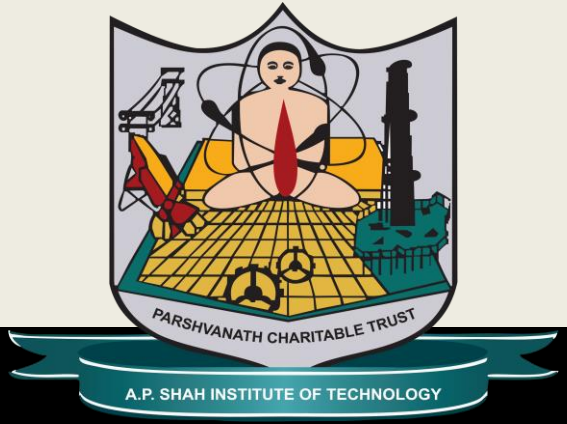

Department of Information Technology
NBA Accredited

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UNIVERSITY OF MUMBAI
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A Project Report on

Applying blockchain to build secure, transparent & traceable SCM

Submitted in partial fulfilment of the degree of Bachelor of Engineering(Sem-8)
INFORMATION TECHNOLOGY by

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Under the Guidance of
Prof. Neha Deshmukh

1.Project Conception and Initiation

1.1 Abstract

- SCM(Supply Chain Management) is defined as the movement of goods from producer to consumer.
- In an SCM, every product that reaches an end-user represents the cumulative effort of many organizations and stakeholders.
- Blockchain has the potential to drive cost-saving efficiencies and to enhance the consumer experience through traceability, transparency, and trade-ability.
- A shared blockchain ledger provides a trusted & tamperproof audit trail of the flow of information, inventory, and finance within a supply chain.

1.2 Objectives

- To facilitate decentralization and transparency through a blockchain-based SCM system.
- To streamline and monitor the SCM activities in real-time.
- To provide better security and traceability.
- To enhance the system using an automated workflow with the help of RPA.

1.3 Literature Review

Sr. no.	Paper Name	Key Findings	Year
1	Product Traceability using Blockchain	Implementation of blocks with tags is done through proper authorization mining of the block and tracing of the product.	2020
2	Asset Tracking System using Blockchain	The system works independently, keeping track of the assets at all stages thereby eliminating any possibility of tampered assets reaching the market.	2021
3	Supply chain Management using Blockchain	Smart contract enabled cross-platform application system based on the hyperledger composer.	2019

1.4 Problem Definition

- The current system is based on a centralized approach and not at all transparent and definitely not reliable.
- There are numerous ways in which the product can be tampered at any stage in supply chain.
- It becomes impossible to pinpoint the exact location and time at which product is being tampered with.
- There are major trust issues in the supply chain which are common in today's manufacturing environment where suppliers often work in silos.

1.5 Scope

- The project aims at a decentralized approach to become resourceful in any aspect it being used eg:- Luxury goods industry, Wine industry, Inventory report, etc.

- It would help eliminate any intermediary to make the line more transparent and end to end tracking available.

- Due to such kind of system, authenticity of goods and downhill growth is ensured.

1.6 Technology stack

Development

- Solidity
- JS (Web3)
- React + Node Framework

Technologies

- Ganache Ethereum
- Metamask
- Truffle Suite

1.7 Benefits for environment & Society

- **Tracking of sustainability metrics**: The system enables the tracking of sustainability metrics such as carbon footprint and waste generation throughout the supply chain.

- **Increased transparency and accountability**: Blockchain technology provides a transparent and immutable record of transactions, enabling companies to hold suppliers accountable for their environmental impact.

- **Reduction of paper usage**: It can help to reduce paper usage and associated environmental impacts.

2. Project Design

2.1 Proposed System

Decentralized app :

The proposed system would be a decentralized application registered with the supply chain entities. Being decentralized all data is stored securely.

Features :

The general functions for any authorised user would be to create, transfer, search or delete an asset.

Accessibility :

The interface is easily accessed as it is an automated blockchain framework irrespective of their location or time.

