Assignment: Blockchain Supply Chain Tracking DApp

Bachelor of Science in Software Engineering

By

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Blockchain Supply Chain Tracking DApp

Assignment Purpose

This assignment solves the problem of **trust and transparency** in supply chains. In real life, it's hard to know where a product is made, who handled it, and where it is now. Using **blockchain technology**, we built a system where **everyone can track the product journey**, and no one can change the data secretly.

What is a DApp?

A **DApp (Decentralized Application)** is a web application that works with blockchain instead of a normal database. It gives more security and trust because no central person controls it — all the data is stored in a transparent way.

Technology Stack Used

- **Ethereum Blockchain (Sepolia Testnet)** – stores product and user data
- **Solidity** – used to write smart contracts
- **Remix IDE** – used for writing and deploying the smart contract
- **MetaMask** – used to connect wallet and send transactions
- **Web3.js** – connects smart contract with the front end
- **HTML/CSS/JavaScript** – used to create the frontend website

Main Features of the DApp

1. Add New Product

- Users can enter product name, description, and location.
- This information is saved on the blockchain with the current time.

2. Update Product Status

- Users can update the status (e.g., Manufactured, In Transit, Delivered).
- Location can also be updated each time.
- This helps in tracking the exact journey of the product.

3. View Product Details

- Anyone can check a product using its ID.
- They can see all its information: who added it, current location, status, and timestamp.

4. View All Products

- A list of all added products can be viewed.

5. Admin Access

- Only the **admin** can allow or block other users from using the DApp.
- This is useful for managing trusted users only.

How it Works – Step by Step

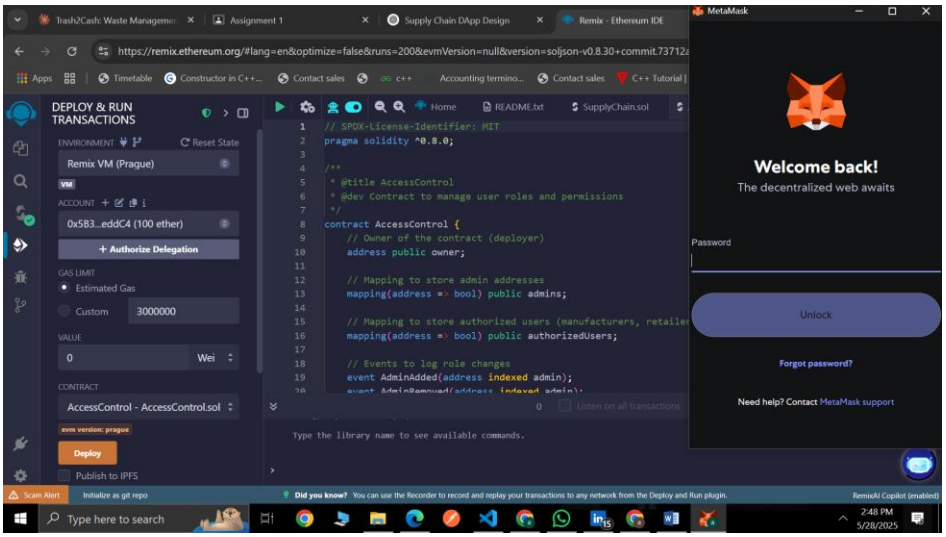
1. **Admin authorizes users** who are allowed to add or update products.
2. An **authorized user logs in using MetaMask** and adds a product.
3. That product is now saved forever on the blockchain.
4. When the product is moved, the user updates its status and location.
5. Anyone can now check where the product is and what has happened to it.

Why This is Important

- It **removes fake entries** or lies in supply chains.
- **Everyone involved (manufacturer, shipper, buyer)** can trust the data.
- It is **tamper-proof** – no one can secretly change anything.
- It makes businesses **more transparent and reliable**.

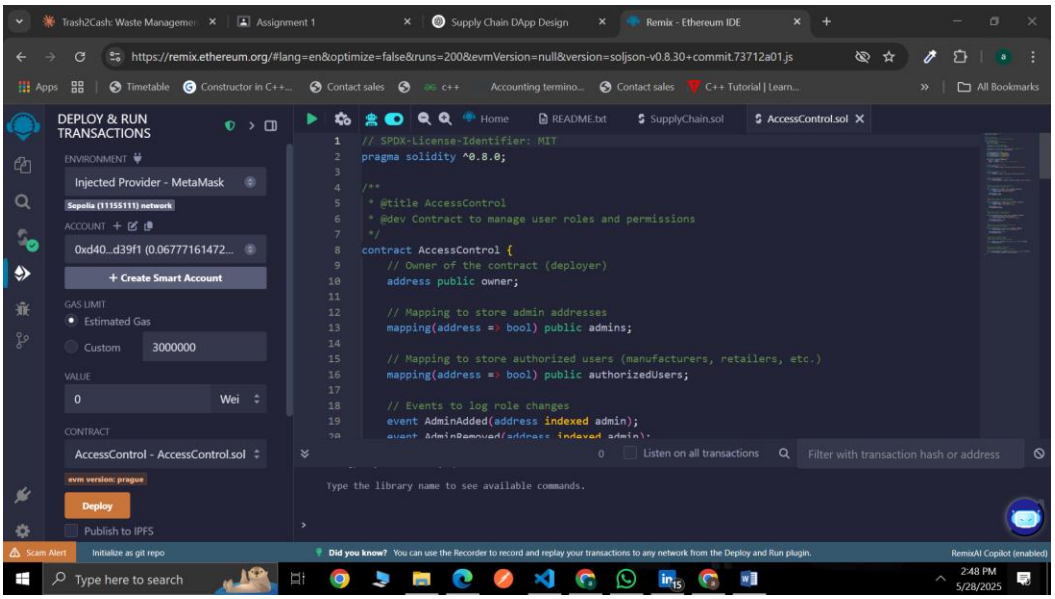
Screenshots:

