

Logistics Management using Blockchain

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Abstract—Logistics Management is one of the various parts in the Supply Chain Management System. It dictates the resources acquisition, storage and transportation. Applying Blockchain Technology to the Logistics Management System of a Company improves the efficiency of the System. Blockchain is a dynamically increasing list of information, which is shared, recorded and keeps track of all the processes or transactions of the System or the Business Network. Using this Technology to the Logistics System significantly boosts its efficiency. Using Basic HTML, CSS, JavaScript UI/UX frontend is being designed. The details in the frontend about the resources of the company is sent to the Backend Blockchain Technology created in the Node.Js Platform. A prototype of such a System is the result of this project.

Index Terms— Logistics, Supply Chain Management,Blockchain.

I. INTRODUCTION

Managing the resources of a company is one of its primary goals in improving its Business. These resources are products of the company or its raw materials or other finished or unfinished products on materials. It is said that in the olden days an army that excels in managing its logistics can easily win any war. That is why logistics is an important or an essential aspect of every company. It is important to know that the logistics management or the resource management of the company is not the same as the supply chain management of the company. Supply chain is the superset of logistics management. Supply chain management includes management of logistics and the distribution of the finished goods or products of a company that is the transportation. For the sake of simplicity and applicability, the scope of the project is limited to logistics management alone and not supply chain management. In order to make a good logistics management system the concept of blockchain technology is used. These days blockchain technology is seen everywhere. A blockchain is a dynamically increasing list of information known as blocks, that are connected together and secured by cryptography. Each entity in blockchain generally has a hash pointer, timestamp and transaction information. Blockchains cannot be easily modified and are designed to provide security to the data and it is an application of distributed computer systems. This blockchain technology makes sure that a centralized authority is not needed in its system thus making it decentralized.

II. PROPOSED SYSTEM

The implementation of a decentralized blockchain system for the logistics management of any company is done through a website primarily made up of *HTML, CSS, JAVASCRIPT* and Node.Js code. This implementation is just a prototype of the logistics management system developed using the blockchain technology. *HTML, CSS* are primarily used to design the frontend of the application. The backend blockchain technology is built using

Node.js. There is a module named crypto in Node.js that is used to develop a blockchain from scratch. It is to be noted that blockchain need not be used only for developing cryptocurrencies but it can also be used to store critical information. For this blockchain, the *SHA-256* hash function is used. Thus the security of the logistics data is ensured. In the website portal designed, the user is given four primary operations namely Acquisition, Storage, Transportation and Analytics. The various process involved in a transaction or record of resource information for a company is stored as follows:

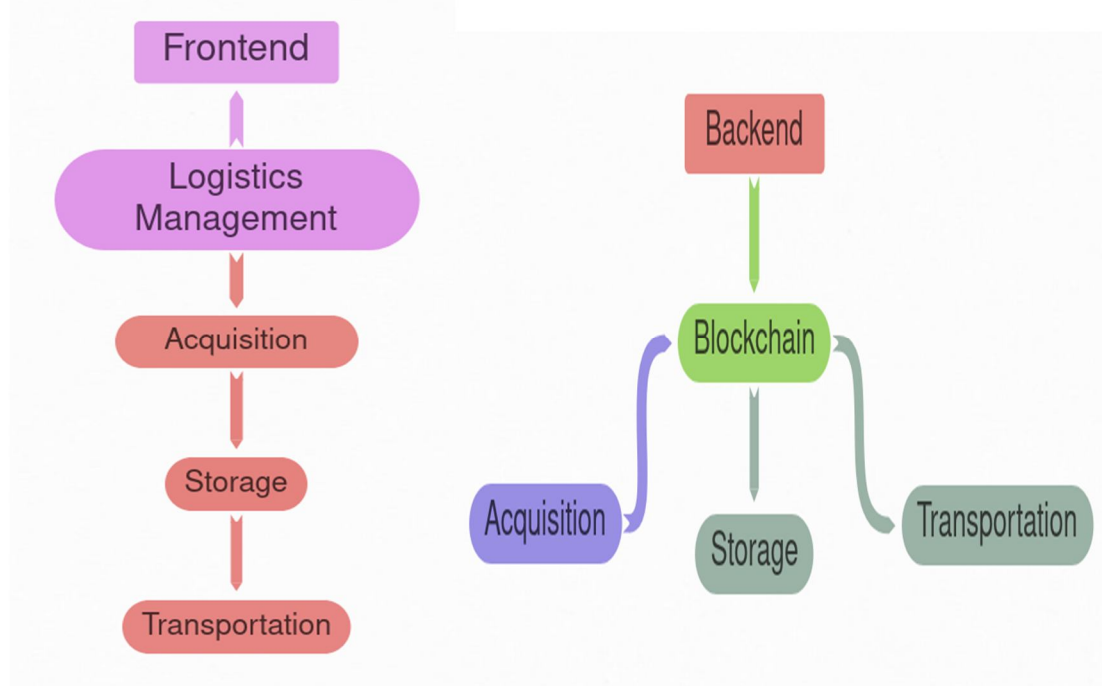


Figure 1. Frontend Logistics Process

Figure 2. Backend Blockchain

III. RESULTS AND DISCUSSION

There are primarily four modules or functions involved in this project. They are the Acquisition, Storage, Transportation and Analysis section.

