

IBM PROJECTREPORT

DRUG TRACEABILITY

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TABLE OF CONTENTS

1. INTRODUCTION

- 1.1 Project Overview
- 1.2 Purpose

2. IDEATION & PROPOSED SOLUTION

- 2.1 Problem Statement Definition
- 2.2 Empathy Map Canvas
- 2.3 Ideation & Brainstorming
- 2.4 Proposed Solution

3. REQUIREMENT ANALYSIS

- 3.1 Functional requirement
- 3.2 Non-Functional requirements

4. PROJECT DESIGN

- 4.1 Data Flow Diagrams
- 4.2 Solution & Technical Architecture
- 4.3 User Stories

5. CODING & SOLUTIONING (Explain the features added in the project along with code)

- 5.1 Feature 1
- 5.2 Feature 2

6. RESULTS

- 6.1 Performance Metrics

7. ADVANTAGES & DISADVANTAGES 8. CONCLUSION 9. FUTURE SCOPE

10. APPENDIX Source Code [GitHub](#) & Project Video Demo Link

1.INTRODUCTION

1.1 Project Overview

Drug traceability is a system that enables tracking and tracing pharmaceutical products throughout the supply chain. The key components include serialization, data exchange standards, and a centralized database. This ensures product authenticity, reduces counterfeiting, and enhances overall drug safety.

1.2 Purpose

The primary purpose of Drug traceability is to enhance patient safety and the integrity of the pharmaceutical supply chain.

2.IDEATION & PROPOSED SOLUTION

1.3 Problem Statement Definition

A problem statement is a short, clear explanation of an issue or challenge that sums up what you want to change.



Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	The need to monitor the temperature of a gas pipeline tunnel in a remote location.	The need to monitor the temperature of a gas pipeline tunnel in a remote location.	The need to provide real-time temperature data to personnel in the tunnel and to personnel monitoring the tunnel remotely.	The need to provide an alert system in the event of an unsafe temperature level	The system should be able to detect temperature changes and alert operators of any potential safety issues .

1.4 Empathy Map Canvas

Ability to sense other people's emotions, coupled with the ability to imagine what someone else might be thinking or feeling

[illegible]

1.5 Ideation & Brainstorming

Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity.


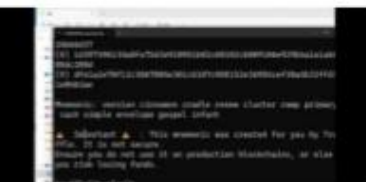
Brainstorm & Idea prioritization




Use this template in your next brainstorming session to generate ideas, evaluate their feasibility and select the most promising ones to pursue and follow in the next steps.

- 1. Brainstorming**
 - Generate ideas
 - Brainstorming session
 - Brainstorming session
- 2. Before you collaborate**
 - Define your problem statement
 - Define your problem statement
 - Define your problem statement
- 3. Define your problem statement**
 - Define your problem statement
 - Define your problem statement
 - Define your problem statement
- 4. Brainstorm**
 - Brainstorming session
 - Brainstorming session
 - Brainstorming session
- 5. Group ideas**
 - Brainstorming session
 - Brainstorming session
 - Brainstorming session
- 6. Prioritize**
 - Brainstorming session
 - Brainstorming session
 - Brainstorming session
- 7. After you collaborate**
 - Brainstorming session
 - Brainstorming session
 - Brainstorming session

1.6 Proposed Solution

A comprehensive drug traceability system could involve implementing barcodes or RFID tags on pharmaceutical packaging, creating a digital database to track each product's movement through the supply chain, and integrating technologies like blockchain for secure and transparent information sharing. This would enhance visibility, reduce the risk of counterfeit drugs, and improve overall drug safety.

S.No.	Parameter	Values	Screenshot
1.	Information gathering	Setup all the Prerequisite:	
2.	Extract the zip files	Open to vs code	

3.	Remix Ide platform exploring	<p>Deploy the smart contract code</p> <p>Deploy and run the transaction. By selecting the environment - inject the MetaMask.</p>	
4	Open file explorer	<p>Open the extracted file and click on the folder.</p> <p>Open src, and search for utiles.</p> <p>Open cmd enter commands</p> <ol style="list-style-type: none"> 1.npm install 2.npm bootstrap 3. npm start 	
5	{LOCALHOST ADDRESS} IP	<p>copy the address and open it to chrome so you can see the front end of your project.</p>	

2 REQUIREMENT ANALYSIS

2.2 Functional requirement

Ensure accurate tracking of pharmaceuticals from production to distribution to enhance safety and combat counterfeiting..