- **MetaMask Wallet Connected:**
  Shows the MetaMask wallet connected to the DApp, confirming the user is ready to interact with the blockchain.



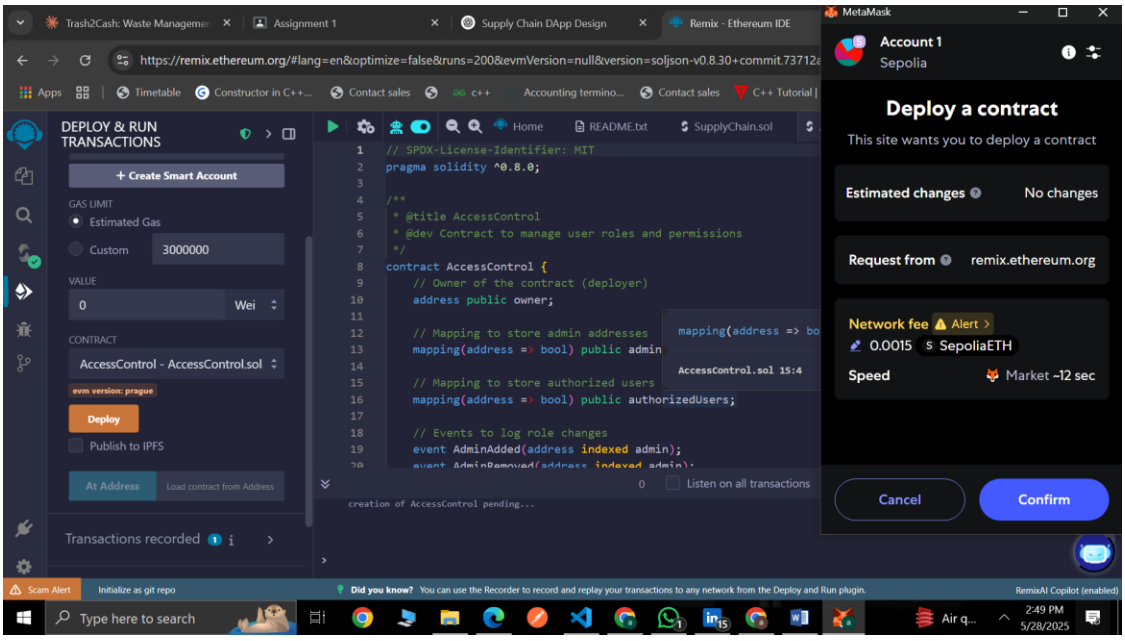
- **Compile AccessControl.sol Contract:**

Shows the Remix IDE screen after successfully compiling the AccessControl.sol smart contract, verifying no errors.



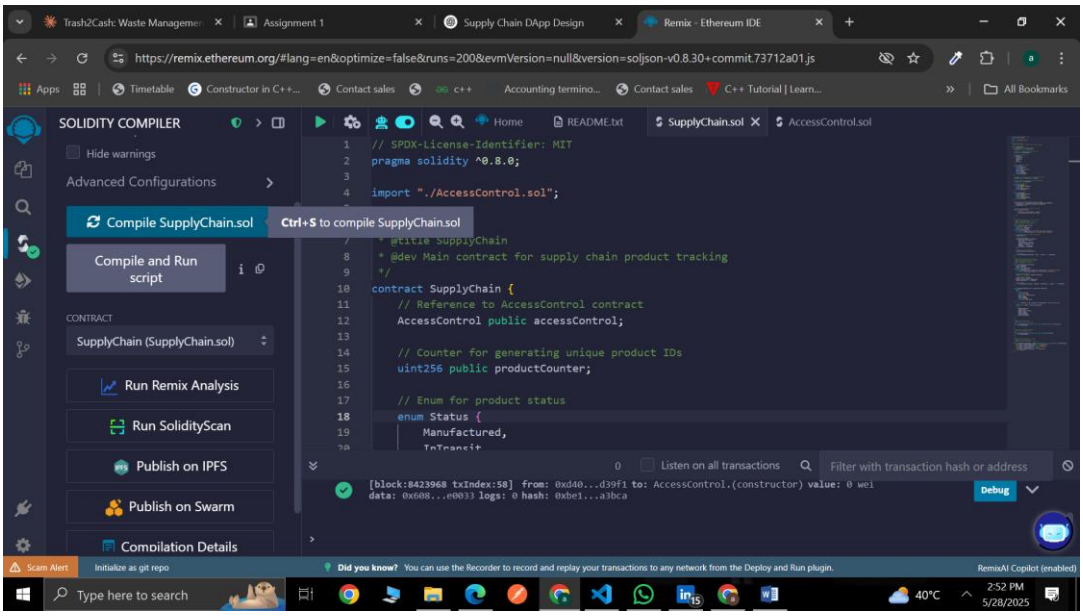
- **Deploy AccessControl.sol Contract:**

Displays the deployment of the AccessControl.sol contract on the Sepolia testnet, including the transaction hash and contract address.