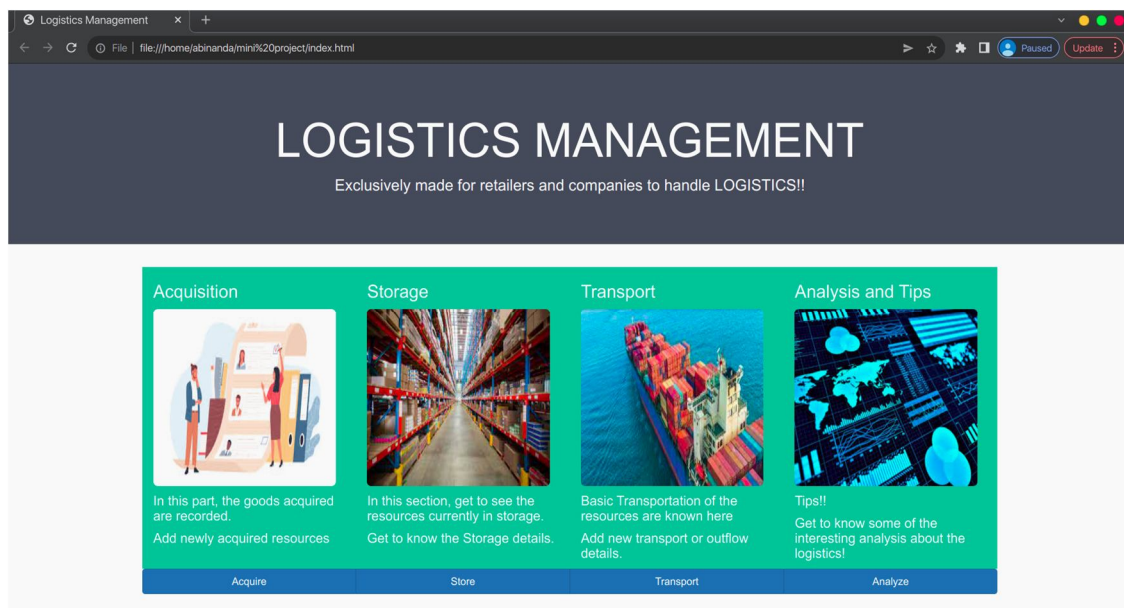


Figure 3. Index front page

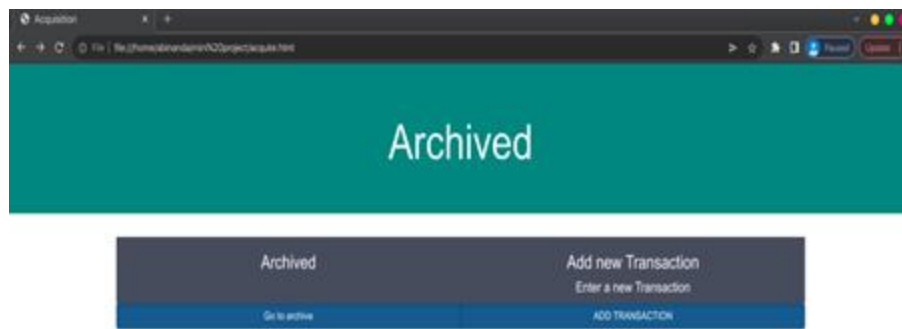


Figure 4. Acquisition section

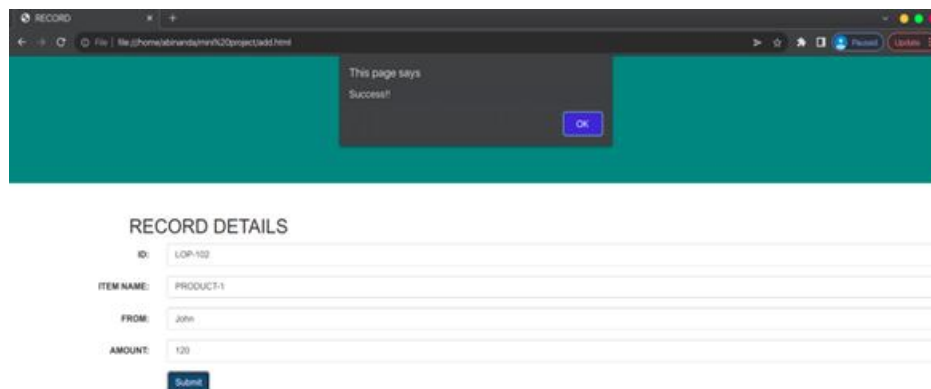


Figure 5. Adding new transaction

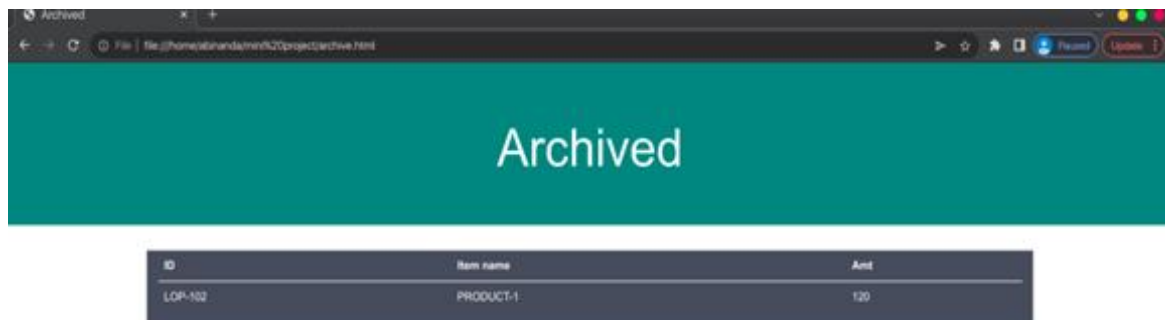


Figure 6. Archived section of acquisition

In the above Fig.6, it can be seen that the newly added transaction or record is updated into the system and gets displayed successfully. As the user adds more transactions, the archived section also gets updated. Now the same can be seen in the storage section or webpage as shown in the Fig.7. It is to be noted that there is a significant difference between the archived and the storage section. In the storage only the items in stock are seen which means that only the items that have not yet been transported are seen, while the same is not true for the archived section as it holds all the records made so far by the user whether it is in the stock or not. As of now it has not been transported and the storage section also contains the same item.

In the Fig.8, the backend work of the record being stored in a block in the blockchain can be seen clearly. The block contains the data along with additional information such as the timestamp of the record entered and the lasthash and the hash value of that particular block in the blockchain.

IV. CONCLUSION

The Logistics Management System developed by Blockchain Technology has been successfully tested and the transactions of such a system are distributed and each record evidently gets a unique hash value assigned to it by the backend blockchain mechanism. It is clear that the prototype modeled logistics system can be easily implemented in any company and help its logistics or resources to be well organized.

ID	Item Name	Amt
LOP-102	PRODUCT-1	120

Figure 7. Storage section

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1  TimeStamp:25/05/2022
2  LastHash:{00000}
3  Hash:C3Ta07K81YvjCgQH9Q1S3R3P3BtN3RIM8n
4  Data:{'ID':'LOP-102','ITEM NAME':'PRODUCT-1','FROM':'John','AMT':'120'}
```

Figure 8. Backend blockchain

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