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Authentication	Overall controller
FR-4	security	Controlling activities

2.3 Non-Functional requirements

Ensure real-time data accuracy, maintain system reliability with minimal downtime, comply with regulatory standards, and provide user-friendly interfaces for efficient adoption.

SOLUTION.

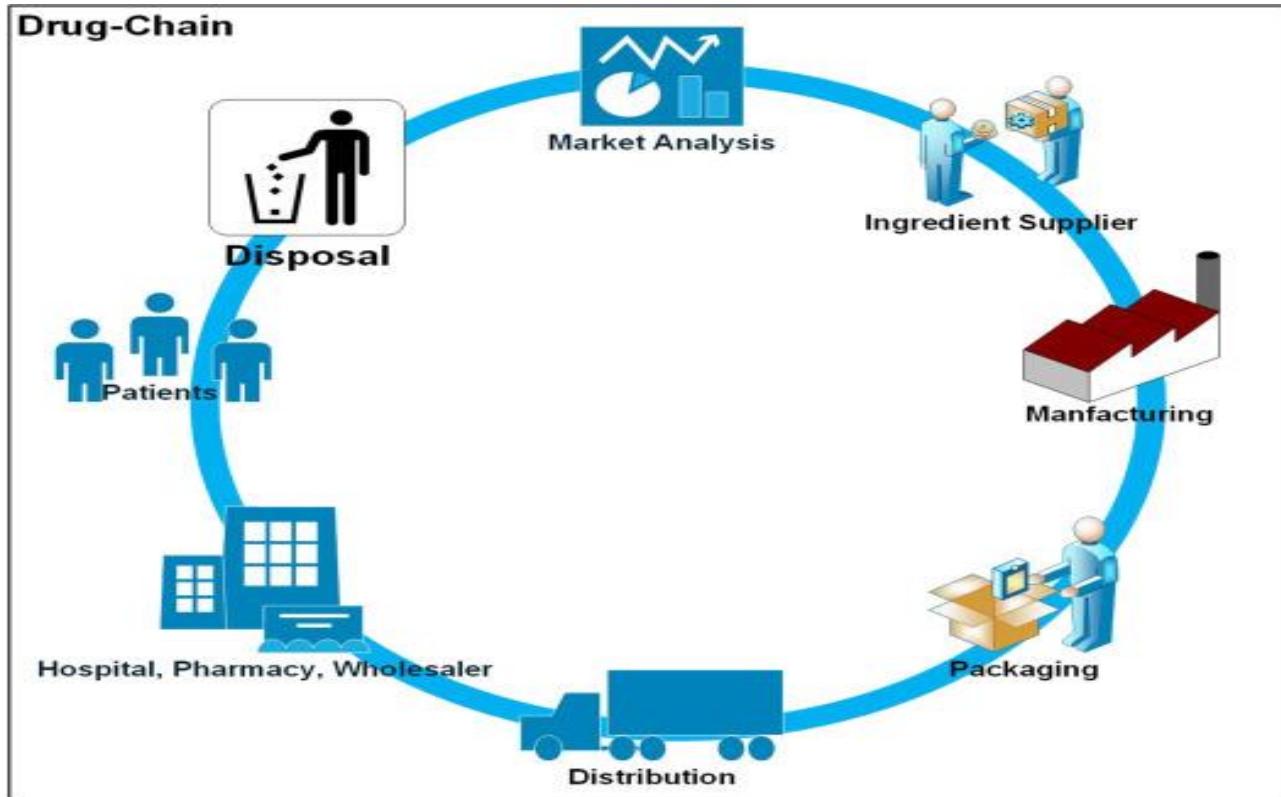
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Safety through usability
NFR-2	Security	Ensuring drug supply security
NFR-3	Reliability	Ensuring Drug supply integrity
NFR-4	Performance	Optimizing operational drug