- **Compile SupplyChain.sol Contract:**

Shows the Remix IDE screen after successfully compiling the SupplyChain.sol smart contract, verifying no errors.



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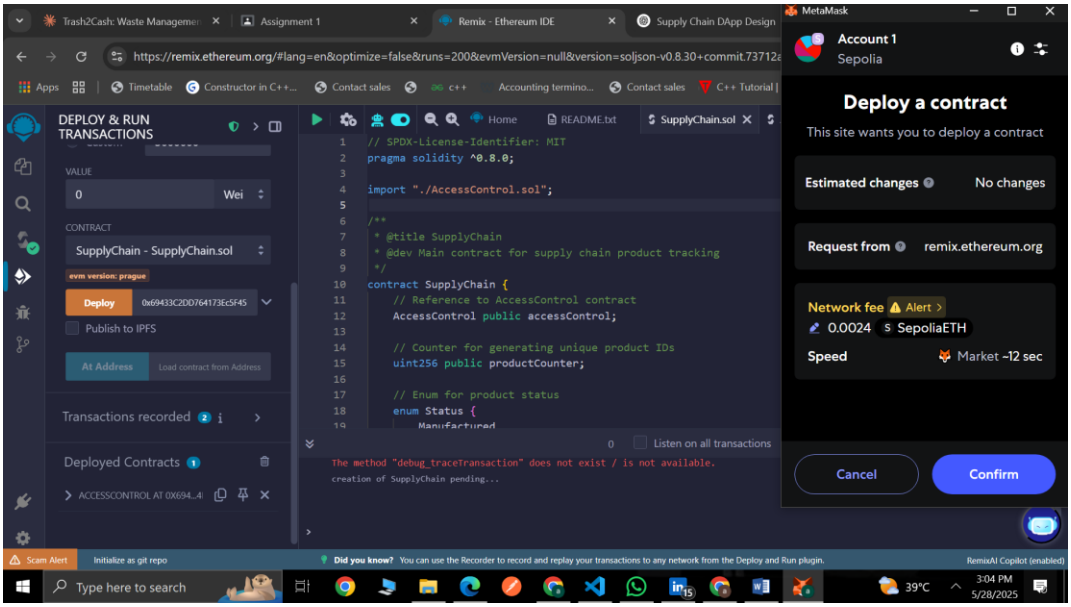
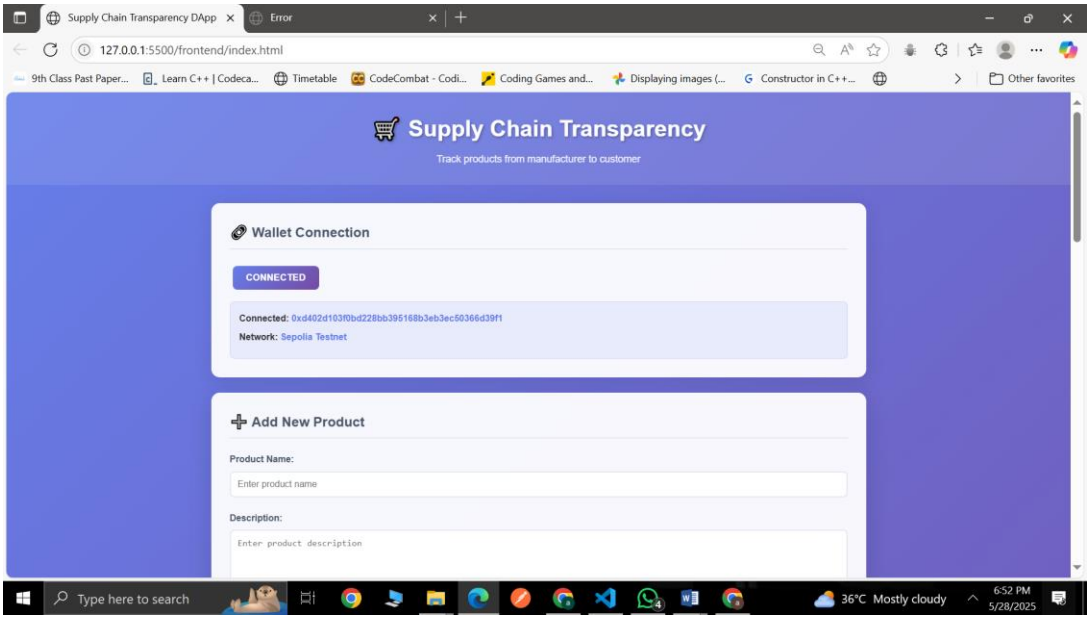


