Develop a Supply Chain Management System Based on Blockchain Technology to Prevent the Risk of Counterfeit

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled Develop an E-commerce system based on Blockchain technology to prevent the risk of counterfeit submitted by Mehedi Hasa and Nur Amin Sifat and Mansura Akter Mim to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation was held on 05 December 2020.

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DECLARATION

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ABSTRACT

Our project is Develop an E-commerce system based on Blockchain technology to prevent the risk of counterfeit.It helps to transaction without any third company.Our project main goal is to eliminate third party and prevent the thread.It helps to secure data.We use blockchain technology.It helps to eliminate the third parties and make data more secure.With the help of our project customer can directly connect to the company and complete the transaction without any delay and less cost. This project explores a new dimension to make it more interesting and challenging.

TABLE OF CONTENTS

CONTENTS **pages**

CHAPTER 1 : INTRODUCTION **pages**

1.1 Introduction 1-3
1.2 Project Motivation 4
1.3 Benefits of The Project 4
1.4 Layout of the report 5
1.5 Summary 5

CHAPTER 2 : Background **pages**

2.1 Introduction 5
2.2 Introduction of Blockchain System 5-6

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2.3 How blockchain transaction works 6
2.4 Smart Contract of blockchain 6
2.5 Scope 7-8

CHAPTER 3 : REQUIREMENT AND SPECIFICATION Pages

3.1 Introduction 9
3.2 Hardware Requirements 9
3.3 Software Requirements 9
3.4 Blockchain Traditional Diagram and Transaction 10
3.5 Flow Chart of Transaction 10-11
3.6 Bitcoin Block Diagram 12
3.7 Ethereum Block Diagram 13
3.8 Flow of Supply Chain management 14
3.9 Smart-Contact between Owner and Client 15
3.10 External Account and Contact account 16
3.11 Use Case Diagram of proposed Supply chain 17

CHAPTER 4 : IMPLEMENTATION Pages

4.1 Implementation Code 18
4.2 Make owner bl 19-27

CHAPTER 5 : FUTURE SCOPE AND CONCLUSION Pages

5.1 Conclusion 28
5.2 Scope 28

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LIST OF FIGURES

FIGURE NO	FIGURE	PAGES
Fig-1	**Blockchain Traditional Diagram and Transaction**	**10**
Fig-2	**Flow Chart of Transaction**	**11**
Fig-3	**Bitcoin Block Diagram**	**12**
Fig-4	**Ethereum Block Diagram**	**13**
Fig-5	**Flow of Supply Chain Management**	**14**
Fig-6	**Smart-Contact between Owner and Client**	**15**
Fig-7	**External Account and Contact account**	**16**
Fig-8	**Use Case Diagram of proposed Supply chain**	**17**
Fig-9	**Implementation Code**	**18**
Fig-10	**Owner Block Creation**	**19**
Fig-11	**Owner Creation Log**	**20**
Fig-12	**Deploy Product By Owner**	**21**
Fig-13	**Deploy Product Log**	**22**
Fig-14	**Tracking Product By Unique Id**	**23**
Fig-15	**Order By Receiver Block**	**24**
Fig-16	**Make Carrier By Owner**	**25**
Fig-17	**Carrier Update Log**	**26**

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Fig-18	**Owner and Client Track The Last Update of Order Item**	**27**

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION:

Blockchain is a system or technology that stores data in a decentralized way which is difficult to change or temper . This system permits digital data to be distributed, but not duplicated. That means a single piece of data can have only one owner. Blockchain is a one kind of distributed ledger for sustaining a stable and temper proof record of transactional data. Blockchain consists of many blocks and every block contains cryptographic hash of other prior blocks ,a timestamp and transactional data of block. Most

An important topic is that it has sorted out the problem of unauthorized spending,double spending, and increasing security of data.

A Blockchain is performed as a decentralized database and each block connects to each other in a peer to peer network. In 1992 ,cryptographer David Chaum was first mentioned in a protocol like Blockchain. After that in 2008 ,Satoshi Nakamoto brought bitcoin through the discovery of bitcoin. He used the first blockchain concept on real world application.

Initially Blockchain only related to crypto-currency such as Bitcoin . But nowadays it is used in many fields such as gaming platforms, healthcare sectors, supply chain ,decentralized databases and many industries.

That's why Block chains have a great future scope. Block chain most important for financial organizations. In future mostly financial institutions will use blockchain for its security features. Recently, if we transfer money from one country to another country we

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need money conversion for payment . But using Blockchain's cryptocurrency we can easily transact money from one place to another without currency conversion.
Moreover,Blockchain is one of the most secure data protection systems . The data of a Blockchain are secured by cryptography. The security provided by a distributed ledger technology that gives the benefits to build up a secure data network. This system is able to maintain all information so that data has not been changed in any process . If anyone does change a data, all the ledgers of a node in the chain confirm that change is done. This system is used to protect devices from hackers. Blockchain technology defends the data exchanges happening between IoT devices. A Blockchain-based system can take additional security for its decentralized technology

A smart contract is a self-activating contract term of agreement between client and vendor being straightly written into lines of code. The code maintains the execution, transactions that are detectable and unchangeable. In 1994 Nick Szabo first proposed Smart contracts. Szabo explains smart contracts as networked.transaction protocols that perform terms of a contract. Smart contract works through "if/when…then…" statements .The code is written into a blockchain.The benefits of smart contact are Speed and accuracy ,Trust,Security,Savings.

Another important future scope is the consent management system . In the blockchain system patients can share data to others and hide their own identity . Most of the time patients lose medical records. This will make it very bad for patients and doctors for further treatment. But the Blockchain system overcomes this bad situation and increases the healthcare system's service efficiency.

Moreover, sharing medical records with other stakeholders increases research resources.Great opportunities in cybersecurity . In the blockchain data store in a cryptographic way and without verification anyone won't store data in the Blockchain system. So data or information will be more secure than traditional ways.

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Using Blockchain technology we can supply products and store their history properly. So anyone couldn't change or temper transaction history without proper authentication .

Even every step or money transaction will be recorded in the blockchain system . So any kind of fraud can easily be caught out. In future , Forecasting, cloud storage ,world trade , IOT, Robotics most of the technology use Blockchain . Not that the Blockchain is not being worked on at present, many organizations recently use Blockchain for many different purposes . We already know, Blockchain is the backbone of the cryptocurrency Bitcoin.

Bitcoin's monetary policy is imposed by an individual mixing of software, cryptography and financial reason rather than the trusted third parties.

Block chain Technology serves all financial fields in the future .People use these services that offer ease of use, convenience, efficiency, and speed. Blockchain technology highly uses industries, but mostly impacts the banking and remittance field.

Blockchain technology provides a highly potential for many products, processes and many areas in the industry. Three main fields of this application Payment transaction,Trade finance,Over the Counter (OTC) market.

Blockchain trim payment, remittance processes but reducing processing times and costs.

The digital commercial requirements are digital benefits, smart contracts and programmable money taking the benefits of blockchain and provides connectivity and programmability between the products, services, assets and holdings.

