Identification of Product Originality Based on Supply Chain Management Using Block Chain

Sheela Rani P¹, Sankara Revathi S², Dharshini J S², and Rekha M²

¹Assistant Professor, Dept of IT, Panimalar Institute of Technology, Chennai
²UG Scholar, Dept of IT, Panimalar Institute of Technology, Chennai, India

Abstract. The Internet of Things (IOT) is integrated with supply chain management process to track the product. To track the product smart tags is used. The smart tags like QR code and NFC is used. But with the technology enhancement the block chain is introduced into the supply chain management process. The block chain is the great revolution that data in the centralized form is transformed in to a decentralized manner. The distributed Ledger Technology (DLT) is one of the method used in ethereum block chain. The main advantage of using DLT is, it offers decentralized, privacy-preserving and verifiable process in the smart tags. In existing system only single server was used to maintain all the process like supplier, manufacturer and distributor. In this application we are using different server which was more secure than existing system. The proposed solution in this paper is it checks the product evidence during the entire lifecycle of the product by using the smart contract. The data can be immutable by using smart contract with ethereum block chain. The duplication is manipulated by the block chain server.

Keywords. Block chain, Distributed Ledger Technology (DLT), Supply Chain Management, Smart contract.

1. Introduction

The main issue is the consumer is buying the product form retailer without any prior knowledge like whether the product is original or duplicate. The consumer is buying the product just by seeing the brand logo and ISO hall mark. But duplicator are expert in making the product as like as the original. To overcome this problem ethereum block chain is used [1]. The details of each and every product is stored in the separate block chain[2]. The distributed Ledger technology is used to store the details in an decentralized manner and also the product details should be viewed by everyone[3]. The ethereum block chain is used because once the product details has entered in to the block chain it cannot be modified by any of them[4]. The smart contract is also used in the supply chain management to make the process more efficient and also to provide trace-ability, security and transparency.
2. Digital Supply Chain Management System


According to this problem the supply chain has revolutionized into digital process. [6] The blockchain concept with smart contract is introduced [6]. It brings the drastic change in the supply management industry. The most important thing is data about the product become decentralized. This easy for the consumer to know well about the product.

2.1. MVC-Model View Controller

2.1.1. Model

The model which describes the kind of data stored. It does not consider about viewer and controller [7]. Whatever the changes made to the data it update the changes automatically and display it to the observer.

2.1.2. View

In MVC view is the visual representation of the data. It defines what data to be viewed by the user. It transfer the request of data from user to the controller [8]. The separate interface is created for supply chain process.

2.1.3. Controller

The controller act as the heart of the entire system. It act as intermediate between user and the system. The appropriate input is displayed on the screen [9]. According to the user input the controller provides the necessary output to the consumer.

There are different frameworks are available in java platform but in our projects we were using two types,

i. Hibernate framework
ii. Spring boot

2.1.4. Hibernate Framework

It is one of the framework in the java platform and also it is a open source software. It is used to retrieve data from the blockchain server. It is one of the method in mapping of java class to tables and also java data type to sql data type.

2.1.5. Spring Boot

The spring boot is used because it is simple to develop and also it can be configured automatically. It is mainly used to develop software applications. It is highly user friendly software. It can be easily understood by everyone.
3. Methodology

3.1. Creating Suppliers

First registration. The registration form contains supplier details after completing supplier registration successfully the supplier details gets stored in the database. Then supplier can login and sells the products to all manufactures what they produce.

3.2. Manufacturer Process

The manufacturer initially creates the account. The raw materials of each and every product will be analyzed by the manufacturer and then the request for particular product will be made by the manufacturer. Then suppliers will accept the request from manufacturer and raw material will be added to the manufacturer inventory [10]. Then ownership of the raw material is now transferred from supplier to manufacturer. Then manufacture will send the product ID to the block chain and then the created product will be added to manufacturer shipment. The product can be easily retrieved from block chain server with the help of product id.

3.3. Distributors Transactions

The registration part contains distributors details and login. The distributor will be seeing the product in the manufacturer cart and then buying product by the distributor will be added to the block chain[11]. The distributors maintains the KYC form for adding duplicate products, it cannot be stored in blockchain[12].

3.4. Product Verification

There are two types of consumers. One is order the product without knowing the product details. So they cannot identify the product is duplicate or original. The second type of customer is view the full details of the product what they are buying so they view the block chain content [13].

4. Architecture Diagram
5. Algorithm

Sha-256 For Proof Of Work
   Pair (int,string)
   hash_with_proof_of_work(string difficulty="00")
   Int nounce=0
   While(true)
      String hash_nounce=cal_hash_with_nounce(nounce)
      If (hash_nounce.find(difficulty)==1)
         Return make_pair(nounce,hash nounce)
      Else
         ++Nounce
   Block first(string data=" ")
   Return block(0,data,"0")
   Block next(previous data, string data="transaction data")
   Return block(previous.index+1,data,previous.hash)
   ++Nounce
   Block first(string data=" ")
   Return block(0,data,"0")
   Block next(previous data, string data="transaction data")
   Return block(previous.index+1,data,previous.hash)

Calculating Hash Value
string sha=to_string(nounce)+to_string(index)
   +timestamp+data+previous data

6. Smart contract on Block Chain

Smart contract is a piece of software so it uses computer code so that the programs are stored in the ethereum block chain, it is similar to physical contract but it is digital.\[1\] It maintains certain rules which are predefined between two parties. The rules are like IF AND THEN.\[2\] The main advantage of using smart contract is, if the rules are met between two parties the smart contract process will get implementing its process automatically. Even though the details are distributed in the block chain server by using smart contract in block chain the details are immutable. It checks the conditions automatically. A smart contract is a self-executing contract between buyer and seller being directly written into lines of code.\[3\] The code and the agreements contained therein exist across a distributed, decentralized block chain network. The code controls the execution, and transactions are traceable and irreversible. Smart contract ensure that database is up-to-date and secure. And also it prevents unauthorized access to the database. Proof of work and consensus are two algorithm used for validating and storing the data. The need of third parties are eliminated with the help of smart contract process in block chain technology. The smart contract plays a major role in the trading business process.

7. Conclusion

In the Proposed System there are Many Advantages By Using Block Chain And Smart Contract In The Supply Chain Management System. In Our Proposed System Separate
Block Chain Server Is Maintained For Supplier, Manufacturer, Distributor And Other Who Were Involved In The Supply Chain Process. By Smart Contract The Datas Are Decentralized And No One Is Required To Maintain The Data. Then By Using Smart Contract In Ethereum Block Chain Provides Transparency, Trace-Ability And Efficiency. Finally In Our Proposed System Product Evidence Is Maintained As It Is From The Entire Life Cycle Of The Product. By Using The Distributed Ledger Technology The Smart Tag Duplication Can Be Prevented. Data Exchange Process Between Involved Stakeholders To Ensure Data Authenticity And Integrity. Each Interaction Between Stakeholders During The Product Item Exchange Is Stored (Logged) On Blockchain.

References