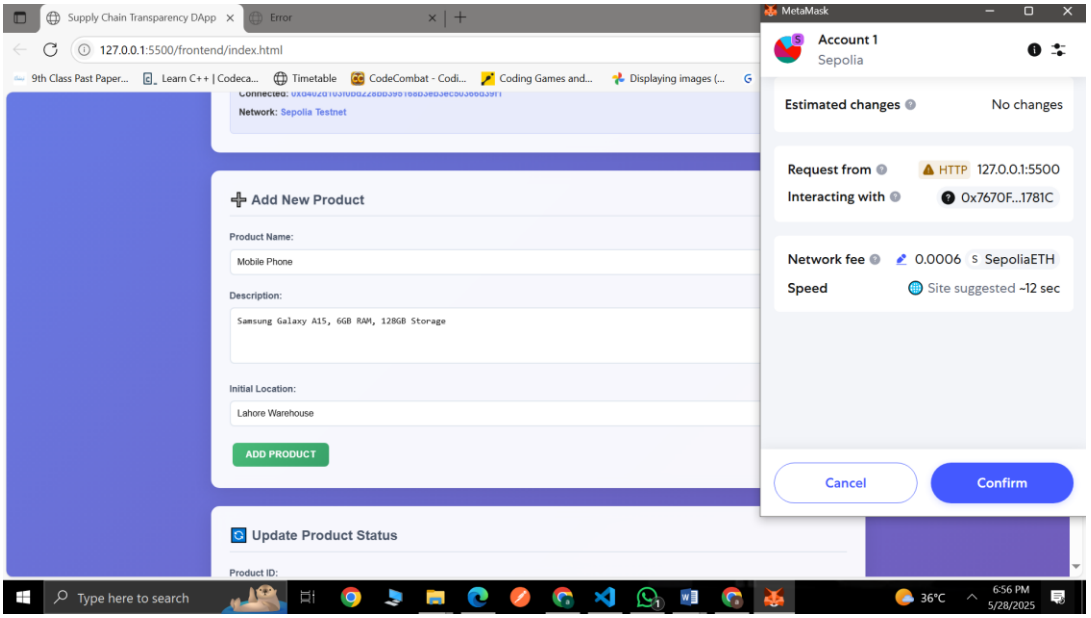
- **Wallet Connection with Interface:**

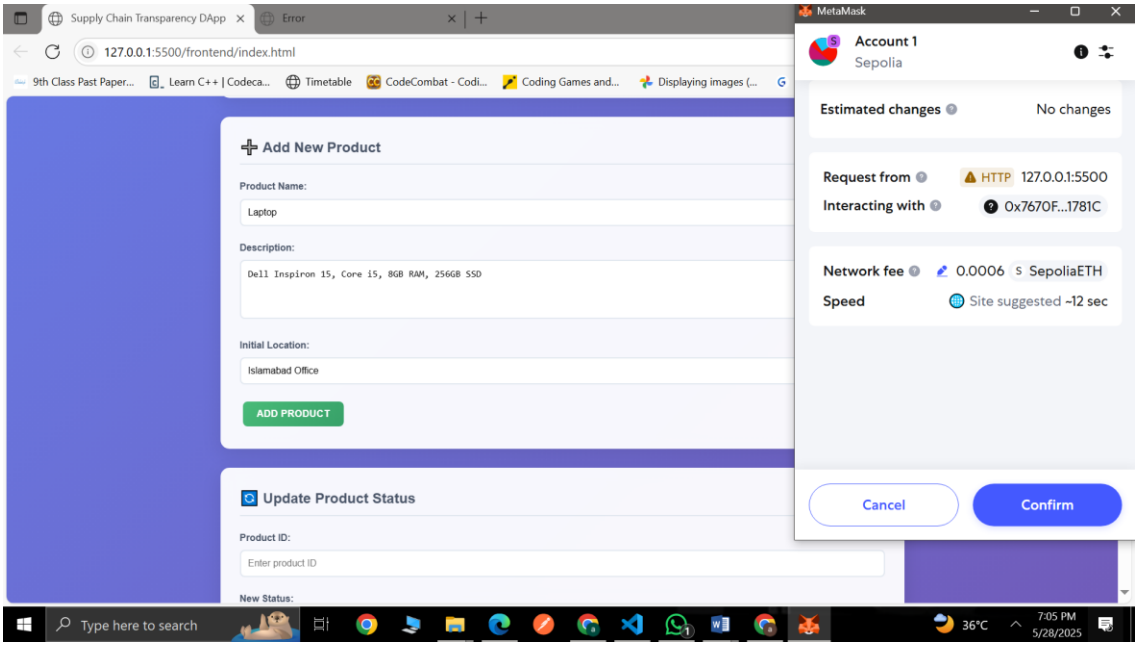
Displays the form where an Interface connect with the MetaMask.

