A Secure Accounts Payable Platform for Goods Trade using Ethereum Blockchain

Problem Statement & Objectives

To build a blockchain based accounts payable system to simulate trading of goods amongst enterprises and settle disputes in the generated claims.

Objectives:

- To build a blockchain system capable of processing invoices for all entities.
- To add capabilities of payment processing to the system.
- To enable transparency, security amongst the involved entities and provide flexibility in choosing roles.

Motivation

Disagreements arise between the participants when there is discrepancy during the execution of any of these products trading operations. Since a distributed immutable ledger is employed, the commodities trade industry using blockchain technology may see less disputes between partners and easy settlement of disputes.

Another motivations for these supply chain organizations to adopt blockchain-based accounts payable systems are to eliminate the process redundancies (accounts payable vs. accounts receivable) and to accelerate the accounts payable processes via optimizations in the claims generation

Methodology
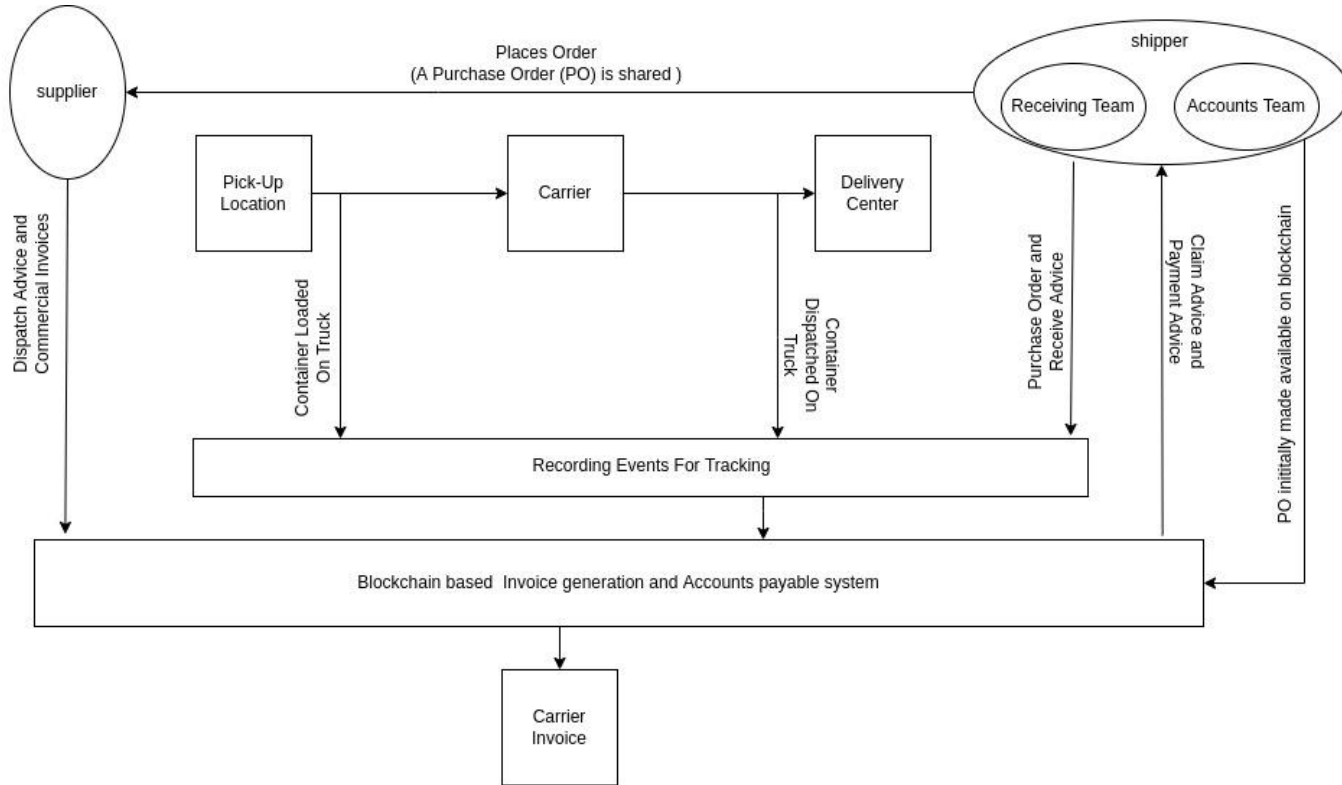
Methodology

- The accounts payable team typically computes the claim amount by exercising methods such as 2-way, 3-way, or 4-way matching.
  - 2-way matching ensures that the quantity of goods in the suppliers commercial invoice is more than or equal to that in the purchase order preventing short delivery.
  - 3-way matching ensures that the goods received by the shipper is at least as much as that requested by them in the purchase order.
  - 4-way matching is used to ensure that the shipper pays no more than the price of the goods which they accept.
- For maintaining the integrity and avoiding third party making unwanted changes appropriate access modifiers are used to restrict access to functionalities.

