting on centralized servers in management systems. It also aims on prearranging a front-end template that intergrades at least some of the most common User interface layouts for diverse management systems in use today.

A concise description would be that it is a template that will be used when different types of management systems are implemented (e.g. Hospitality Management, Tourism management, and online loan application web app, or any web application that displays company information to the public via the internet and digitally stores user and company information in one way or the other) that also stores data among various nodes in a peer to peer network. This project does not offer a cost free solution to that problem, it just reduces those costs incredibly, giving companies a major reduction in operational costs which might even lead to them reducing the cost of the products and services they offer. Furthermore, it will not be replacing the current server side optimization software such as

hypervisors and virtualization technologies that are designed to increase performance of server and reduce the cost of hosting. The same software still has a place in this proposed architecture because it can still be reconfigured to work on the smart phones and PCs we intend to use. They will work even better because not much data will be stored on a single device since the aim is to distribute data among various nodes.

The benefits of this kind of project when it comes to cost and time saving are tremendous.

Concepts

- **Web App** – Web application
- **Backend** – Server part of the Web application
- **SSD** – Solid State Drive
- **Blockchain** – A system in which a record of transactions is stored on different computers connected in a peer-to-peer network.
- **Proof-of-spacetime** – a type of consensus algorithm achieved by demonstrating one's legitimate interest in a service by allocating non-trivial amount of memory or disk space to solve a challenge presented by the service provider.

- **Moore's law** – Moore's law is the observation that the number of transistors in a dense integrated circuit(IC) doubles about every two years.
- **Server** – a dedicated device that provides data to a client computer.
- **Hypervisor[2]** - A hypervisor, also known as a virtual machine monitor or VMM, is software that creates and runs virtual machines (VMs). A hypervisor allows one host computer to support multiple guest VMs by virtually sharing its resources, such as memory and processing.
- **Node** – a client device used as a storage and/or transmission medium in a network (It can be any device that has a node software installed on it allowing it provide those features).

Problem Statement

Every growing business these days that is looking to solidify its position in the market place in any industry needs to have an online presence and that mostly entails interacting with clients on the web and storing their data, they also produce massive amounts of data within themselves such as employee data and research on consumer

spending etc. All of this data is usually stored on web and file servers. This is a very efficient way of storing data as it can easily be accessed whenever in need and they can even ensure its physical security. As organizations grow larger, their data also grows exponentially as they expand their consumer base and the cost of storing data becomes noticeably expensive.

The problem of storage is a world-wide expense, especially in the business world. Industry leaders just seem to have acknowledged its existence and accepted to live with it. It only seems like a trivial inconvenience because larger storage devices are being manufactured on an annual basis, but that growth has mainly been governed by Moore's law. This law was not meant to hold up forever, it has always been known that a more permanent or longer lasting solution had to be discovered. Temporary solutions that have pushed us this far have been implemented, like large capacity SSDs, faster data transmission mediums, and more. We're slowly beginning to approach the law's limitations as expected, and alternative measures are still very far behind in development. An alternative method is to store data on the cloud, this is reasonably cheaper but the cost can only become so low since those cloud service providers still use the same method of storing data, they are simply cheaper because they own more than enough server hardware to provide