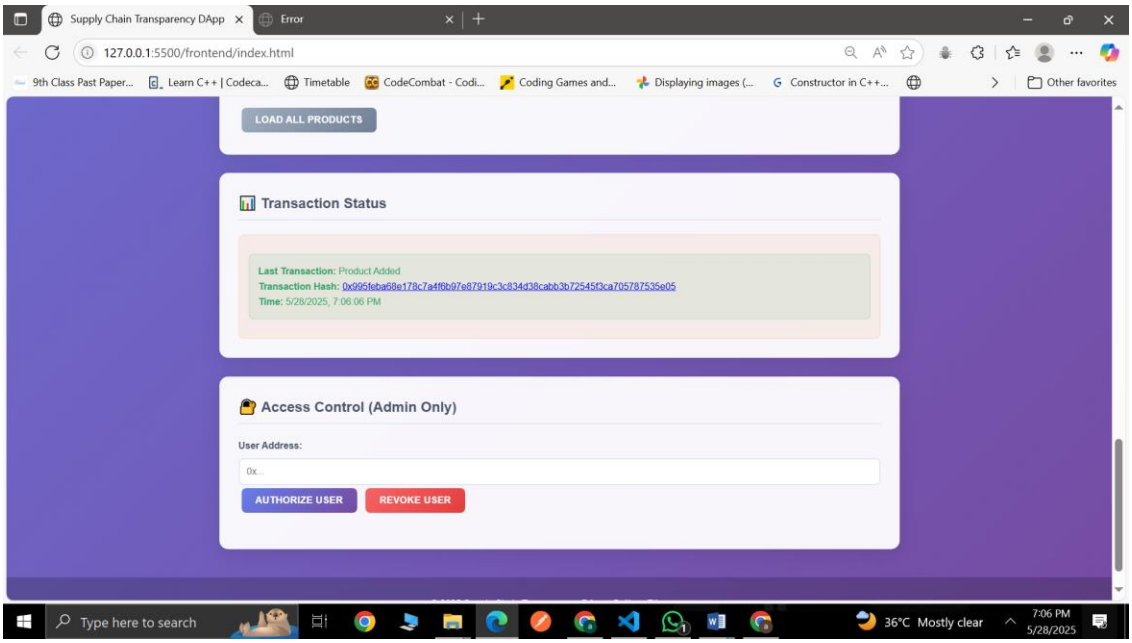


- **Adding New Product:**

Displays the form where an authorized user adds a new product with its name, description, and initial location.