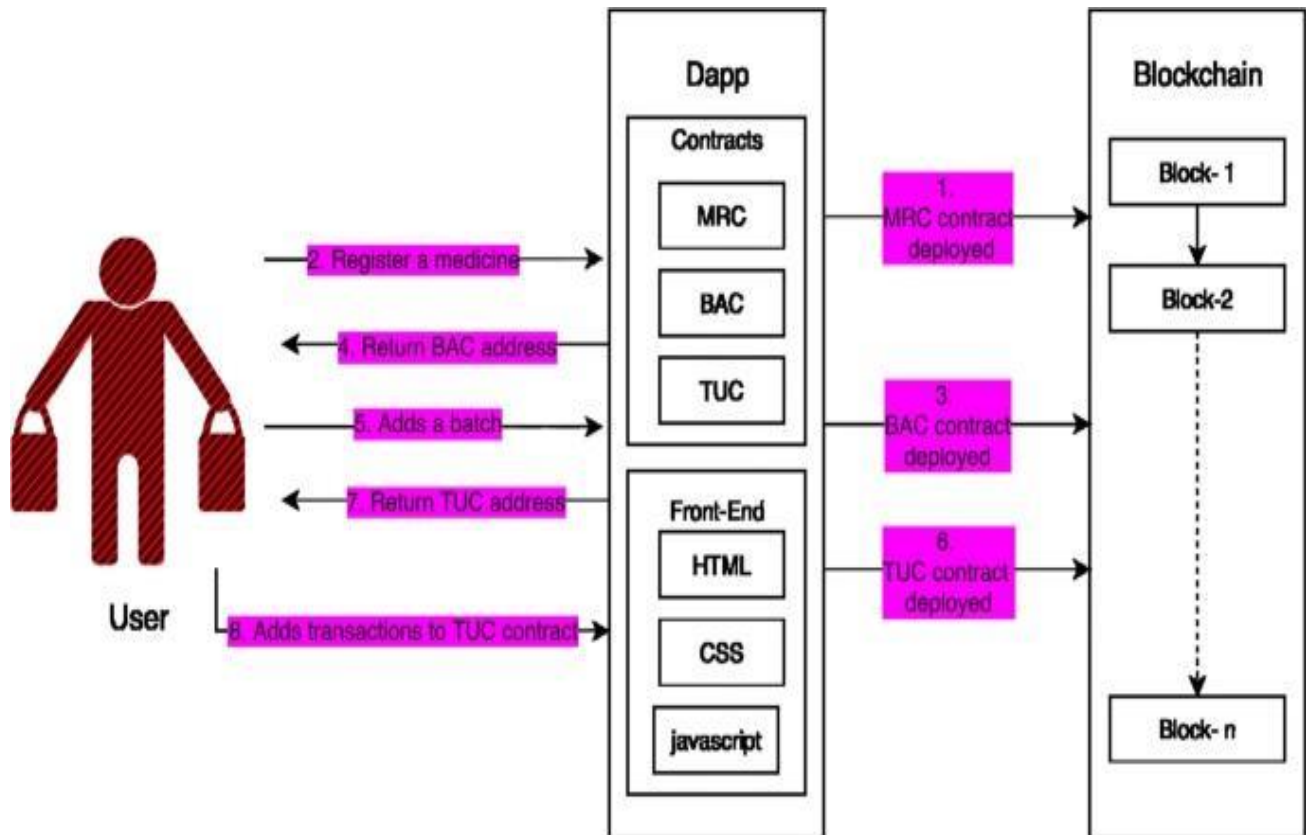
3 PROJECT DESIGN

3.2 Data Flow Diagrams

A data flow diagram is a traditional visual representation of the information flows within a system .A neat and clear DFD can depict the right amount of the system requirement graphically . It shows how data enters and leave the system ,what changes the information and where data is stored.