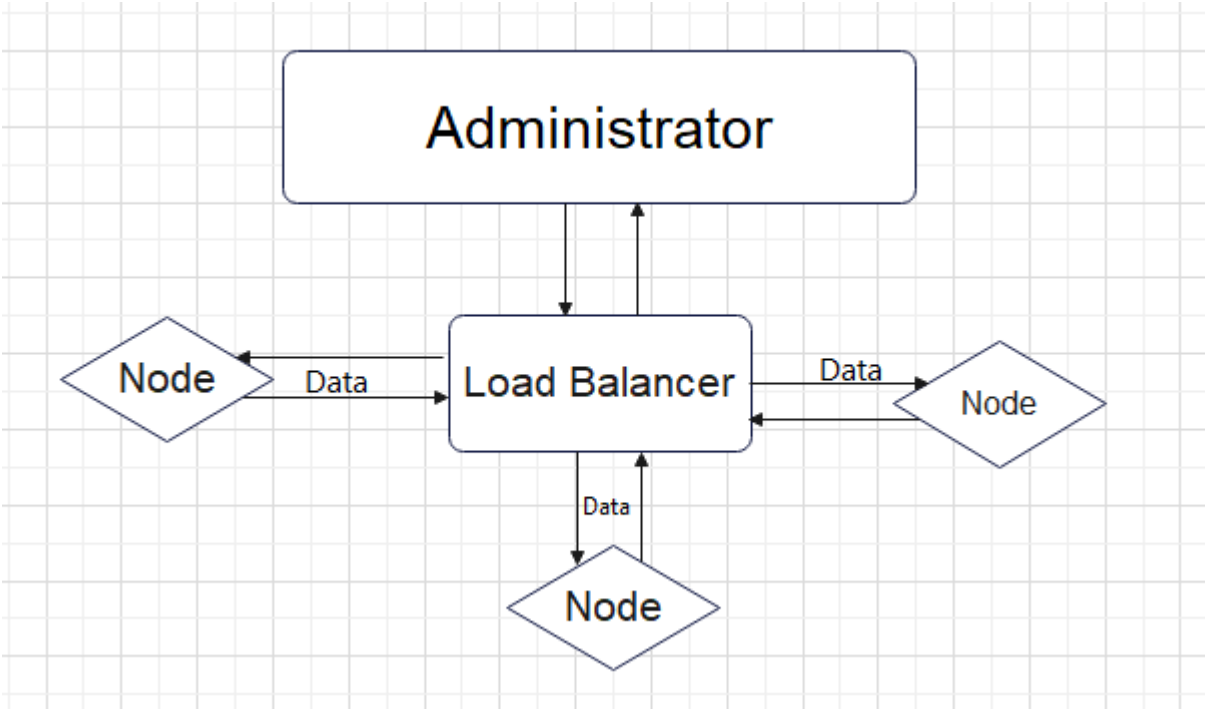
those services. This doesn’t seem to be a problem because most companies just see it as one of the costs of doing business.

The idea of this project was brought about by the realization that most end users do not really use up all the storage they have been given, like the 128GB SSDs in most smartphones and desktops in school computer labs. Users just use up about half of their storage, and while the world might soon face a storage crisis if nothing is done about this, users can be given the opportunity to rent out their storage space. The same idea has been implemented by the FileCoin blockchain although like most blockchains, they were only trying to mitigate the problems brought about by centralized and governed storage. If the same architecture with some modifications was used to resolve one of the biggest issue we might have to face, the solution might last long enough for a more permanent approach to be fully developed. The project will also attempt to simplify the tedious management system design that ends up using the same structure or at least a lot of common features. This will be done by building a template that consists of some of the typical features commonly found in most management systems, thereby greatly reducing development process and time taken to develop a fully functioning management system.

Objectives

The envisioned outcome is a fully functioning server program installed on the client's device while the management system controlled by the governing office acts as the client that can upload and download data from every device that has the server program running on it. The management system will also consist of a load balancer program that will distribute data among server nodes respectively as data is stored evenly across various nodes. This will form a distributed database that gets more efficient as more clients join as nodes providing even more storage and faster data transmission hence higher reliability. One of the perks of a centralized server is high accessibility and the guarantee that data can be retrieved whenever needed by the organization. One way to keep that up would be to ensure that a client will be online whenever needed. That could be part of the validation process when a node is added to the network.

The important feature is to have a controlling authority that can manage nodes on the network.



Literature Review

Some developers have noticed this problem, even though they had a different perspective in mind. They were only against the idea that cloud providers have taken control of most of the world's data. Even though they don't really have access to it, they feared that the fact that we rely on them for the safety of our data gives them too much power. The governing body behind the development of FileCoin,

Protocol Labs and Juan Benet, had the idea of creating a decentralized system allowing users to rent unused hard drive space.

[1] Filecoin (⨍) is an open-source, public cryptocurrency and digital payment system intended to be a blockchain-based cooperative digital storage and data retrieval method. It is made by Protocol Labs

and shares some ideas from InterPlanetary File System allowing users to rent unused hard drive space.

Although they implemented the same idea of a distributed database, they were solving a different problem in mind. The objective of this project is to reduce storage costs for organizations while their goal was to decentralize the existing database architecture hence creating a system that had no governing entity.

This project will have a load balancer program that will be managed by any organization that implements the system. The load balancer will be responsible for adding new nodes to the network and evenly distributing data among nodes. The FileCoin system however, works by connecting nodes in a peer to peer network and sharing data among themselves using proof-of-replication and proof-of-spacetime.