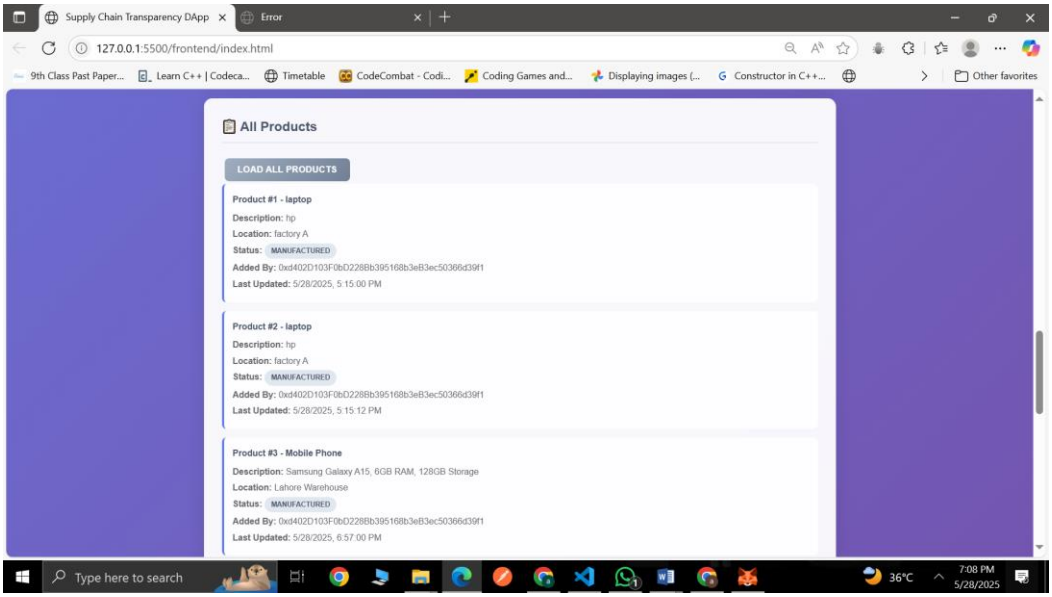


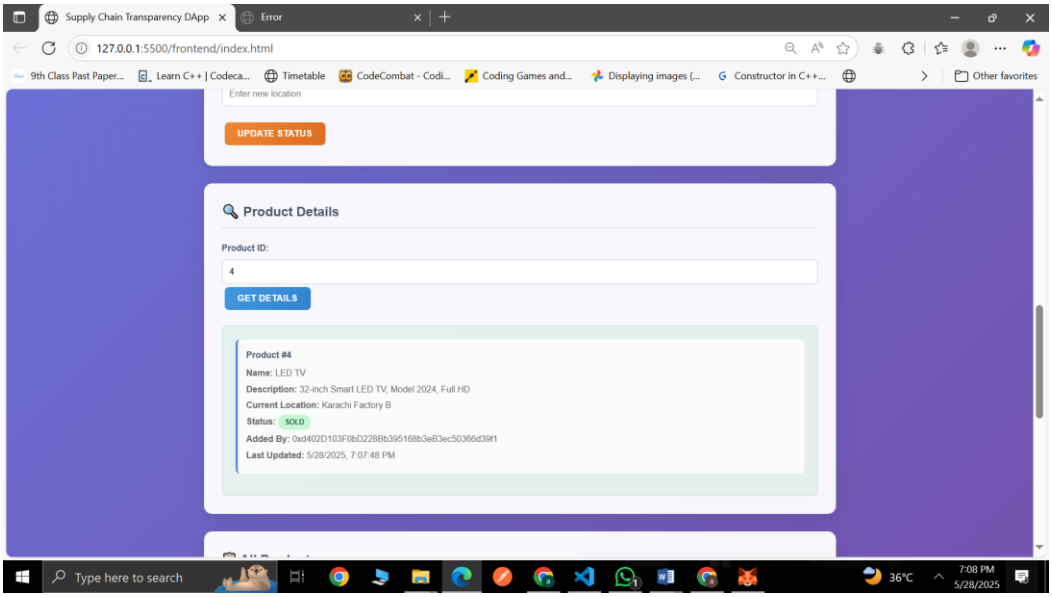




- **Viewing Product Details:**

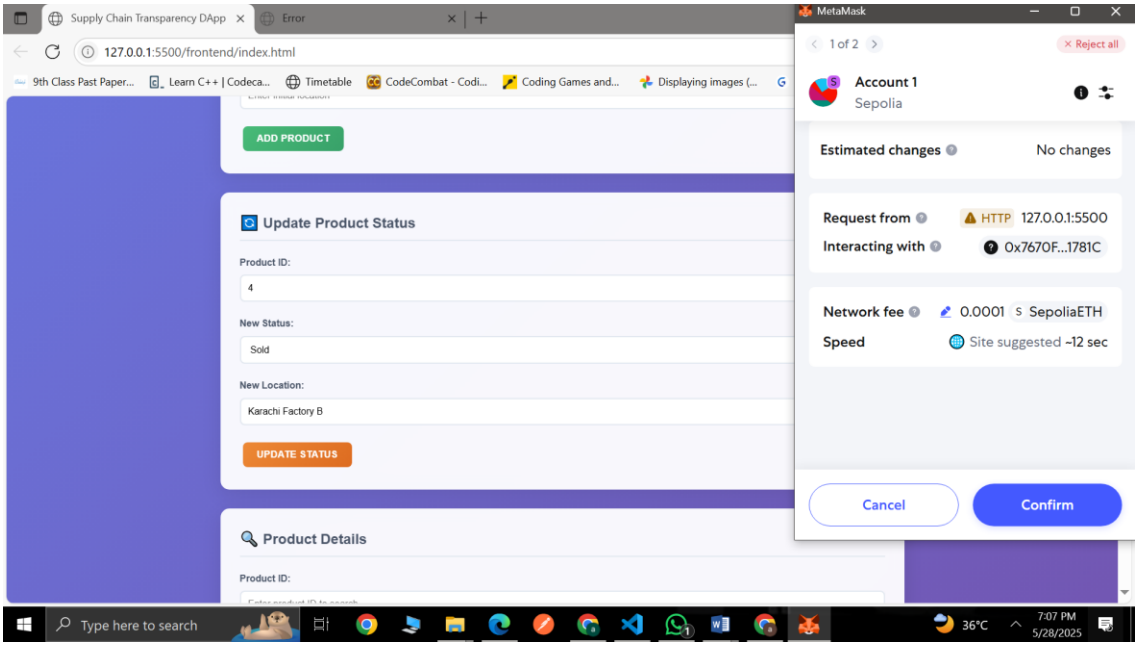
Shows the product information page, including current status, location, and timestamp details for a specific product.





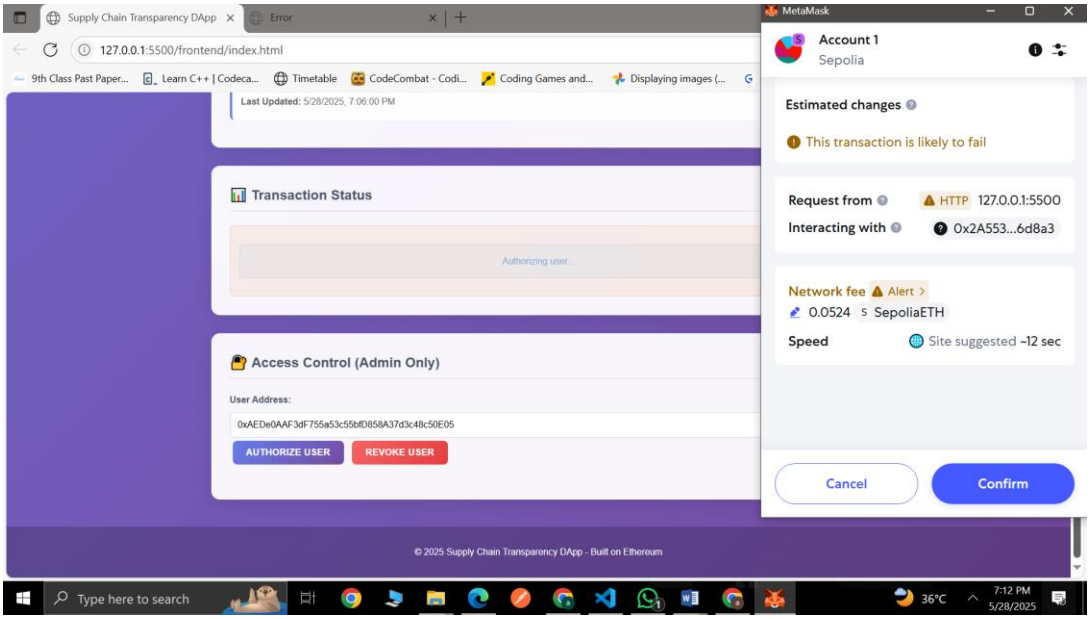
- **Updating Product Status and Location:**

