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Make Technology Work

Hyperledger Implementation for Real-Time Asset Tracking in the Supply Chain Industry

Digital Services

Success Story

Client

The client is a Logistics and Supply Chain Management Platform provider that allows shippers & transporters to increase sustainability, security, productivity, and profitability in their supplier networks.

Overview

Given the sheer complexity of the logistics business across inventory, customs, billing, subcontracting, storage etc., the client had been experiencing a lot of resistance in enforcing its compliance policies. Additionally, individual ledgers maintained by the different parties created significant headwinds in efficient complaint/querry resolution and reduced the client's flexibility in changing plans/needs. Indium Software was commissioned to leverage Blockchain's distributed ledger to develop a common platform that would bring onto it all the parties involved in the logistics journey, thereby improving transparency (while maintaining security) and enabling real time tracking of goods. Comprehensive dashboards were also built to visualise and intuitively interact with the data generated.

Challenges

- Tracking of adherence to compliance policy for transportation, storing etc.
- Individual ledgers maintained by the different parties pose a challenge to localize a problem efficiently.

Additional Features

- Customized dashboard for the users to view information and interact with the application.
- Admin dashboard to enable user management and other functionalities.
- Securely track consignment status.
- Capture the sensitive information in a secure and transparent manner.

Solution

Indium Software's Approach and Implementation

To overcome the mentioned challenges the following solution approach is being followed:

- User registration and dashboard features were implemented in a web application using Angular JS.
- Web application allows for user registration. User can be registered in the following categories:
  - Buyer
  - Seller
  - Handler
- Once registered, the user can log in to view their respective dashboard.
- Using the dashboard the users can view reports and statistics in real-time and make calculated decisions.
- Tracking of the goods is done with the help of a GPS device which transmits the location constantly, and is available for the different parties to see on the application.

Business

Blockchain

Domain

IoT, Supply Chain

Tools

Hyperledger Fabric, AngularJS/ NodeJS, Fabric SDK

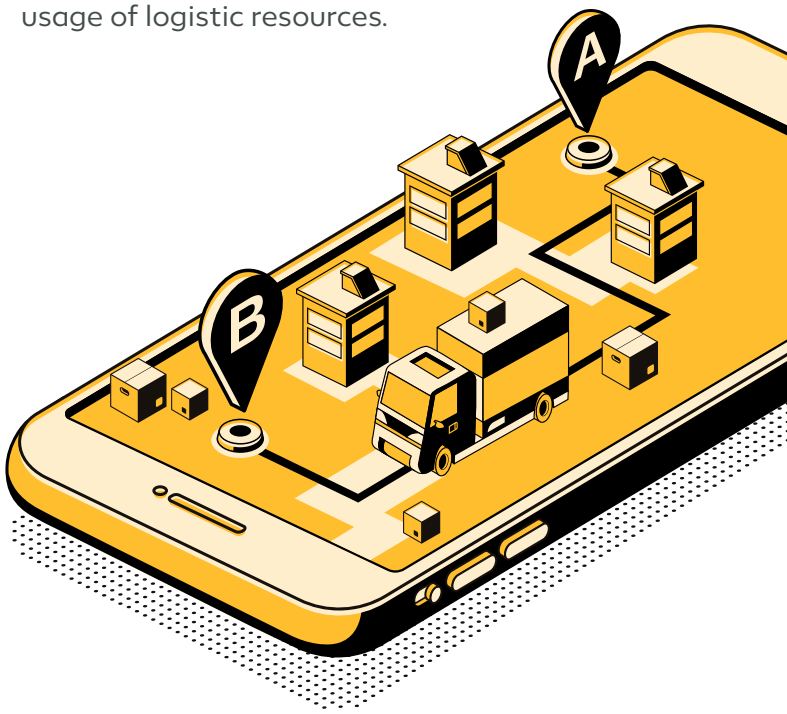
Key Highlights

- Real-time tracking of the goods and a history of the location is maintained in a tamper proof and secure manner
- The application enabled all stakeholders to come onto a unified platform

- The environmental information is tracked by different sensors and the data is fed live into a database. Since the data was unstructured in nature, it was decided to go with MongoDB for storing the sensor and location data.
- The transactions in the Blockchain captures the following data:
  - Current Owner ID
  - Unique Contract ID is created in a dynamic field that is auto generated with a 17 digit ID
  - Rip Name
  - Description of Freight
  - Weight, volume, or measurement of freight
  - Number of packages
  - Assets in Waypoint or Asset Host ID in Waypoint
  - Handler Name
  - Consignee phone (Recipient Phone)
  - Sensor location data from beginning address to ending address, and is constantly updated inside the contract
  - Date and time (along with the location data, the date and time is also captured) is constantly updated - Time stamped with time zone
  - Trip Progress % is updated when location data is updated
- Bearing in mind the requirement of private Blockchain network with a process framework support, Hyperledger Fabric was chosen.
- Apache Kafka is used as a consensus mechanism,
  - Leader does the ordering
  - Provides crash fault-tolerance
  - Finality happens faster
  - Implementation of ACL
- Smart contract was written in NodeJS for actions like,
  - Contract creation
  - Change of ownership
  - Event based update (Location and Sensor reading)
  - Final delivery and return
- Fabric SDK was used as a means for interacting with Client application and the Smart contract.

Business Impact

- Real-time tracking of the goods and a history of the location is maintained in a tamper proof and secure manner.
- Order delivery history is maintained in a transparent fashion.
- It enabled decision-making based on real-time data availability.
- Combined with IoT, it enabled efficient usage of logistic resources.



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