2.2 Design

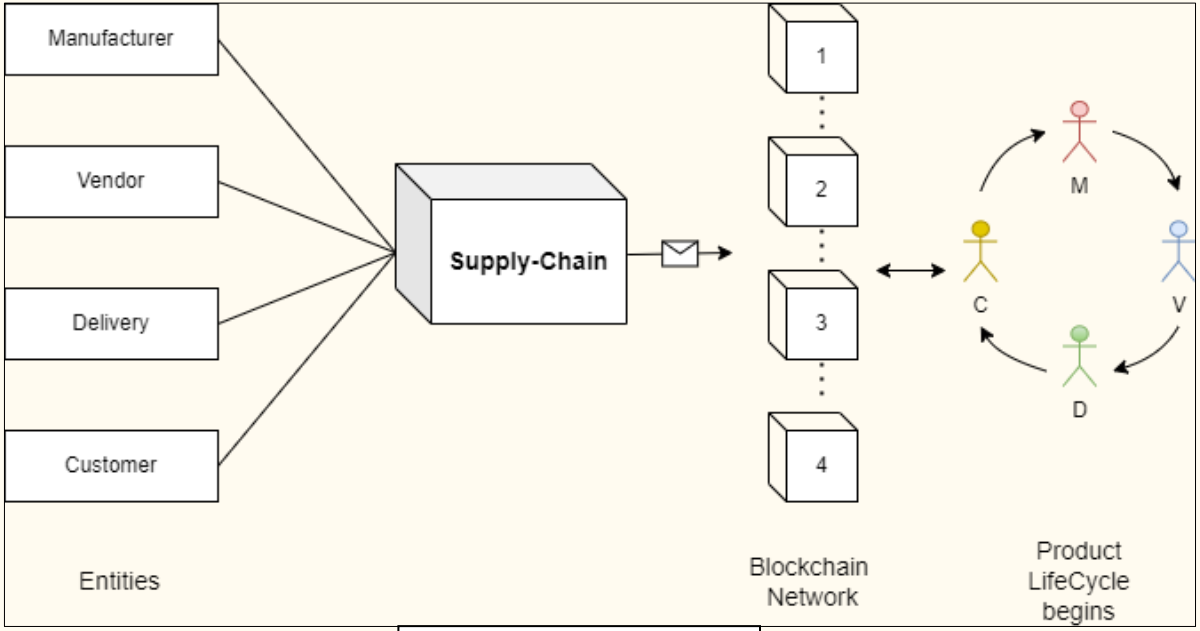

Fig 1 : Workflow

2.3 Description Of Use Case

A concrete use case of supply chain management with blockchain is the tracking of a product from its origin to the end consumer. With blockchain, the following steps could be taken:

Recording the product: The records/details of the product on the blockchain, including the location, time of manufacturing, and quality parameters.

Processing: Each step in the processing is recorded on the blockchain, creating a transparent and traceable record of the product.

Distribution: This includes the departure and arrival times, the route taken, and the temperature and humidity conditions during logistics.

