IDEA

Ministry/ Organization name: National Jute Board, Min of Textiles

Problem Statement : Software to track the goods through its delivery path and ensure safe delivery

Team Name : The Detectives

**Team Leader Name** : Nandakrishna   **College Code** : U-0733

Idea / Approach details

- The idea is to label each product with a one-to-one **counterfeit-proof feature(RFID)** and to then track it using a global delivery system based on a **Blockchain**.
- A package delivery system based on the **blockchain technology** which would help **enhance security** with **data integrity** and the **verification** of both users and data.
- A **web app** will be built for the same to **remotely track** the most recent position of every package on the move.
- Deploying the service on a **blockchain service** such as **AWS or Microsoft Azure** thus **reducing the setup and maintenance costs of servers.**
- Tracking using **RFID** technology.

Technology Stack
- Blockchain (Ganache for a local ethereum network and Truffle for testing and deploying. Metamask to manage wallets and interact with ethereum network.)
- RFID Technology
- Web App Development (HTML, CSS, Javascript, Materialize/Bootstrap for front-end. Http-server and web3 library to call our smart contracts' methods.)

Example of Delivery System
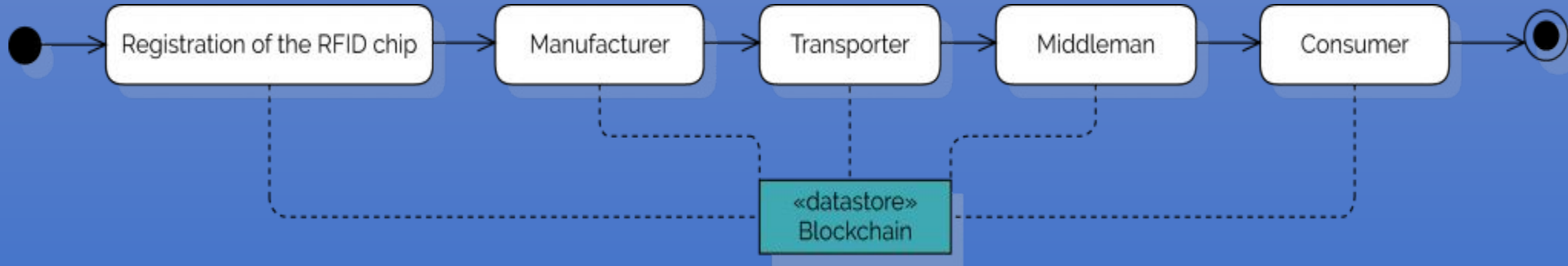
- **Registration of the RFID chip**: The **RFID chip is configured** for every product, ensuring the **authenticity** and the **integrity** of the product.
- **Manufacturer**: In the production process, the manufacturer **inserts the RFID chip** into the product.
- **Transporter**: The resulting data (for example **location changes**, transitions, temperature, humidity, vibrations, etc.) are linked with the product ID and **stored in the Blockchain**. In the Blockchain the **product can be identified via the one-to-one RFID chip** and contains all recorded data from the transport process.
- **Middleman**:The finished product is delivered to the final consumer via the **intermediary**. Any changes in the state (location, transitions, temperature, humidity, vibrations, etc.) are stored in the Blockchain.
- **Consumer**: The intermediary gets the products to the consumer. The **consumer is clearly identified by the RFID chip**. It can inspect and verify all relevant manufacturing and transport data.

Why Blockchain?

1. Multiple parties are involved in transactions along a supply chain, and each typically has its own version of the truth. This results in many **errors, duplicates and redundancies**. A single **common general ledger** that is **tamper-proof** mitigates many of these inefficiencies.
2. **Decentralized:** eliminates the risk of a **single point of failure** in the network.
3. **Immutable:** Data is written onto the blockchain in a way that **cannot be altered without detection.**
4. **Consensus**: ensures that a single entity does not control the blockchain and also allows for the permissioning of data.
5. **Democratic**: **Ensures transparency** and stakeholders participating in the blockchain network have an **equal** voice on issues such as data ownership, rights, data sharing, and protection
6. Provides efficient **provenance tracking**
7. Smart supply logistics will **prevent loss of goods** and will provide accurate **information of commision and other intermediary services.**

Why RFID?

1. Improve the quality and **transparency of data** across the supply chain.
2. Increased **productivity**- more accurate and lesser time spent on taking inventory.
3. Reliable and **real-time tracking** and tracing of inventory in challenging environment.
4. Guarantees **authenticity** of the product.
5. The flexibility and **cost-effectiveness** of passive RFID tags makes it possible to attach or embed them to a wider range of objects, making them suitable for textile products.
6. RFID tags with larger on-board memory capacity can even store **additional information** about the asset.

