Food Supply Chain Management using Blockchain in Food Traceability

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Abstract – *In this paper, we propose a blockchain for implementing food supply chain. the entire system is supported QR Code scanner at physical level and blockchain at cyber level. The QR Code scanner provides distinct identity of product which helps in real time applications. Food traceability has been at the middle of recent food safety discussions which may be a new advancement in blockchain applications. When food borne diseases threatens public, the primary step is to trap down the source of food preparation method. except illness, economically and criminally motivated food adulteration is additionally a growing concern thanks to globalization and wide growing supply chain networks. Wastage of food thanks to adulteration and misconception of labeled expiry dates, we want to boost safety to stop wastage. The blockchain architecture aids in creating a tamper-proof digital database of the food packages at each instance. The proposed system uses blockchain techniques, and also the problem is solved with minimal errors. this technique also has future enhancement on the protection features and may be further improved by strengthening the hardware security.*

Index terms: Blockchain, Food Supply chain(FSC), QR scan code, IoT, Sensor ID.

1. INTRODUCTION

New tendencies like massive knowledge, net of things, computing, advances in materials science, among different enhancements amendment the manner food offer chain might look within the future. Blockchain chain has vast impact on food offer chain. it's created as a backbone of recent kind net. Blockchain is originally enforced for digital currency, bitcoins, knowledge storage, etc. The key edges of applying blockchain technology in FSC are: i) real time trailing and sensing of food product throughout the FSC, and permitting identification of key bottlenecks; ii) discouraging adulteration of food product, and characteristic weak links on occurance; iii) crucial the time period of food product resulting in reduced waste.

Every blocks in blockchain stores data with Hash functions that is exclusive code. This is often what it makes blockchain additional secured. A network create use of public key and personal key so as to confirm security to make digital consent. The property of unchangeability, it becomes easier to spot meddling of knowledge. It's thought of tamper-proof as any amendment in one block may be addressed .

1.1 Challenges in Blockchain

Blockchain is still a new technology, how organisations adopt this technology also depends on how existing and related challenges are resolved. These affect how organisations apply blockchain and smart contracts, and whether the design and decision-making capabilities within will or can change at short notice. Let take a look on blockchain challenges that need to be fixed.

2. RELATED WORKS

2.1 Blockchain galvanized RFID based mostly info design for Food offer Chain

Blockchain galvanized internet-of-things design for making a clear food offer chain. The design uses a proof-of-object based mostly authentication protocol, that is analogous to the cryptocurrency's proof-of-work protocol. The whole design was complete by group action a RFID based mostly sensing element at the physical layer and blockchain at the cyber layer. The RFID provides a singular identity of the merchandise and also the sensing element information, that helps in real time quality observance.

2.2 An design for ascendable Access Management in IoT

The net of Things (IoT) is stepping out of its infancy into full maturity and establishing itself as a section of the longer term Internet. One amongst the technical challenges of getting billions of devices deployed worldwide is that the ability to manage them. Though access management technologies exist in IoT, they're supported centralized models that introduce a brand new form of technical limitations to manage them globally. During this paper, we tend to propose a brand new design for arbitrating roles and permissions in IoT. The new design may be a absolutely distributed access system for IoT supported blockchain technology. The design is backed by a symbol of conception implementation and evaluated in realistic IoT situations.

2.3 SHA-512/256

With the emergence of pervasive sixty four bit computing we tend to observe that it's additional price effective to calculate a SHA-512 than it's to calculate a SHA-256 over a we tend to propose a customary thanks to use SHA-512 and truncate its output to 256 bits. For sixty four bit architectures, this may yield a additional economical 256 bit hashing algorithmic rule, than this SHA-256. We tend to conjointly give a way for reducing the dimensions of the SHA-512 constants table that associate implementation can have to be compelled to store.