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Another great application of blockchain technology is Hyperledger Fabric, which is linux Foundation's project but supported by IBM it became a popular framework recently. Hyperledger Fabric is a more reliable and easier Blockchain framework . Which originates from the concept of a distributed ledger. Some important features make Hyperledger different from other frameworks. That's why day by day many organisations adopt this framework for their business purpose. Some important features mentioned here such as privacy issue , scalability , immutability of smart contact,storage issue etc.

1.2 PROJECT MOTIVATION:

In the existing system we can see that there is a limited number of transaction can be done.This is the major problem of our country.We can only transact a few amounts.
In the existing system there is a third party which can help to transact.But we have to pay some fee.We have to wait some time for transaction.Sometimes the data can be theft by this third party.

1.3 BENEFITS OF THE PROJECT:

- Eliminate third party
- Make more secure
- Reduce transaction time
- Reduce transaction cost
- Customer can connect direct with company
- Customer get full control of his own account

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1.4 Layout of the report :

Here, I describe how I developed my total system.We use it to develop the system with blockchain technology.

1.5 Summary:

In this chapter, my objectives come very clear. In this chapter, I have discussed the system development life cycle and we followed that.

CHAPTER 2

Background

2.1 Introduction:

In this project we use blockchain technology that stores data in a way which is impossible to cheat or hack.A blockchain technology is a list of data records that are called blocks and connect each other using some technique. Nowadays blockchain technology makes a great buzz. Now many scope are created for blockchain.

2.2 Introduction of Blockchain System:

Todays blockchain create his own buzz in the financial market.The technology are being used Insurance,healthcare,smart contract.The most successful implement of blockchain is bitcoin.peer to peer to block is the most important technique in this system.Each node connect each other and share the data.Block chain contains a lot of block and they hold the information.Blockchain technique eliminate double spending problem,eliminate third

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party and more secure.Blockchain can solve double spending problem without any central company.Blockchain technology is used money transfer,goods,properties without third party.Once data is recorded in the blockchain it is impossible to change or modify data.Blockchain has block and each block has

a.data

b.Hash

c.Hash of the previous data

Each block connects to each other. A block has a hash that is unique. Other block connect with the previous hash. Each block connects with a distributed peer to peer network. Each block has its own data Each block connects with each other and can share the data.This makes the block chain more secure.If someone enters the chain he gets the full information of the blockchain.Each devices called nodes.

2.3 How blockchain transaction works:

Some people request for a transaction and the transactions can be money,information,other data.The requests are allowed over the network.Each block accepts the transaction and distributed with peer to peer network.If network accept the transaction and follow the algorithm then the transaction will be accepted. If the transactions are completed then the data are added with a network.Each node follows merkle tree algorithm.

2.4 Smart Contract of blockchain:

Smart contracts are lines of code that are stored in a blockchain that automatically executes after fulfilling predefined conditions.At the primary level, they have programs that are set up to be run by developers person.The advantages of smart contracts are the

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business collaboration that spots everything and in which they implement certain contracts so that everyone can see their own results without any partner between them.

Benefits of Smart Contract in Blockchain:

Speed and accuracy: Smart contracts are digital and automated, so you don't have to spend time correcting written errors in manually filled documents.

Trust:Smart contracts automatically complete the transaction in accordance with the predefined rules and the encrypted records of that transaction are shared among the participants.So no one can question that the information has been changed for their own benefit.

Security:Blockchain transaction records are encrypted,which makes it very difficult to hack.The blockchain records information before and after each transaction that is not easy to change.

Savings:Smart contracts can rely on visible data and technology of transactions, without relying on third parties.Because it is made by code,so there is no need for an extra person to validate and verify the terms of the contract.

2.5 Scope

Scope of Blockchain Technology:

Blockchain in Digital Advertising: In today's world,one of the biggest problems in digital advertising are challenges such as domain fraud, bot traffic, lack of transparency and long payment models. Blockchain technology can provide a solution to this problem. Because

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blockchain technology only allows the right companies to succeed. This reduces the incidence of fraud in the supply chain.

Blockchain in Cybersecurity: The innovative cryptography feature of blockchain technology will help encrypt and verify data. In this way, data is less likely to be attacked or altered without authorization.

Blockchain will remove the requirement of the third party:With the help of blockchain technology, it is possible to influence various processes and strategies.This eliminates the need for trusted third parties in transactions.Most of the world's leading companies are present today to act as trusted third parties, for example, Swift and the Depository Trust Cleaning Company.

Blockchain in Forecasting: Blockchain technology to change the entire process for research, consultation, analysis and forecasting.Most of the globally distributed forecasting markets are created with the help of online platforms.

Blockchain in Cloud Storage: The distribution / decentralized security feature of blockchain will make cloud storage more secure and stronger against holding because the data on the centralized server is released due to hacking, data loss, or human error.

Healthcare Sector: For example,healthcare is one of the information-deficit sectors in India. Plenty of time is spent compiling various descriptions about patients who need to spend instead of providing treatment facilities to those in dire need.

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Chapter - 3:

REQUIREMENT AND SPECIFICATION

3.1 Introduction

We discuss here requirement collection and so analysis procedure. We also discuss here around this proposed model's flow chart , traditional architecture of Blockchain transaction and explain smart contact and how smart contact use in real word projects .

3.2 Hardware Requirements:

- Processor Speed:1.0GHZ or above
- RAM: 1 GB RAM or above
- Hard Disk: 20 GB hard disk or above
- Processor: Intel dual core or above

3.3 Software Requirements:

In our system we just use some technology to develop.

Those are:

- Internet Browser
- Text Editor (Remix)
- Solidity Programming Language.

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3.4 Blockchain Traditional Diagram and Transaction:

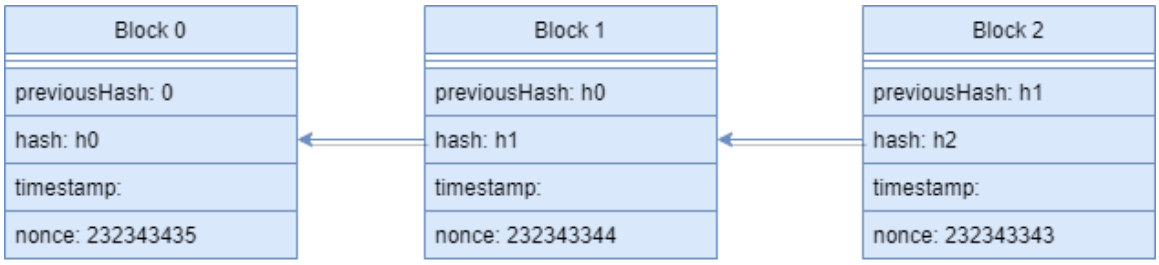

Fig-1: Blockchain traditional diagram

3.5 Flow Chart of Transaction :

Owner: Who sends his product to Receiver or Client. Every Transaction has one Owner .

Receiver: Who receives the owner's product from the owner. Every Transaction has one Receiver.

Carrier: Carrier carry product owner to Receiver/Client.