Methodology

Steps Followed:

- Solidity smart contract is deployed on local ganache environment
- Web3.js library collection is used to interact with deployed contract on ganache.
- Web3 provider is used to integrate metamask wallet to project that enables transactions and authentication.
- Accounts are imported in wallet and connected to local host running frontend.

Implemented Features

- **Authentication using Private Key** - To ensure the security of the Ethereum blockchain, authentication using private key is enabled into the application. An image is used as a private key in this context.

- **Live Tracking** - The live tracking feature is incorporated so that all the entities' accounts payable system have access to the current status of the goods of a particular purchase order.

- **Invoice generation** - Once the order is placed, the invoice for the same can be generated easily using a single click of a button which downloads the PDF of the placed order.

Implemented Features

- **Automated payment processing** -The payment processing is automated where the amount of ether to be paid by the shipper is visible to the shipper on their dashboard. The shipper only needs to click on the 'Pay' button for their placed order.

- **Partial Orders** - The shipper can accept a part of the order i.e less quantity of goods that that received from the carrier. The invoices for the same are updated accordingly once the goods are delivered by the carrier to the shipper.

- **Multiple suppliers and shippers** - The application also supports the existence of multiple shippers placing orders. An entity can act as a shipper, supplier and a carrier. Furthermore, multiple suppliers can host their products where in all the shippers can view their products.

Results
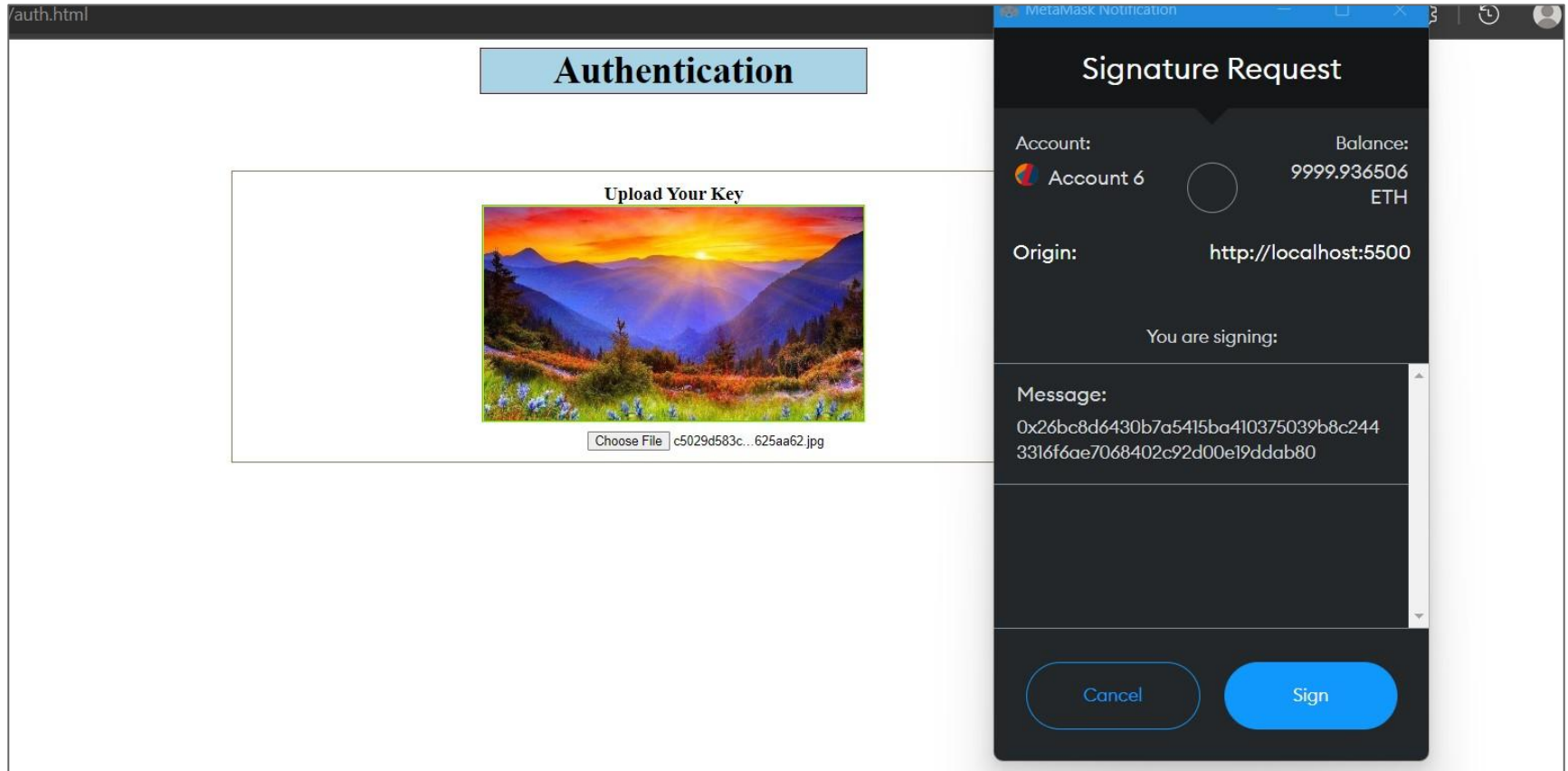
Signing image using private key and setting it as password