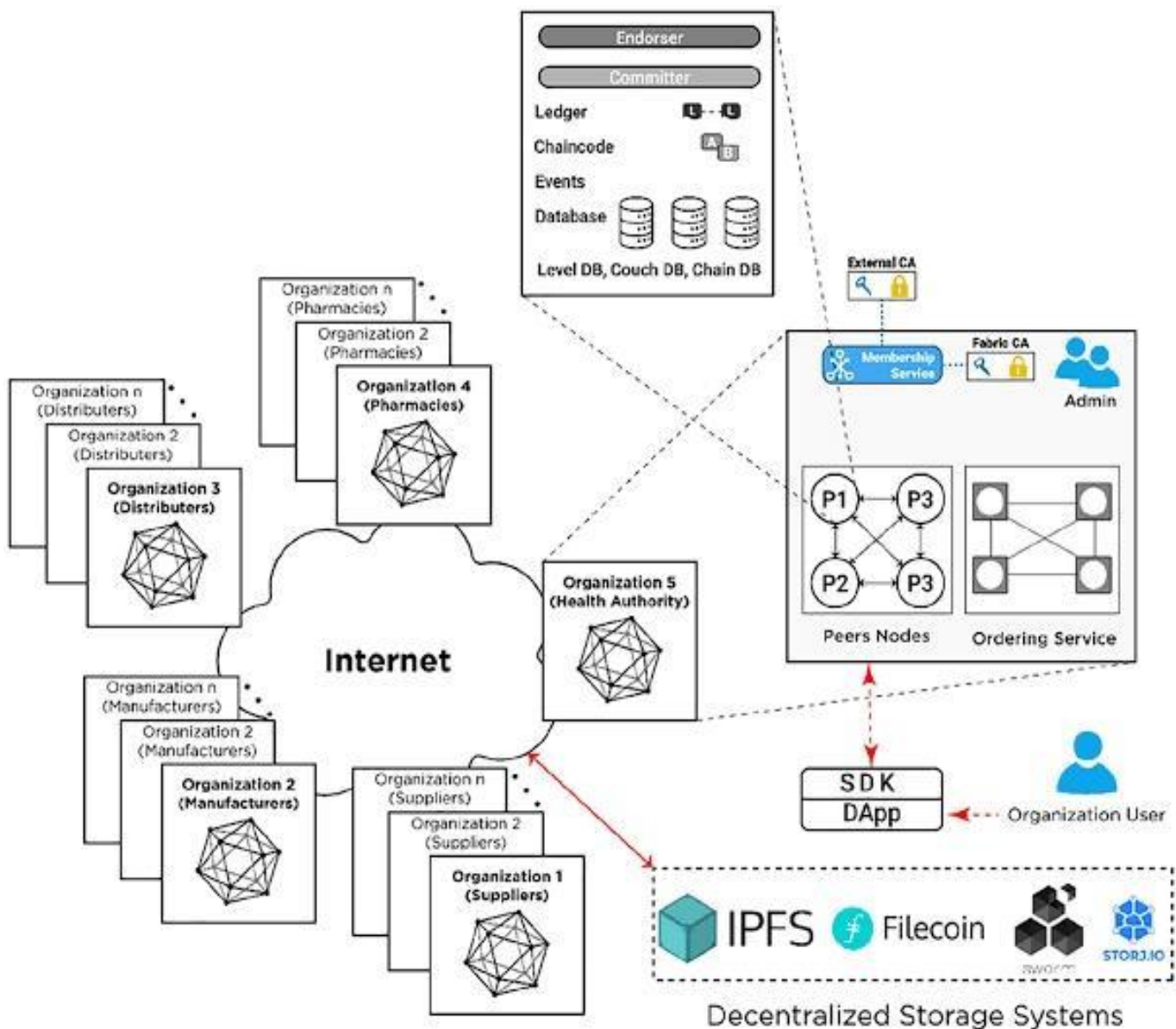
EXAMPLE:





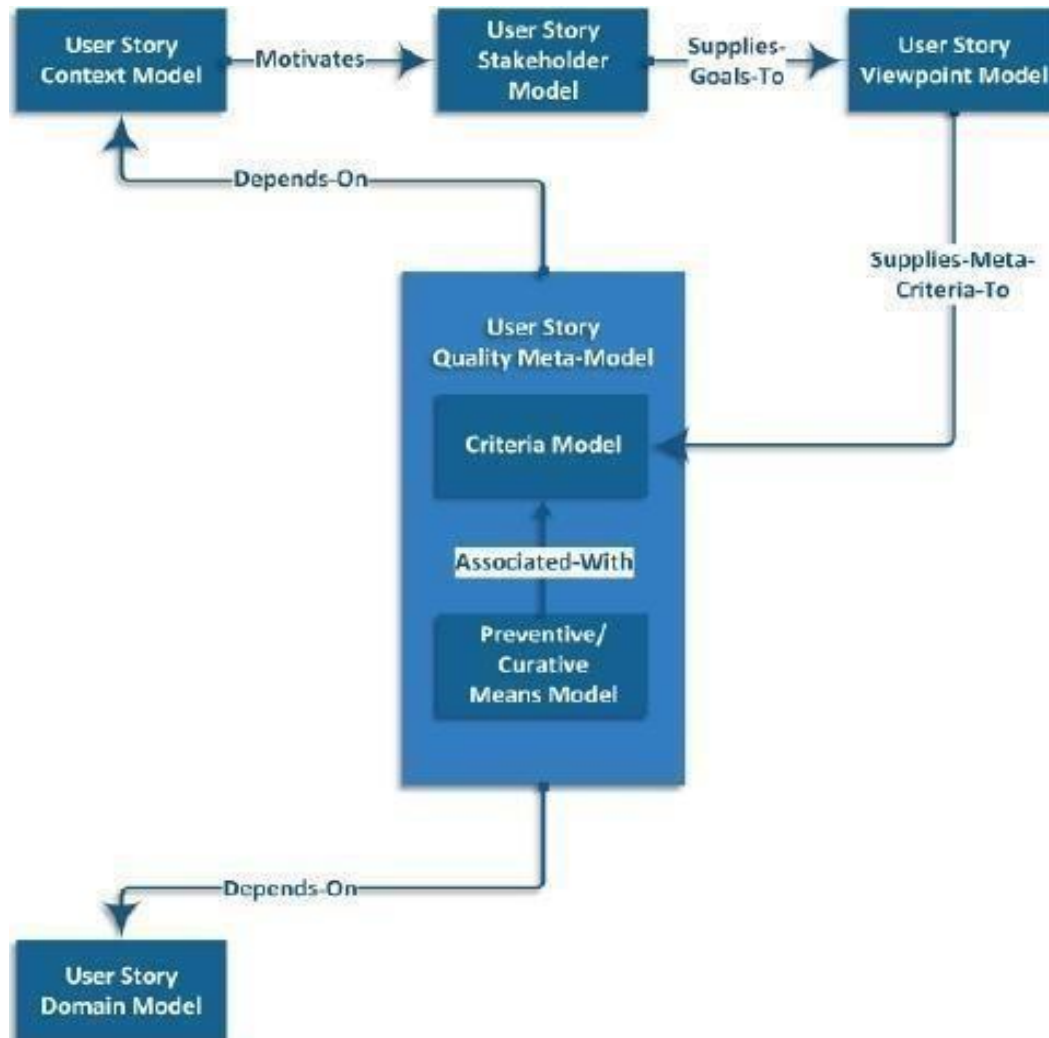
Solution & Technical Architecture :

The solution architecture for drug traceability involves a centralized system where production, distribution, and regulatory entities interact. Functional components include data acquisition (from manufacturing and distribution), a secure database for storage, real-time tracking, authentication mechanisms, and reporting interfaces for stakeholders to ensure a comprehensive drug traceability system..



4.2 User Stories

- A user story is a short, simple description of a product feature from the perspective of the person who wants to use the new feature, usually a user or customer of the product.
- These 3 C's are Cards, Conversation, and Confirmation. These are essential components for writing a good User Story.