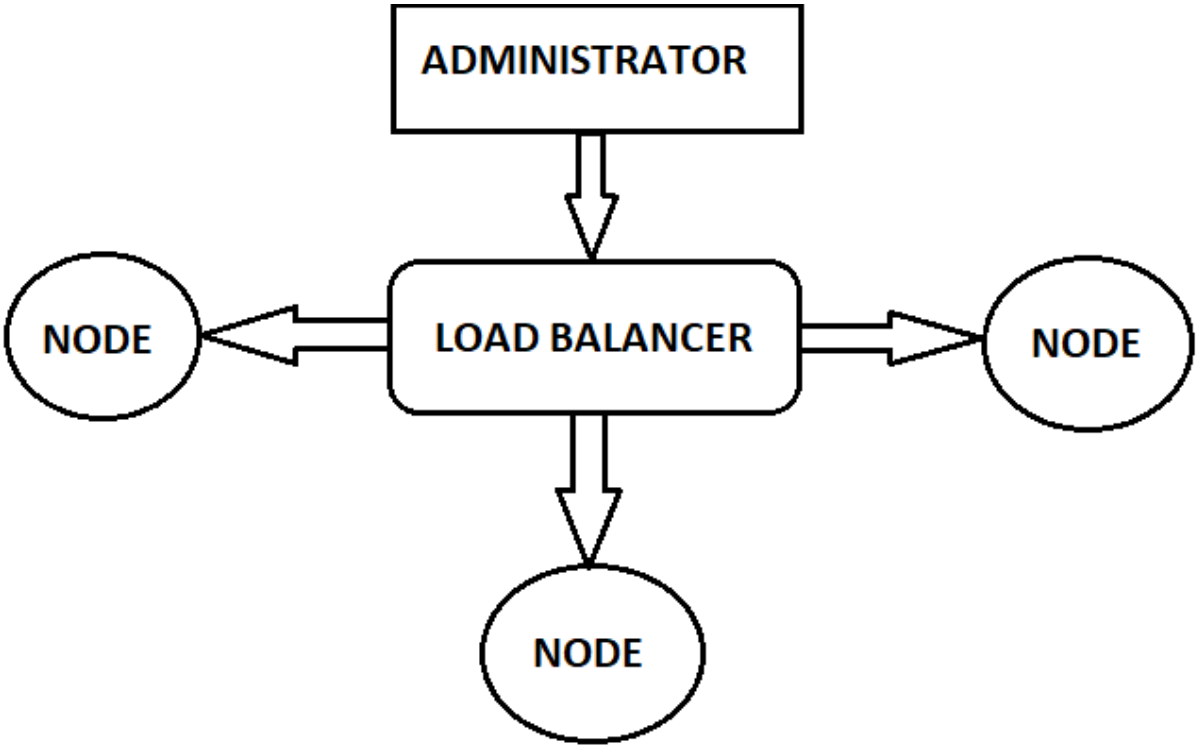
Significance of the project

Considering that established businesses are the ones to reap the biggest reward in terms of cost deduction, they will be the biggest beneficiaries. It would be pointless to solve a problem that only big companies which are fully able and well-resourced to fight through have, as they have been doing so for some time. The most important, although not the biggest beneficiaries are users who have