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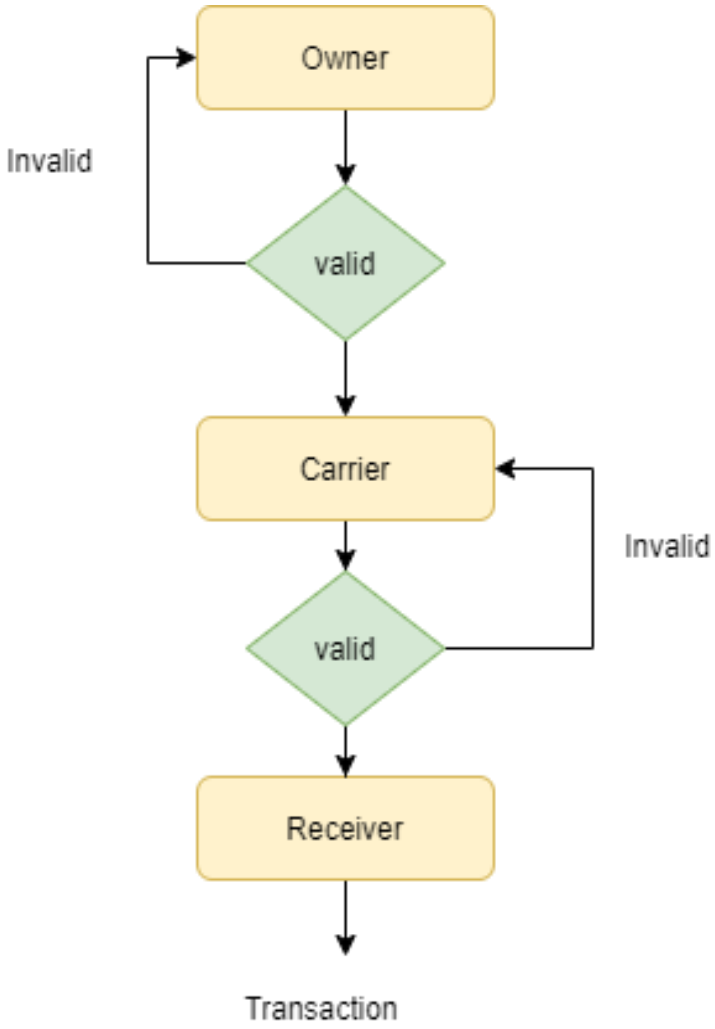

Fig-2: Flow Chart Of Transaction

If all information about the product of the owner is valid and then sent to others ,it will reach the end user safely . But if product information is invalid , the product will go back to the owner .

This is the main concept of blockchain use in the supply chain.

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3.6 Bitcoin Block Diagram:

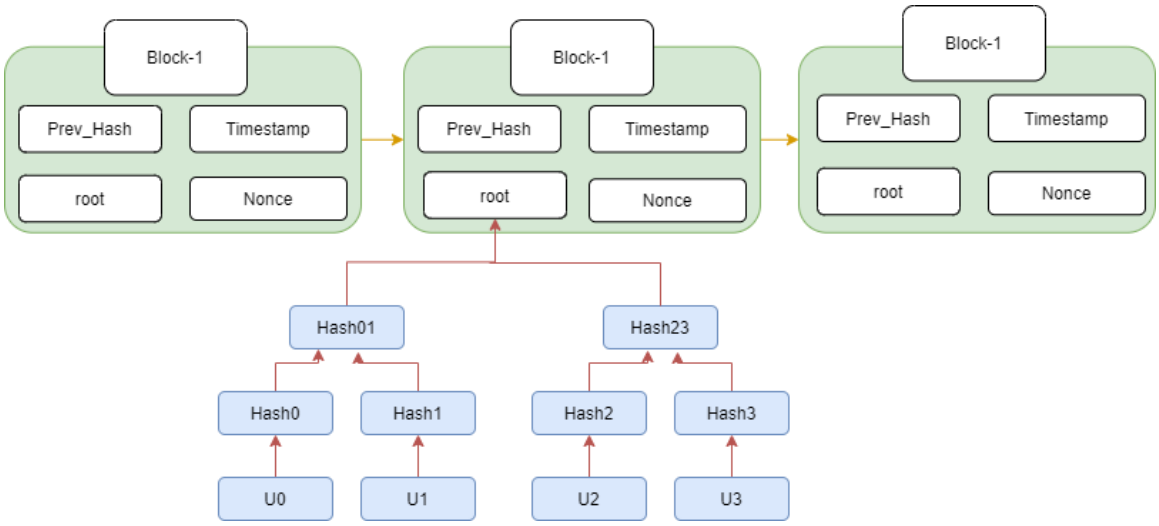

Fig-3: Bitcoin Block diagram

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3.7 Ethereum Block Diagram:

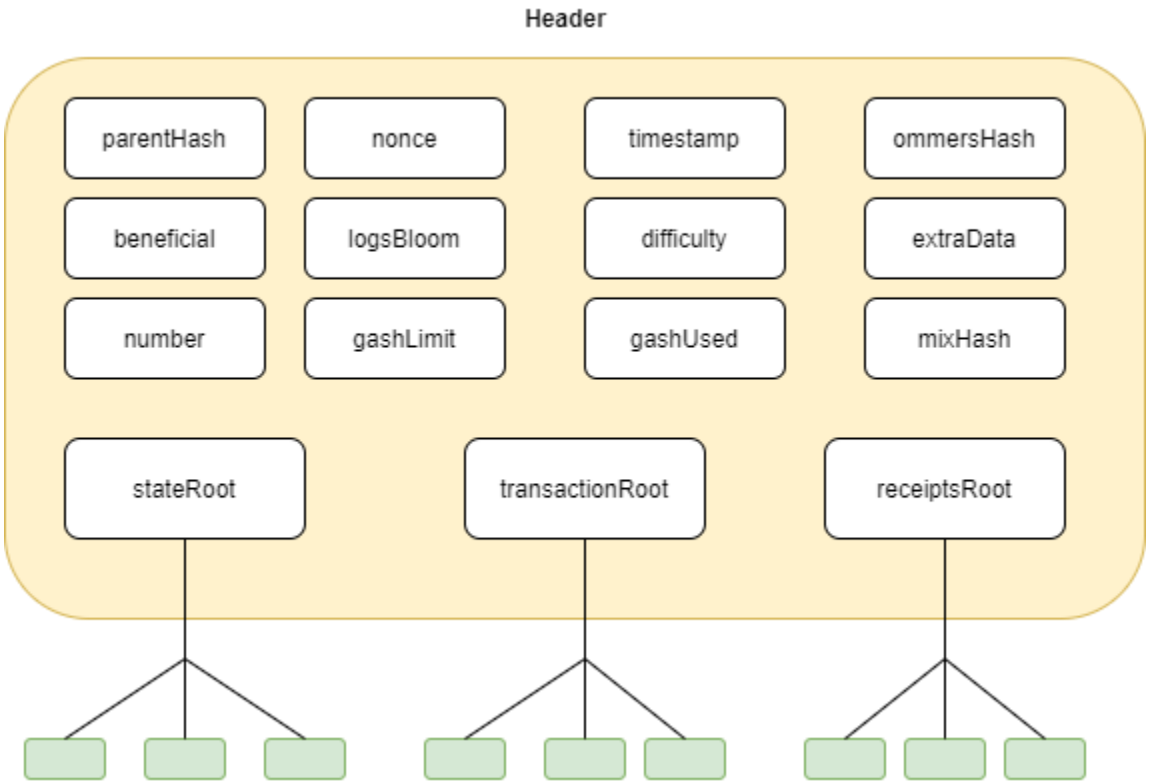

Fig-4: Ethereum Block diagram

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3.8 Flow of Supply Chain management:

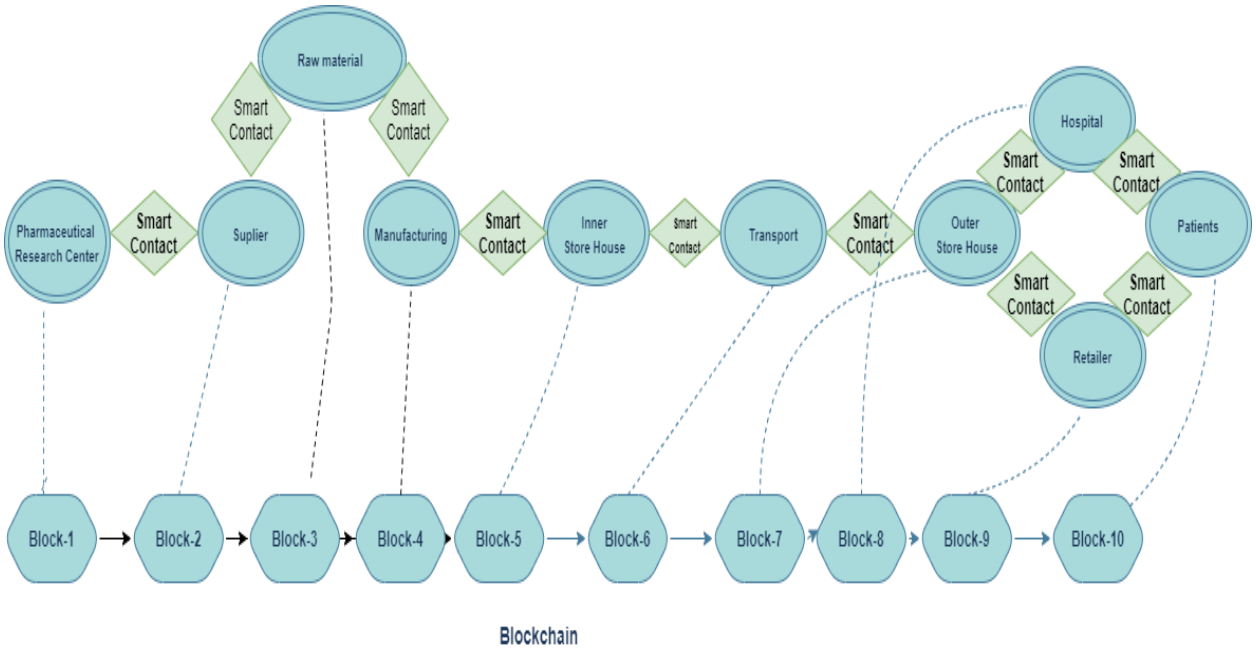

Fig-5: Flow Chart of Supply Chain Management

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3.9 Smart-Contact between Owner and Client:

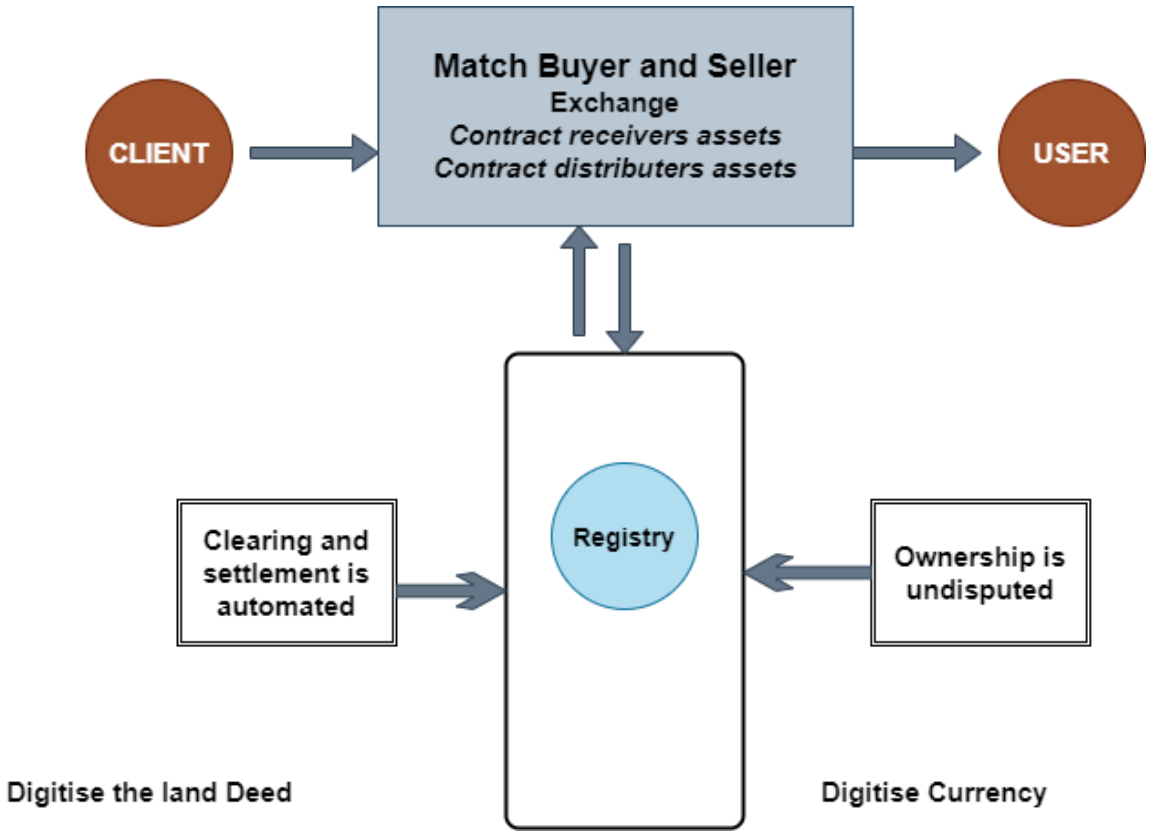

Fig-6:Smart-Contact between Owner

In above we draw a flowchart but we don't explain how to communicate between two users. Using smart contact users can form an agreement among themselves. This smart contact contains all agreement between owner and client.When smart contract agreement has been taken,it cannot be changed . One of them won't change this contact so safely can make their transaction .