4 CODING & SOLUTIONING (Explain the features added in the project along with code)

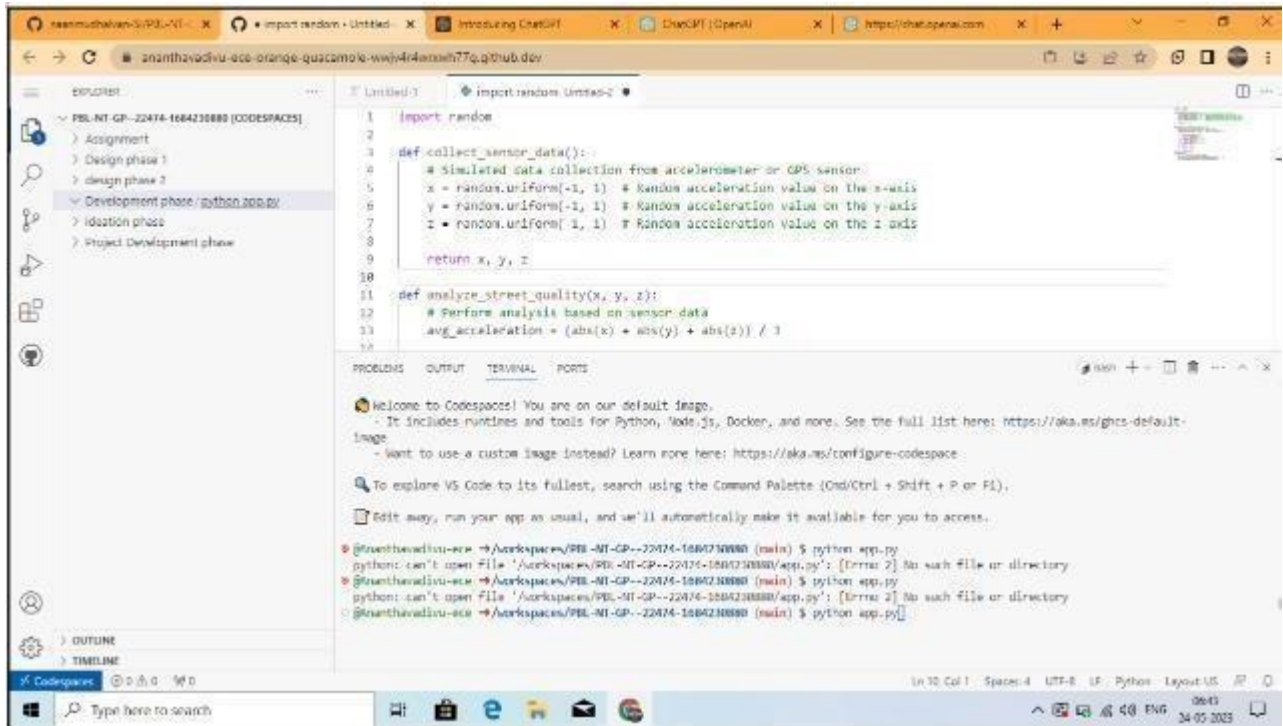
Hardware used:

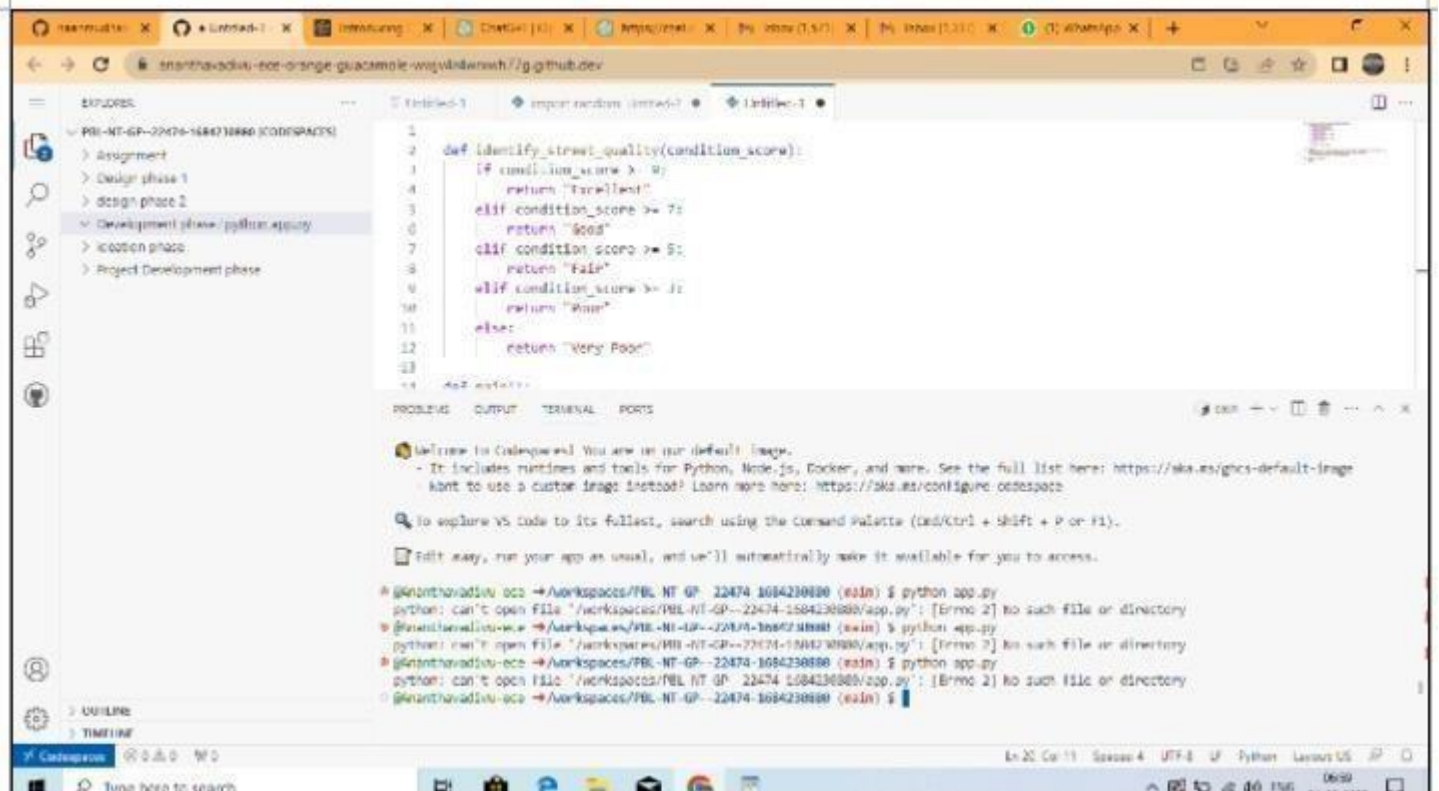
- GPS Tracking Devices
- Security Cameras and systems
- RFID scanners
- Data storage system