3. PROPOSED SYSTEM

To improve safety and stop wastage, fashionable IoT based totally technologies area unit required to look at the food quality and increase the visibility level of the monitored data. Sensing techniques compatible with existing following and tracing infrastructure area unit planned for observance food merchandise. QR sensors area unit aimed to forestall defective merchandise from reaching the purchasers. QR sensors is invasive or non-invasive in observance the physical or chemical properties of food. Add all details in blockchain like product buying place and date, product ingredients buying date, product packaging date etc.
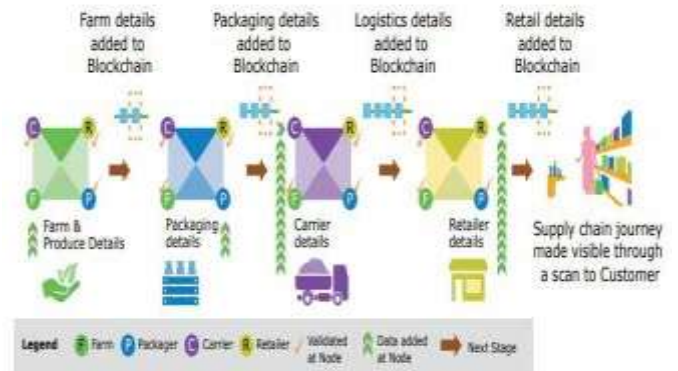

Figure :Architecture diagram

4. MODULES

Supplier raw material

Manufacturer analyzation

Distributer inventory control

QR code scanner verification

4.1 SUPPLIER RAW MATERIALS

For each product it contains the barcode range and its range are going to be passing through food API then ingredients are going to be taken out by victimization barcode range. Provider sells the merchandise to any or all manufactures what the manufacture.
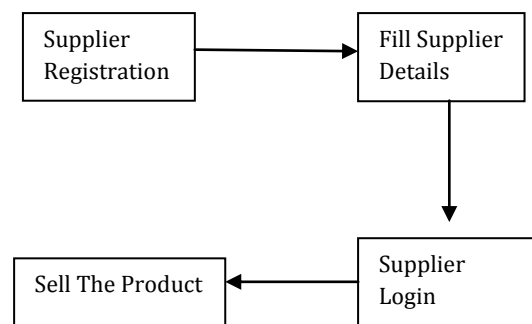
DFD FOR SUPPLIER RAW MATERIAL

Figure 4.1 Supplier raw material

4.2 MANUFACTURER ANALYZATION

They'll analyze the raw materials and also the manufacturer will request the number of raw materials to the provider. Then suppliers can settle for the request from manufacturer and stuff are another to the

manufacturer inventory. The manufacture can send the merchandise ID, expiration date, range of packets, etc to the block chain and so the created product are another to manufacturer cargo. From the block chain the manufacturer can retrieve the merchandise.
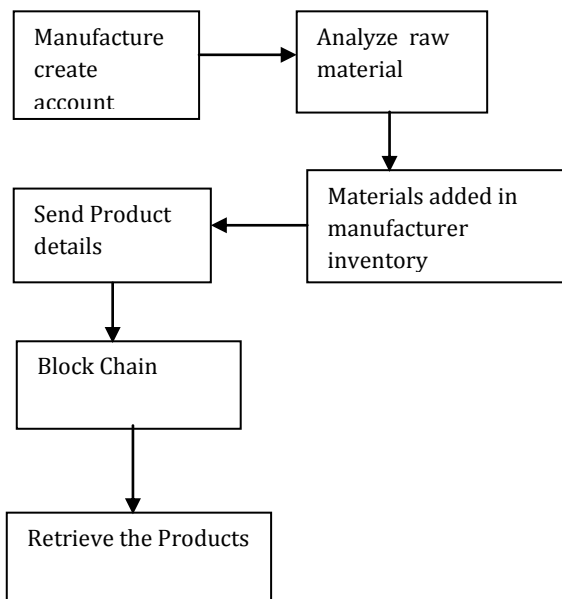
DFD FOR MANUFACTURER ANALYZATION