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3.10 External Account and Contact account:

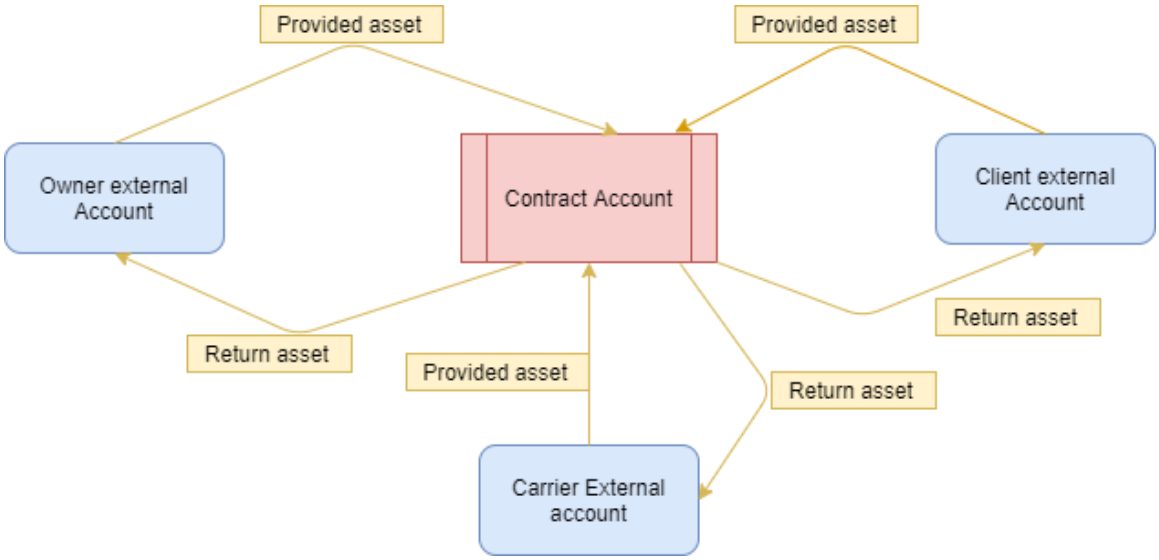

Fig-7: Multiple User smart Contact Process

If any kind of relevant purpose multiple users participate in smart contact and the transact money each other for their own task. That time, every user block considers an external account and smart contact considers an internal account. External accounts can transact money as assets and internal accounts just hold these as assets. Users store their asset in smart contact and according to predefined smart contact process smart contact returns its stored asset to their relevant user.

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3.11 Use Case Diagram of proposed Supply chain:

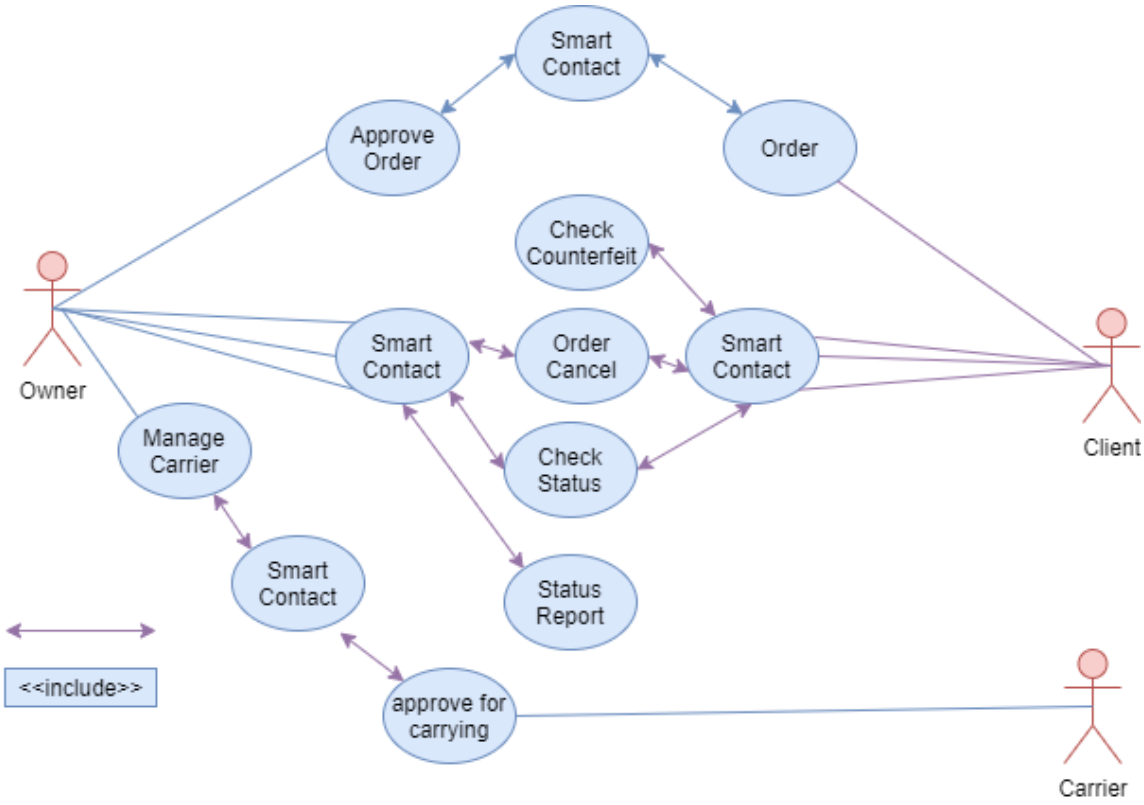

Fig-8:Use Case Diagram of proposed supply chain.

In this diagram we can see that the user client can order through smart contract and also evaluate whether through smart contact. Order cancellation , order status all activity organised through smart contact .

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Chapter - 4

Implementation

4.1 IMPLEMENTATION CODE:

```
53
54      ////////Order function Start//////////
55      function OrderIitem(uint _itemId,string memory _itemName) public returns(address){
56          address uniqueId = address(sha256(msg.sender,now));
57          pakageMapping[uniqueId].isIdGenerated = true;
58          pakageMapping[uniqueId].itemId = _itemId;
59          pakageMapping[uniqueId].itemName = _itemName;
60          pakageMapping[uniqueId].transactStatus = "Your pakage is ordered and is under processing";
61          pakageMapping[uniqueId].orderStatus = 1;
62          pakageMapping[uniqueId].customer = msg.sender;
63          pakageMapping[uniqueId].orderTime = now;
64          return uniqueId;
65      }
66      ///////////Order function Start////////////
67
68       ///////////Order cancel////////////
69       function cancelOrder(address _uniqueId) public returns(string){
70           require(pakageMapping[_uniqueId].isIdGenerated);
71           require(pakageMapping[_uniqueId].customer==msg.sender);
72           pakageMapping[_uniqueId].orderStatus = 4;  // 4: cancel
73           pakageMapping[_uniqueId].transactStatus = "Your Order has been cancel";
74           return "You order has been cancel!";
75       }
76        ///////////Order cancel end////////
77
78
79        ////////carrier/////////
80        function Carrier1Report(address _uniqueId, string _transitStatus){
81            require(pakageMapping[_uniqueId].isIdGenerated);
82            require(carrier[msg.sender]);
83            require(pakageMapping[_uniqueId].orderStatus==1);
84            pakageMapping[_uniqueId].transactStatus = _transitStatus;
85            pakageMapping[_uniqueId].carrier1 = msg.sender;
86            pakageMapping[_uniqueId].carrier1_time = now;
87            pakageMapping[_uniqueId].orderStatus = 1;
88        }
89        ////////carrier end///////
90
91
92
93  }
```

Fig-9:Implementation Code

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4.2 OWNER BLOCK CREATION

First we take this address 0x5B38Da6a701c568545dCfcB03FcB875f56beddC4 as an owner block.