Results
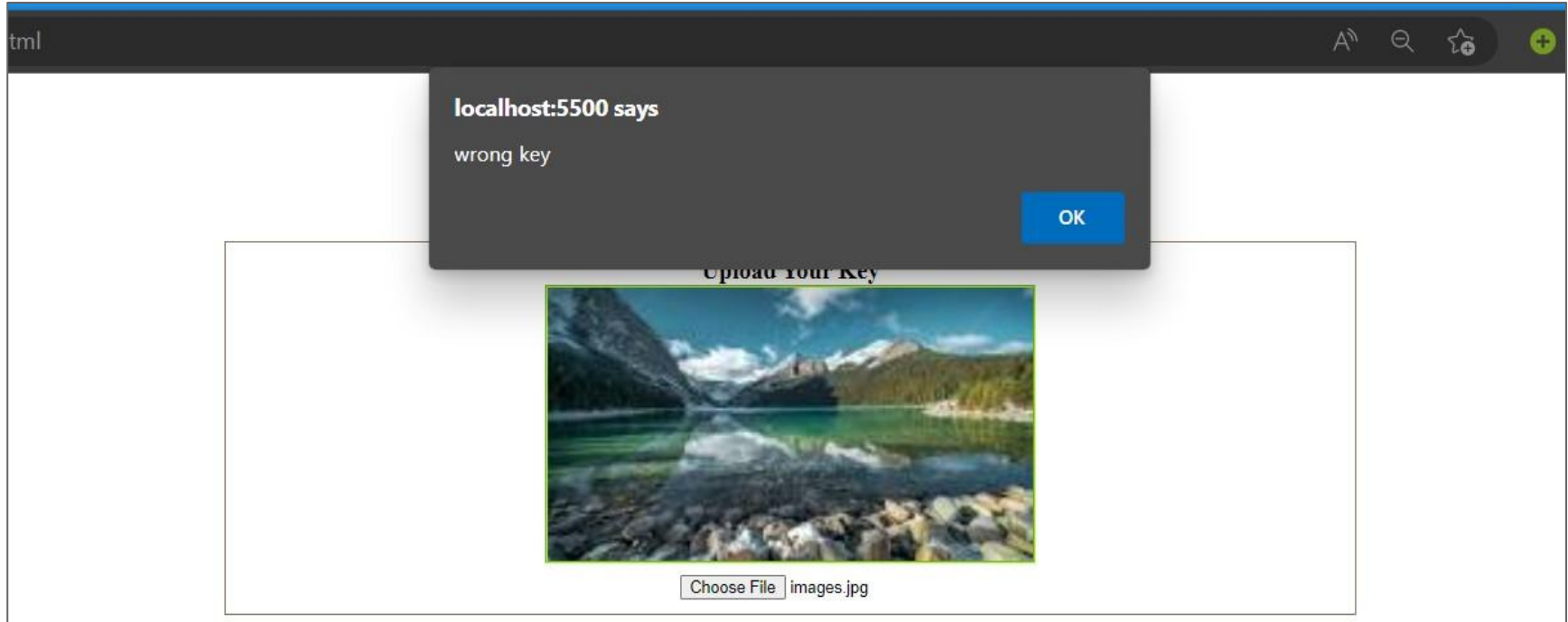
Uploading invalid image

Results

Adding of product by supplier and view of inventory

Results

List of products available to shipper and buying of product

Results

Track 1

Order ID	Delivery address	Status	Quantity Accepted
1	NH 66, Srinivasnagar Surathkal, Karnataka	Placed	

Payment Section

Enter Amount to be paid

Enter Address to which payment is to be made

Pay

Payments Pending

Order ID	Amount	Payment Address		
1	5	0xbb4710f0f4d03ff0a8ed01ab39f1c26f697da81b	Pay	Generate Invoice

Live tracking of order, pending payments and invoice generation

Results

Assigning carrier to particular order by supplier and pending payments of supplier

Results

Changing of status to passed to carrier

Results

Carrier Page

Results

Partial acceptance of order by shipper

Results

Inventory updation after return of particular order

Results

Carrier updates status to delivered

Results

INVOICE FOR ORDER : 1

id : 1

product_id : 1

quantity : 1

customer_name : novo tech

status : Delivered

delivery_address : tikamgarh road mahroni

customer_address :0x154c79daDf282e8E44be0c836d0e47D99117dCCe

carrier_address :0x5B38Da6a701c568545dCfcB03FcB875f56beddC4

price : 3

pending_payment : 0

Dynamic Invoice (can be downloaded as pdf)

THANK YOU