2.4 Activity diagram

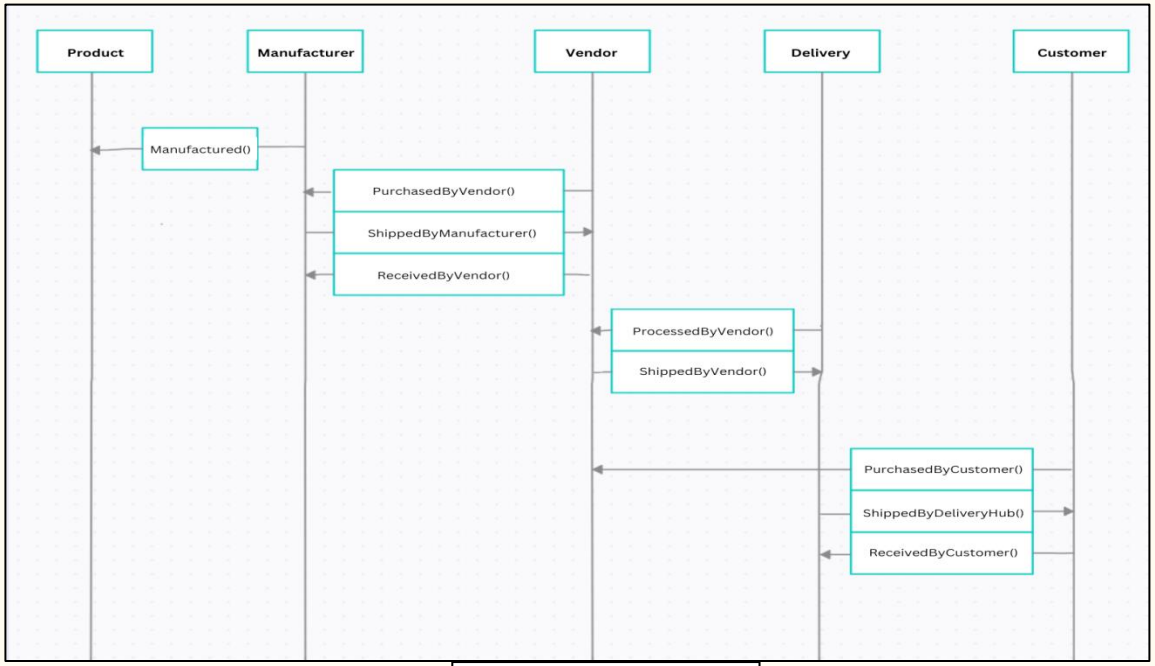

Fig 2 : Functions

3. Implementation

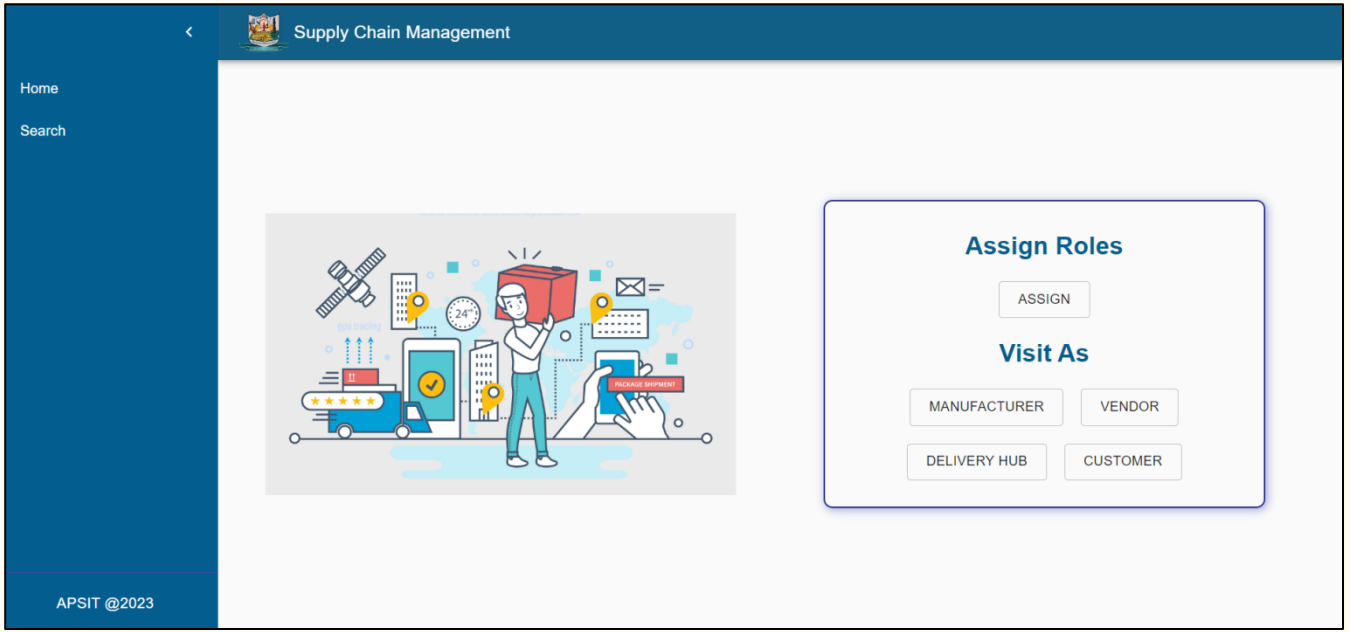

Fig 3 : Landing Page

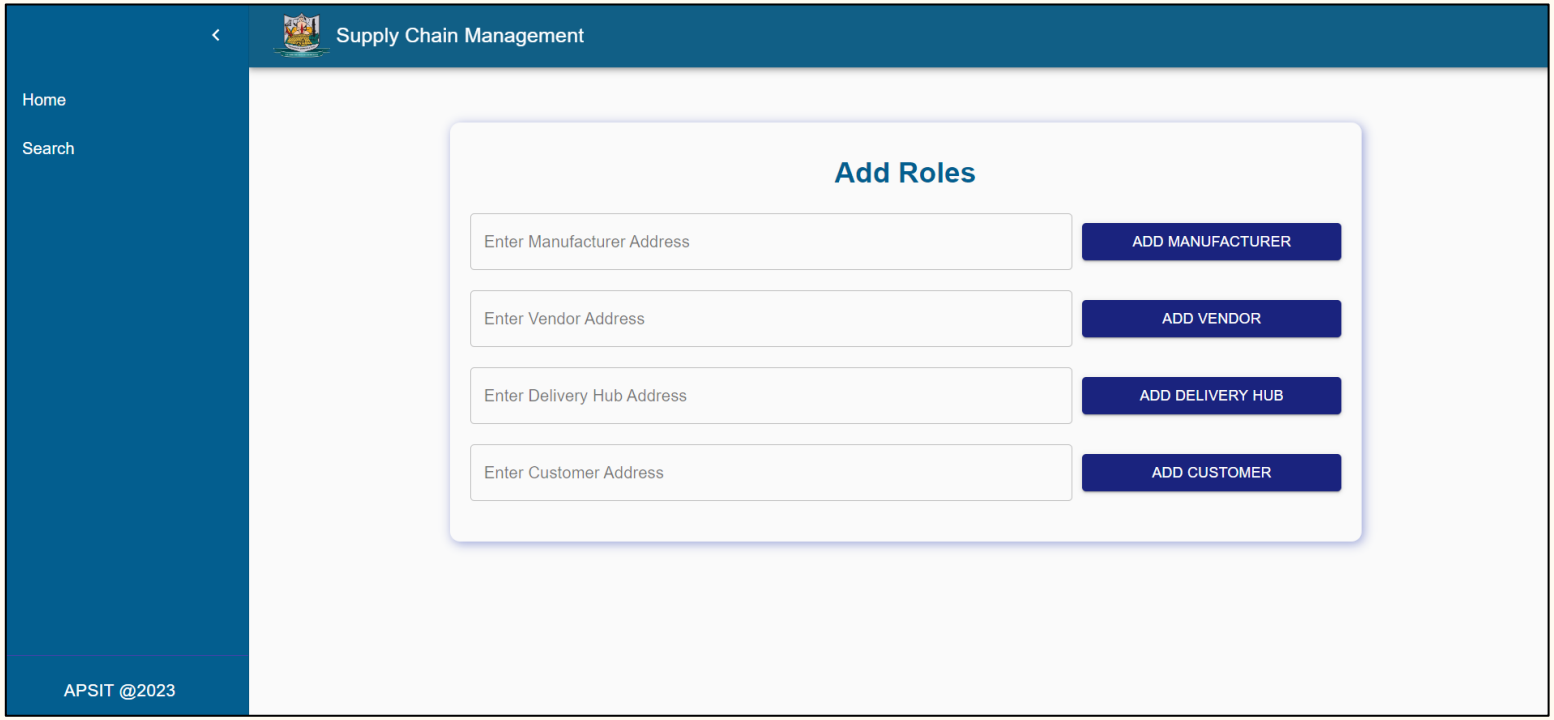

Fig 4 : Assign addresses

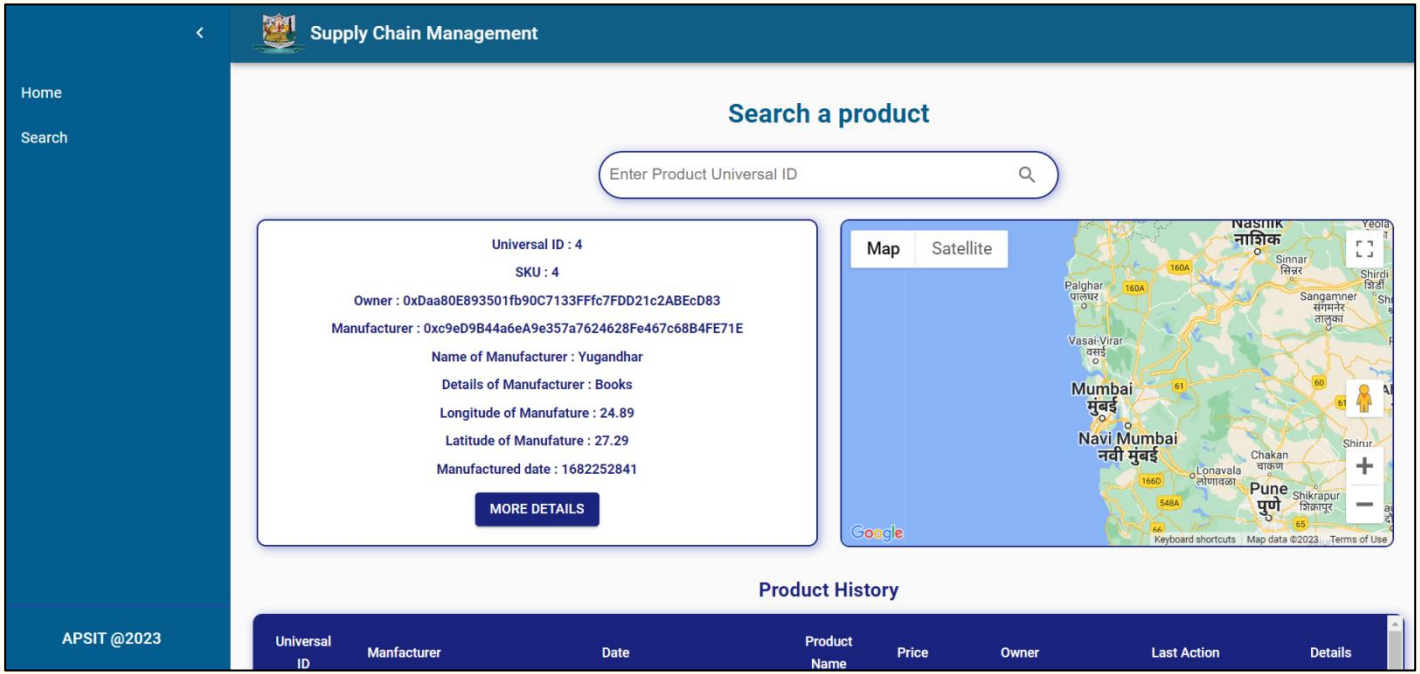
Supply Chain Management
Home
Search
APSIT @2023
Search a product
Enter Product Universal ID
Universal ID : 4
SKU : 4
Owner : 0xDaa80E893501fb90C7133FFfc7FDD21c2ABEcD83
Manufacturer : 0xc9eD9B44a6eA9e357a7624628Fe467c68B4FE71E
Name of Manufacturer : Yugandhar
Details of Manufacturer : Books
Longitude of Manufature : 24.89
Latitude of Manufature : 27.29
Manufactured date : 1682252841
MORE DETAILS
Map
Satellite
Mumbai
मुंबई
Navi Mumbai
नवी मुंबई
Pune
पुणे
Nashik
नाशिक
Product History
Universal ID
Manfacturer
Date
Product Name
Price
Owner
Last Action
Details