Fig-10:Owner Block Creation

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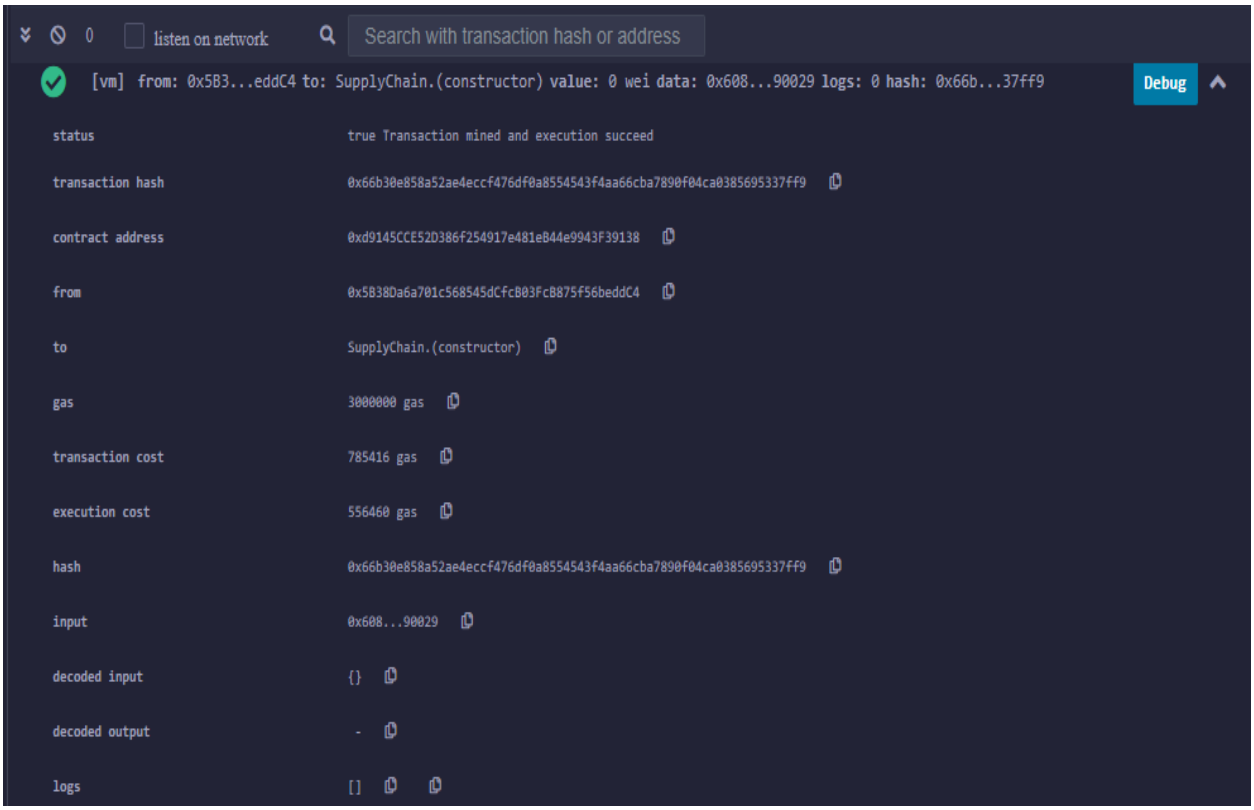

OWNER CREATION LOG:

Fig-11: owner creation log

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DEPLOY PRODUCT BY OWNER:

Fig-12: Deploy Product

ItemId 123 and itemName Paracetamol deploy on a blockchain network.

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DEPLOY PRODUCT LOG:

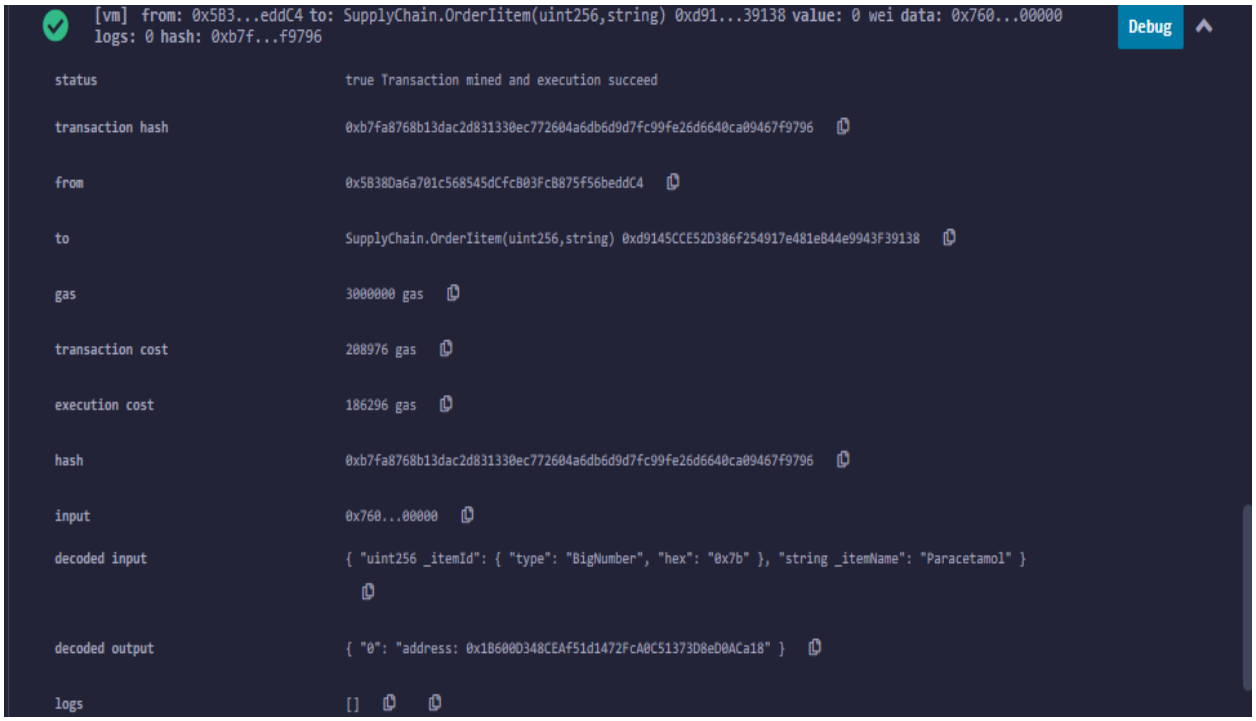

Fig-13: Deploy Product log

{ "uint256 _itemId": { "type": "BigNumber", "hex": "0x7b" }, "string _itemName": "Paracetamol" }

Owner deployed this product in a blockchain network. After deploying a product in blockchain we get a unique id.

Using this unique id 0x1B600D348CEAf51d1472FcA0C51373D8eD0ACa18 we can track this product and we can prevent counterfeit of product.