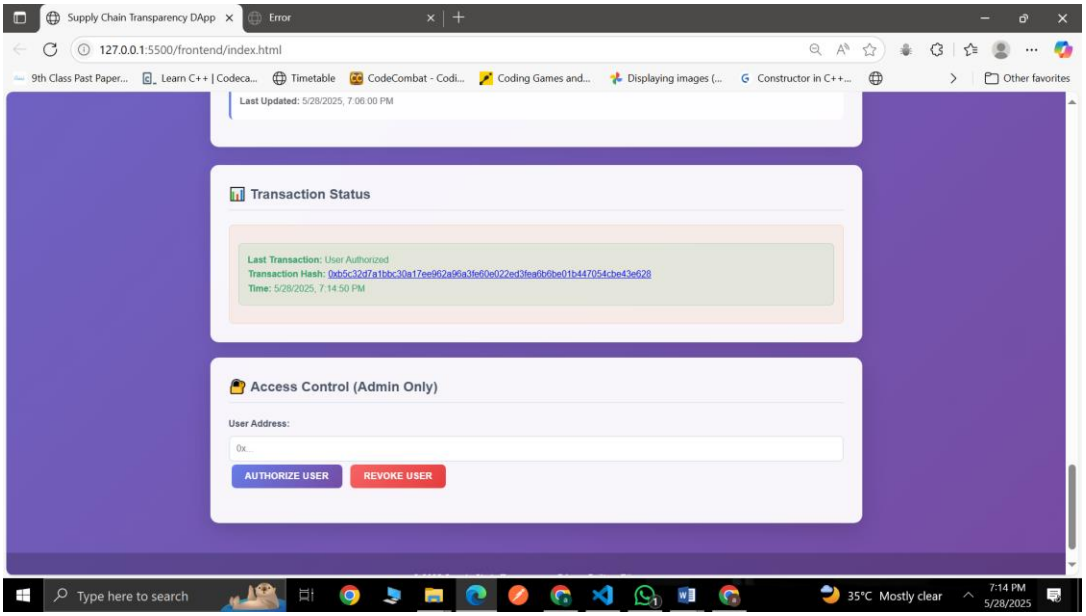
Demonstrates the interface used by manufacturers or retailers to update the product's current status and location in real time.