Fig 3 : Search

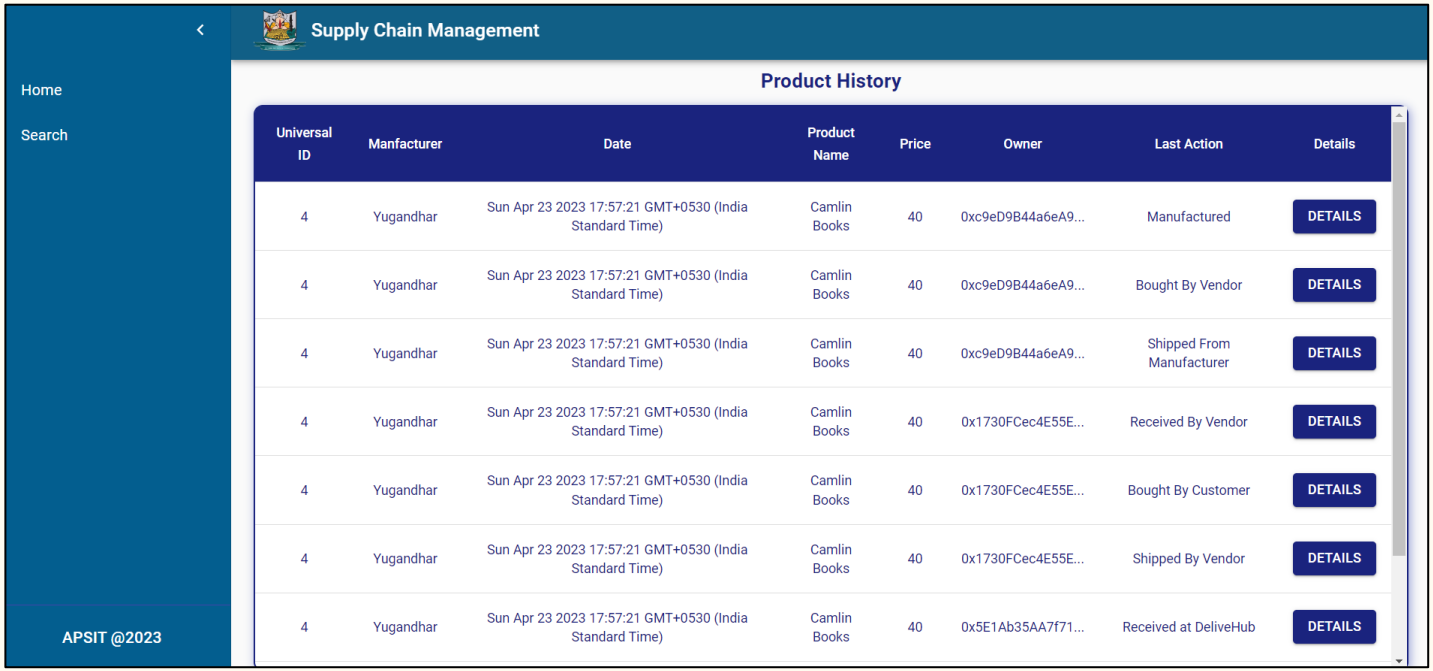

Fig 4 : Details

4. Testing

In this process, we validate and verify that the application does what it’s supposed to do. Functional testing of a Blockchain-based supply chain management system includes testing various functions and features, such as:

- Creating and tracking transactions, including product orders, shipments, and deliveries.
- Validating transactions using smart contracts to ensure that they meet specific criteria or requirements.
- Ensuring that the system is secure and free from vulnerabilities.
- Testing the user interface to ensure that it is user-friendly and easy to navigate.
- Testing data integrity and consistency across the entire supply chain.

5. Result

- The implementation of a supply chain management system with Blockchain can result in various benefits, including increased transparency, traceability, efficiency, and security.

- In addition, Blockchain-based supply chain management systems can also enable real-time tracking of goods, which can help to reduce delays and optimize inventory management.

- Overall, the use of Blockchain technology in supply chain management has the potential to transform the way that companies manage their supply chains, leading to improved efficiency, security, and customer satisfaction.

6. Conclusion and Future Scope

The use of Blockchain provides a secure, transparent, and immutable system for tracking the movement of goods, ensuring the accuracy of data, and enabling automated execution of business rules through smart contracts. Furthermore, the integration of IoT devices can capture data and update the Blockchain in real-time, improving the efficiency of the supply chain process.

Along with these, the integration of RPA with supply chain management using Blockchain technology has enormous potential to transform the supply chain industry. It can streamline operations, increase transparency, improve efficiency and productivity, reduce costs, and enhance security.

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Paper Publication

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Thank You