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TRACKING PRODUCT BY UNIQUE ID:

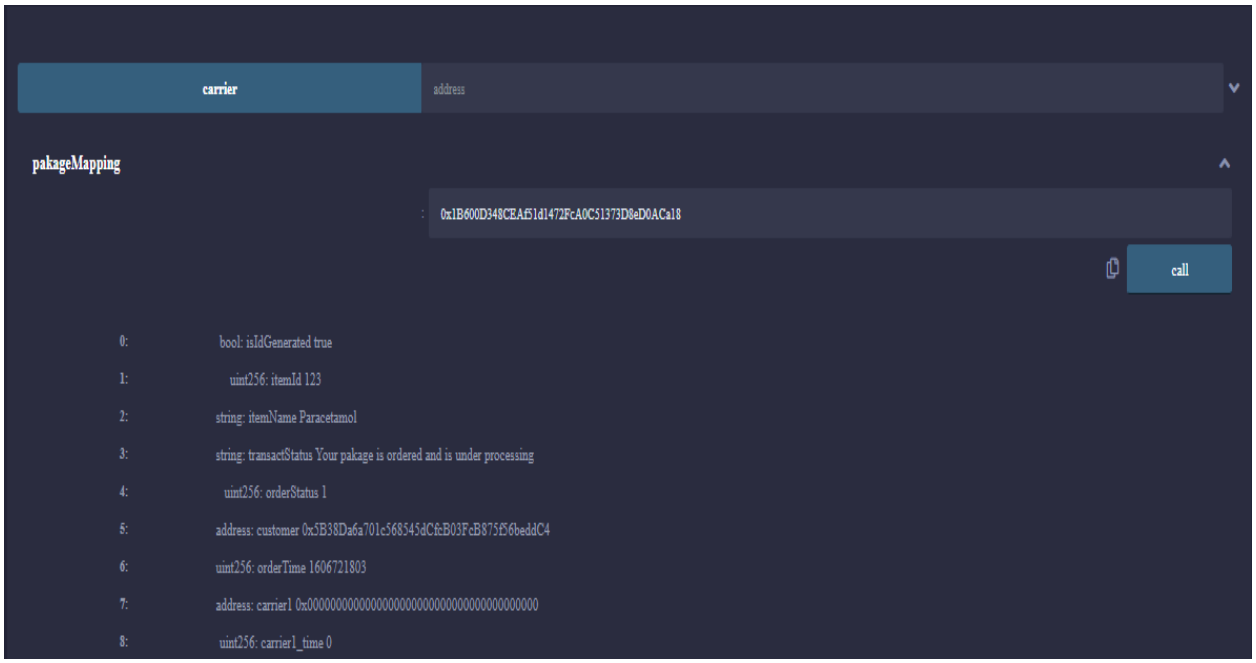

Fig-14 : Tracking Product

Is Item generated ? Who is the carrier of this item ? Which time this item deployed and what is the last status of this product. We can clearly identify this using Unique Id.

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ORDER BY RECEIVER BLOCK:

Make Client block 0x4B20993Bc481177ec7E8f571ceCaE8A9e22C02db and order item from blockchain network which was deployed by owner of product.

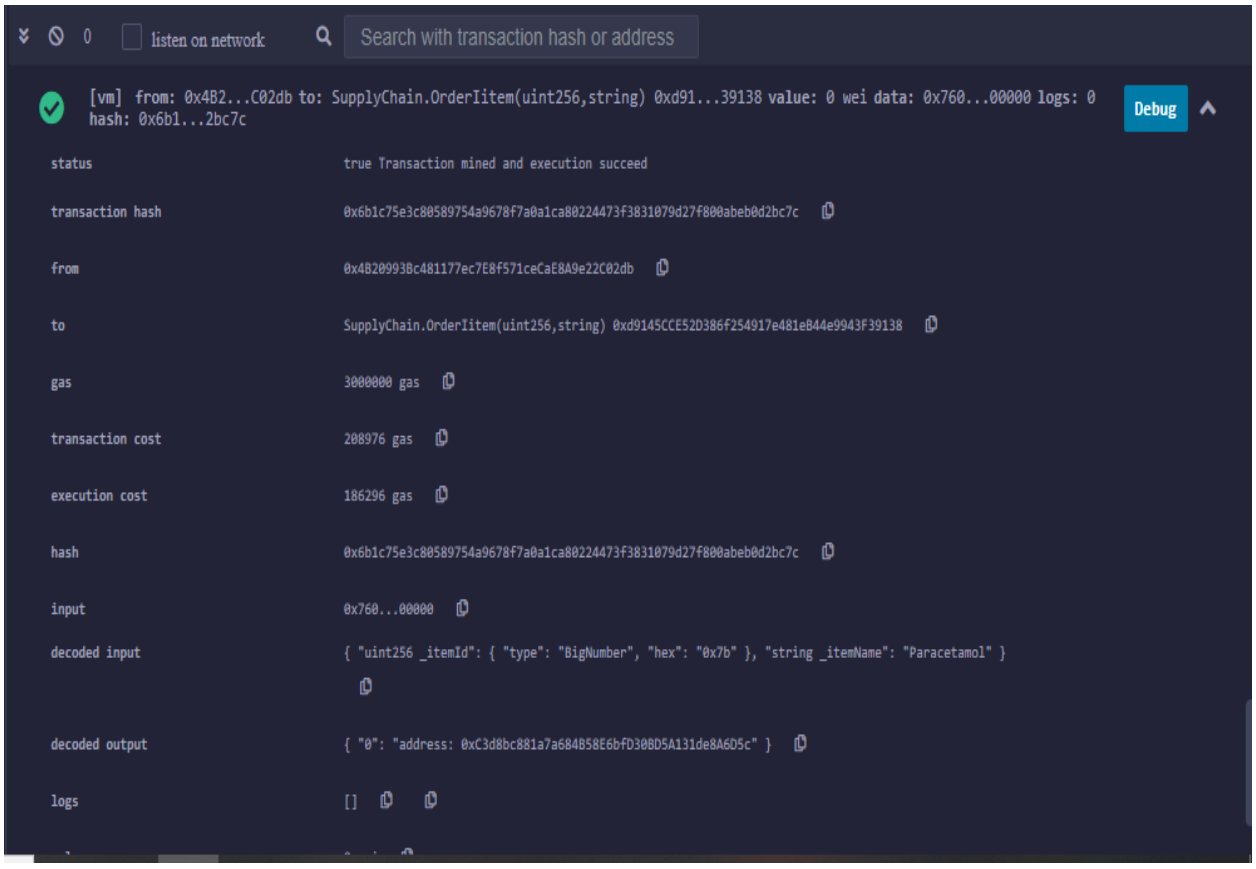

Fig-15: Order By Receiver Block

After order items, the client gets a unique id and can justify this product real or fake.