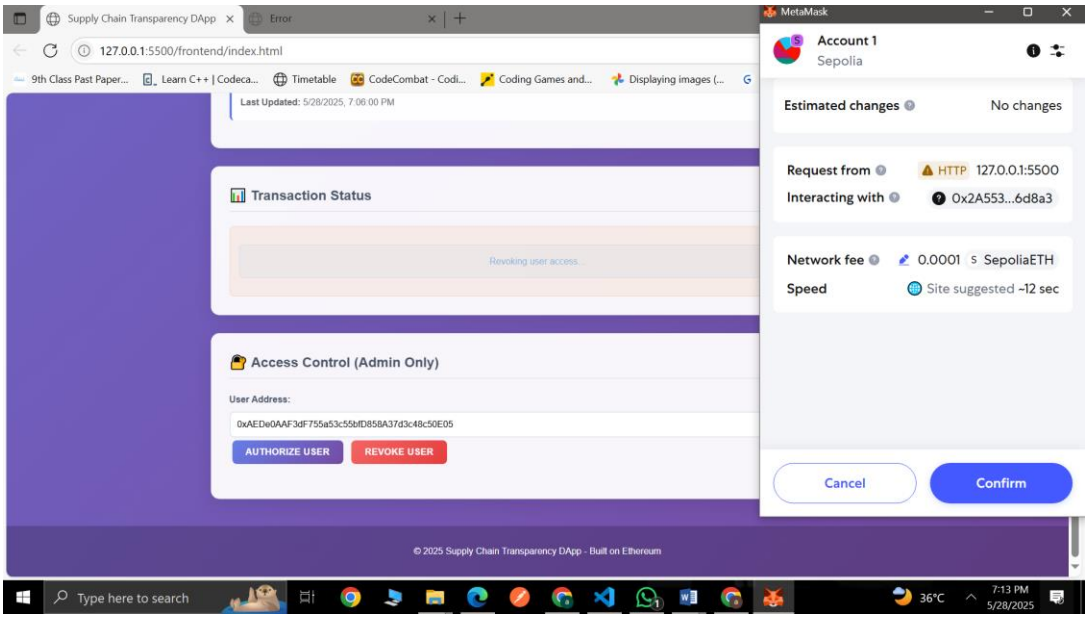


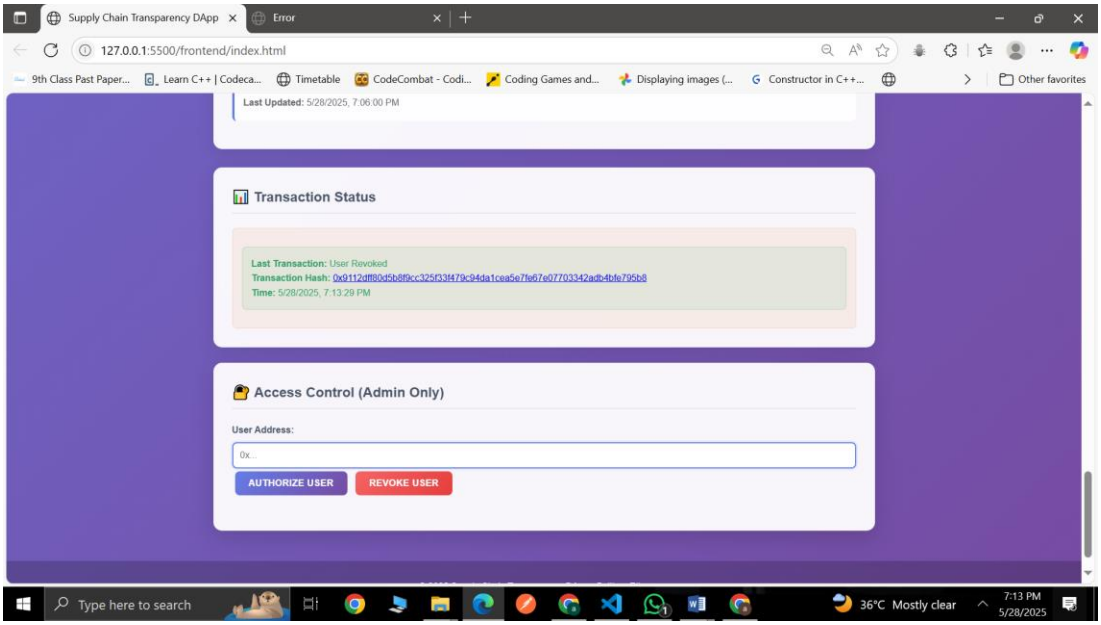
- **Admin Authorizing Users:**

Displays the admin panel where the admin authorizes or revokes users' access to the system.




Supply Chain Transparency DApp
Error
127.0.0.1:5500/frontend/index.html
Last Updated: 5/28/2025, 7:06:00 PM
Transaction Status
Last Transaction: User Authorized
Transaction Hash: 0xb5c32d7a1bbc30a17ee962a96a3fe60e022ed3fea6b6be01b447054cbe43e628
Time: 5/28/2025, 7:14:50 PM
Access Control (Admin Only)
User Address:
0x...
AUTHORIZE USER
REVOKE USER
Type here to search
35°C Mostly clear
7:14 PM
5/28/2025


Supply Chain Transparency DApp
Error
127.0.0.1:5500/frontend/index.html
Last Updated: 5/28/2025, 7:06:00 PM
Transaction Status
Revoking user access...
Access Control (Admin Only)
User Address:
0xAEDe0AAF3dF755a53c55bfD858A37d3c48c50E05
AUTHORIZE USER
REVOKE USER
© 2025 Supply Chain Transparency DApp - Built on Ethereum
MetaMask
Account 1
Sepolia
Estimated changes
No changes
Request from
HTTP 127.0.0.1:5500
Interacting with
0x2A553...6d8a3
Network fee
0.0001 SepoliaETH
Speed
Site suggested ~12 sec
Cancel
Confirm
Type here to search
36°C
7:13 PM
5/28/2025



Deployment Info (Sepolia Testnet)

- The smart contract was deployed on Sepolia using Remix.
- We used real test ETH and connected MetaMask to interact with the contract.
- Transactions were done for:
    - Adding a product
    - Updating product status
    - Authorizing a user

Frontend:

- Website connects with MetaMask wallet.
- User can:
    - Add a new product
    - Search a product by ID
    - See full product list
    - Update product location and status
- Admin can:
    - Give access to new users
    - Remove users from the system

GitHub Repository

https://github.com/Afshan-Farooq-dev/SupplyChain-DApp

Conclusion

This assignment shows how blockchain can **solve real-world problems in supply chain tracking**. It gives **full control to verified users**, stores all data permanently and securely, and helps build **trust** between companies and customers. With this DApp, the **entire product journey becomes visible and clear** from creation to delivery.