Idea / Approach details

Use Cases

- Can be used to track delivery of any packages like genuine raw materials and processed textiles.
- Identification of counterfeits, Inventory control, Warehousing
- Distribution, Logistics, Automatic object tracking

Dependencies/Show Stoppers

- The same RFID that was previously scanned cannot be used for product registration again. A new RFID is required for each package.

Our Prototype for Internal Hackathon:

Fig. 1: Items are logged into the blockchain system initially

Fig. 2: Shows all items under an entity and allows them to log into the system that it has been packaged for delivery.
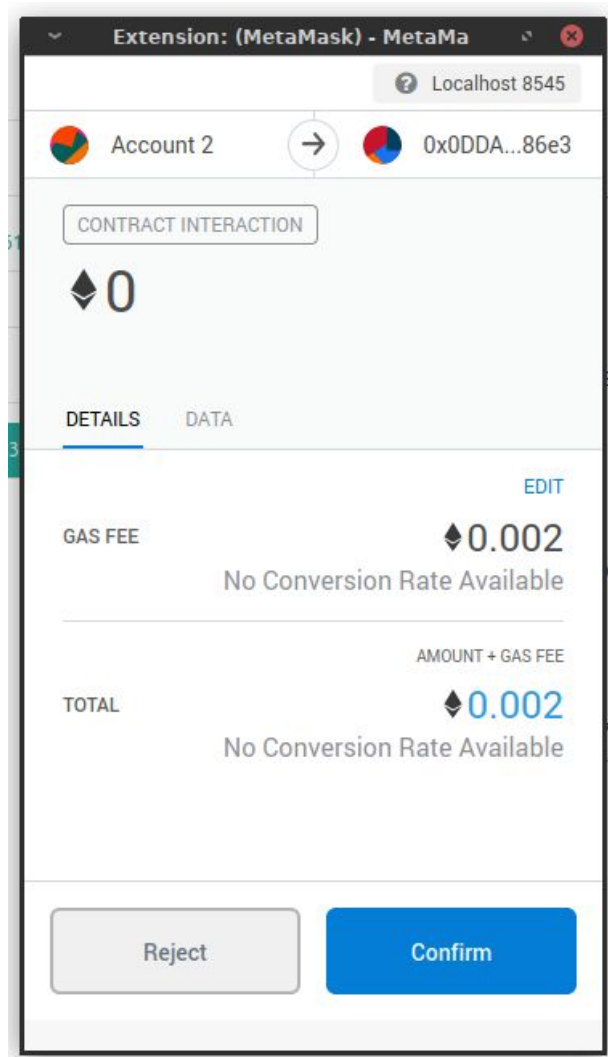
Fig. 3: Metamask allows us to manage wallets, make valid transactions and interact with ethereum network.
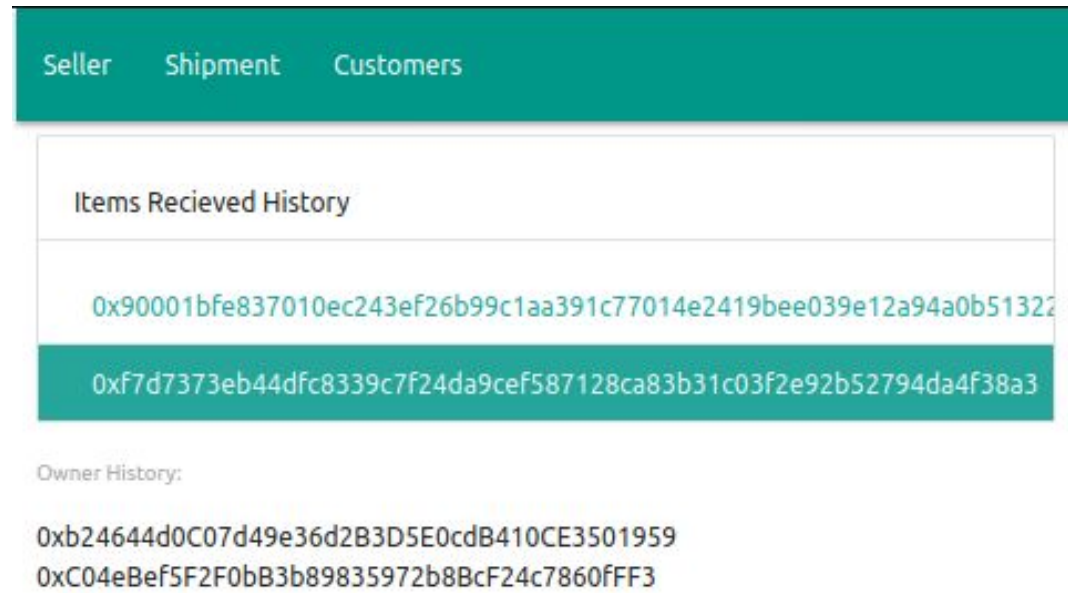

Fig. 4: Selecting an item gives the history of owners, thus allowing for efficient and secure tracking of its delivery path