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MAKE CARRIER BY OWNER:

Owner make this block 0xAb8483F64d9C6d1EcF9b849Ae677dD3315835cb2 as a carrier

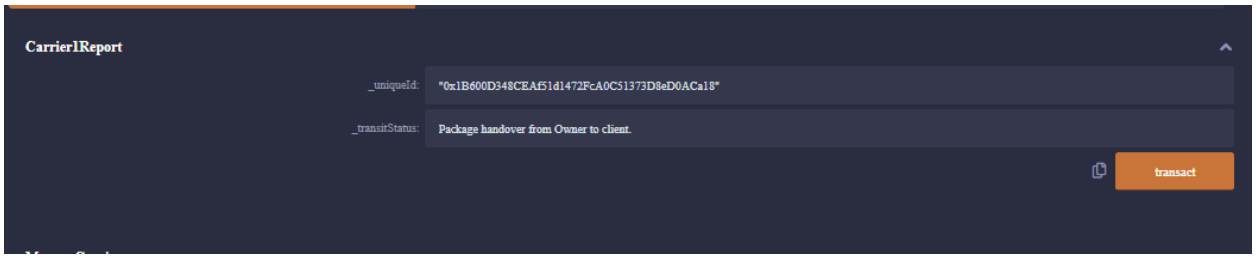

Fig-16:Make Carrier By Owner

According to unique id Carrier updates his order status and client tracks this order with time stamp what is the last position of his product.

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CARRIER UPDATE LOG:

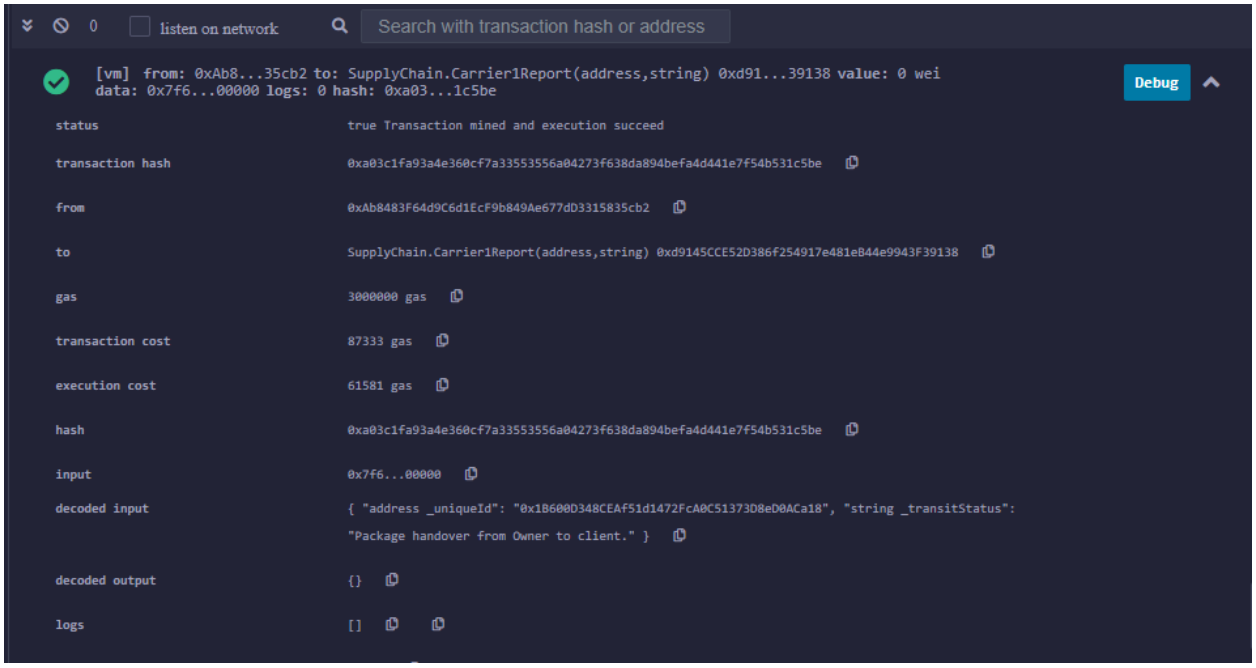

Fig-17: Carrier Update Log

In the log file we can track the last status of order of product.

{ "address _uniqueId": "0x1B600D348CEAf51d1472FcA0C51373D8eD0ACa18",
"string _transitStatus": "Package handover from Owner to client." }

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OWNER AND CLIENT TRACK THE LAST UPDATE OF ORDER ITEM:

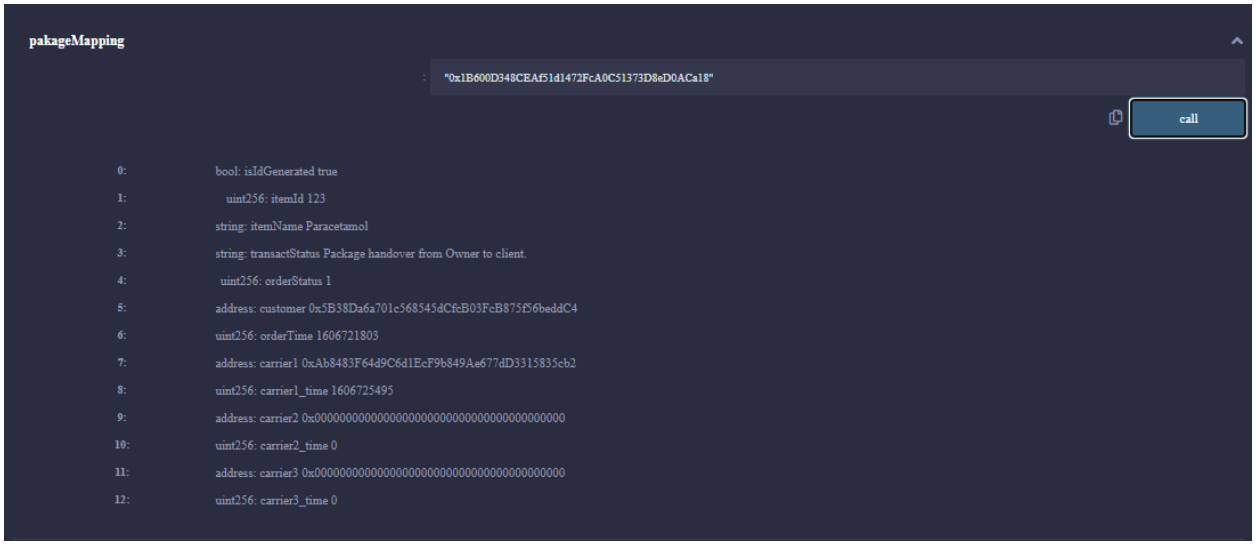

Fig-18: Track Order Item By Owner and Client

According to the last update status client can observe order situation and can also track time stamp of order which time this order item delivered to him.

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CHAPTER-5

FUTURE SCOPE AND CONCLUSION

5.1 CONCLUSION:

There are various implications for our study literature and e-commerce follow-up, blockchain and supply chain. Blockchain technology and e-commerce reduce transparency, reliability and cost.First, the study provides everything from blockchain technology and e-commerce applications.Second, we have highlighted the features of blockchain technology and their advantages over online shopping sites.Third, it offers new applications in addition to existing e-commerce applications, including blockchain.Fourth, we have highlighted in this study how transactions can be done very easily without third parties.

5.2 SCOPE:

We will be able to transact easily with this study without any third party.This eliminates the need for trusted third parties in transactions.With this study, we will be able to protect all the information of the participants of e-commerce from being stolen.Because all blockchain data is encrypted. So it cannot be hacked easily.The innovative cryptography feature of blockchain technology will help encrypt and verify data.In this way, data is less likely to be attacked or altered without authorization.

If someone changes any for personal benefits, this study will allow e-commerce participants to view all their personal information.

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