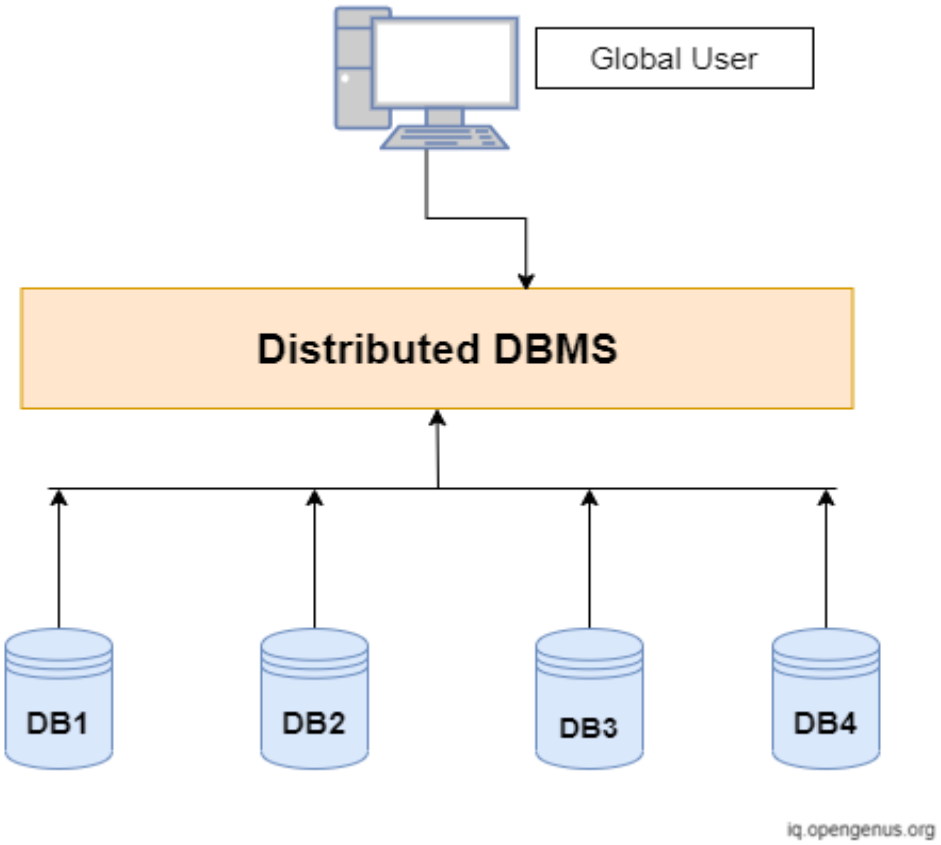
more than enough space on their devices. This will give them an opportunity to rent out their unused storage space for a minor fee. The aim of this project was to reduce storage costs considerably, not cut them completely since an organization will still need to incentivize node owners to allow them to use their devices. With this business logic, the possibilities are limitless. If it becomes widely adopted, users can even include it in their payment plan when purchasing a new PC or smart phone as part of a contract to reduce their costs by agreeing to rent out certain amount of space.

[3] "*Templates* ***allow for a constant form and structure, which makes it easier for your team to locate important aspects quickly***. *Uniformity impresses prospective and current clients with your company branding*." The need for templates is growing as more businesses try to beat their competitors to market, so time taken for development will be saved considerably.

Project Outline



- **Administrator** – The role of the administrator is to control information flow within the whole system. They get to manipulate the load balancer, adding and removing nodes. They will control the load balancer through the front end template.
- **Load Balancer** – The load balancer is a program that acts as the control center of the whole system. It governs the distribution of data among different nodes proportionally with regard to the space in the whole network. With the administrator's control, it can also add or remove nodes from the network.
- **Node** – A client computer that has a node program installed on it allowing it to provide unused space.



Proposed time schedule

ID	Project Phases	Start	Finish	Duration	Complete
1	**Project Proposal**	2023-03-03	2023-03-13	7.0 d.	14.3%
2	**Design**	2023-03-14	2023-03-28	11.0 d.	22.7%
3	**Front-End Implement**	2023-03-29	2023-04-21	18.0 d.	13.9%
4	**Back-end Implementation**	2023-04-24	2023-05-26	25.0 d.	10.0%
5	**Unit-Testing**	2023-05-29	2023-06-09	10.0 d.	25.0%
6	**Intergrated testing**	2023-06-09	2023-06-19	7.0 d.	35.7%

The above Gantt chart illustrates the complete breakdown of my work schedule regarding the development process of the project. The development model in use will be the V- Shaped model of development allowing me to revisit each step during the testing phase.

During the **design** phase, an in depth model of information flow will be analyzed and projected. When it comes to the **front end implementation**, coding of the user interface will begin and all the specifications discovered during the design phase will be implemented. The **back end** implementation will deal with the implementation of the business and technical logical structure behind the whole project with coding. **Unit testing** will focus on testing the individual components in the project, while **integrated testing** will focus on testing the project as a whole, with all the parts working together.

Estimated Budget

If the template user chooses to give up control and the project gets deployed to the FileCoin blockchain, then the cost would sum up to around $30 per Terabyte of space rented. This is far better than the current cost of servers with half the amount of space given. Other than that, the only costs incurred are that of time and expertise

required to bring the project to life as well as the PC used to write the code and the PCs that will be used to demonstrate the workings and functionality since there are no hardware components that need to be integrated into the project.

References

- *[1]Filecoin Docs*. Retrieved 2022-09-05 from https://en.wikipedia.org/wiki/Filecoin
- *[2]https://www.vmware.com/content/vmware/vmware-published-sites/us/topics/glossary/content/hypervisor.html*
- *[3]https://www.linkedin.com/pulse/benefits-using-templates-tom-lipscomb*