Figure 4.2 Manufacturer analyzation

4.3 DISTRIBUTER INVENTORY CONTROL

First registration. The registration part contains distributer details. And login. The distributer are seeing the merchandise within the manufacturer cart so shopping for product by the distributer are additional to the block chain.
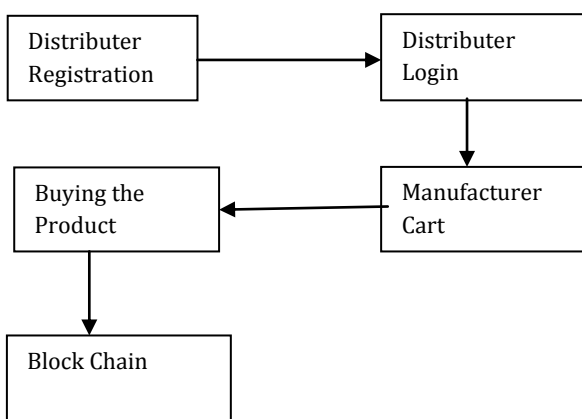
DFD FOR DISTRIBUTER INVENTORY CONTROL

Figure 4.3 Distributer inventory control

4.4 QR CODE SCANNER VERIFICATION

Finally user transaction ID, product name and cost will be added to the block chain. The consumer will check the product and they will buy the product by using online transaction.

5. HARDWARE AND SOFTWARE SPECIFICATION

5.1 Hardware Requirements

Hard Disk   :   80GB and Above
RAM   :   4GB and Above
Processor   :   P IV and Above
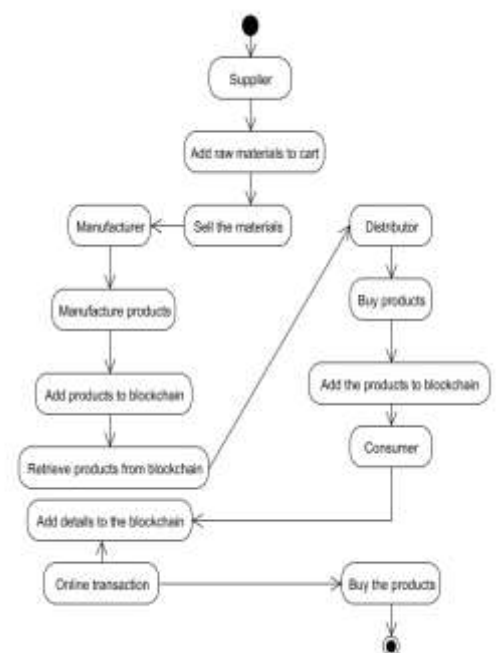
5.2 Software Requirements

Windows 7 and above
JDK 1.7
J2EE
Tomcat 7.0
MySQL

5.3 Technologies Used

J2EE (JSP, Servlet)
JavaScript
HTML
CSS
AJAX

6. DATA FLOW DIAGRAM

This is the entire activity diagram for the entire project.

7. CONCLUSIONS

Food traceability has been at the center of recent food safety discussions, notably with new advancements in blockchain applications. Because of the character of destructible food, the food trade at whole is extremely in danger of making mistakes which is able to ultimately have a sway on human lives. Once foodborne diseases threaten public health, the first step to root-cause analysis is to trace down the provision of contamination and there is no tolerance for uncertainty. These are the foremost blessings of this method. The planned system uses blockchain techniques, and conjointly the disadvantage unit aiming to be resolved with nominal error. The complete vogue was complete by act a QR primarily based device at the physical layer and blockchain at the cyber layer.

The QR provides a singular identity of the merchandise and conjointly the device knowledge, that helps in real time quality observance. The blockchain vogue aids in creating a tamper-proof digital info of the food packages at each instance. Degree thorough security analysis was performed to analysis the vulnerability of the planned vogue below differing types of cyber attacks.

8. REFERENCES

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