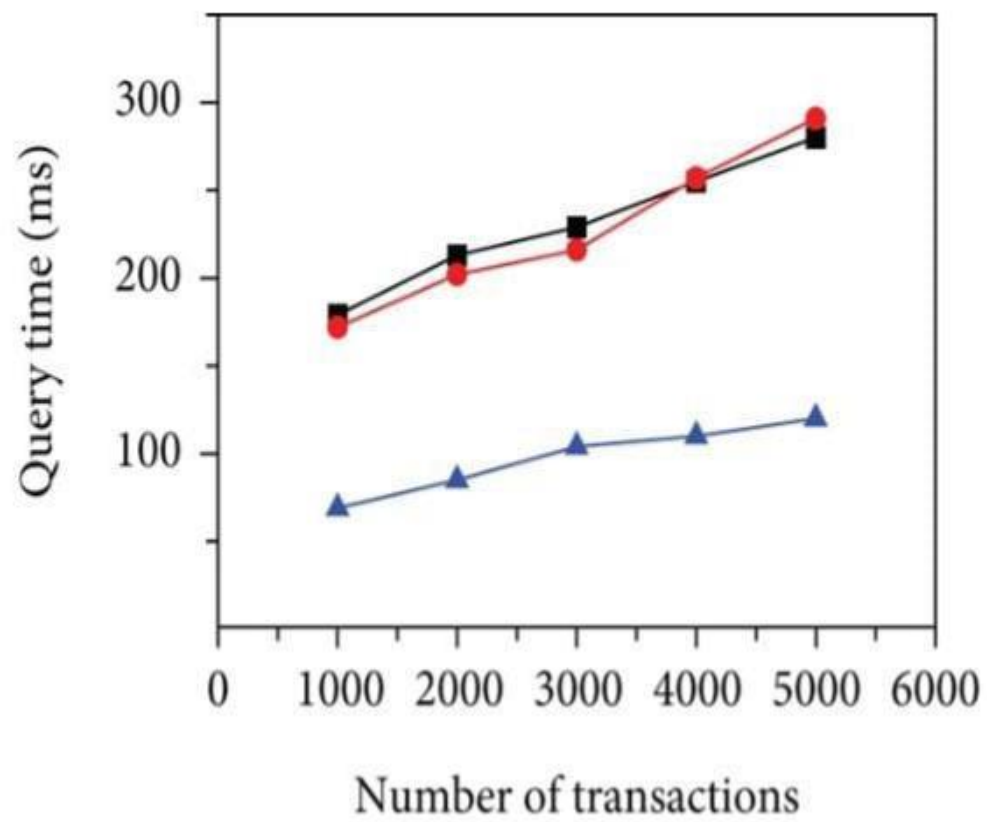
Software used

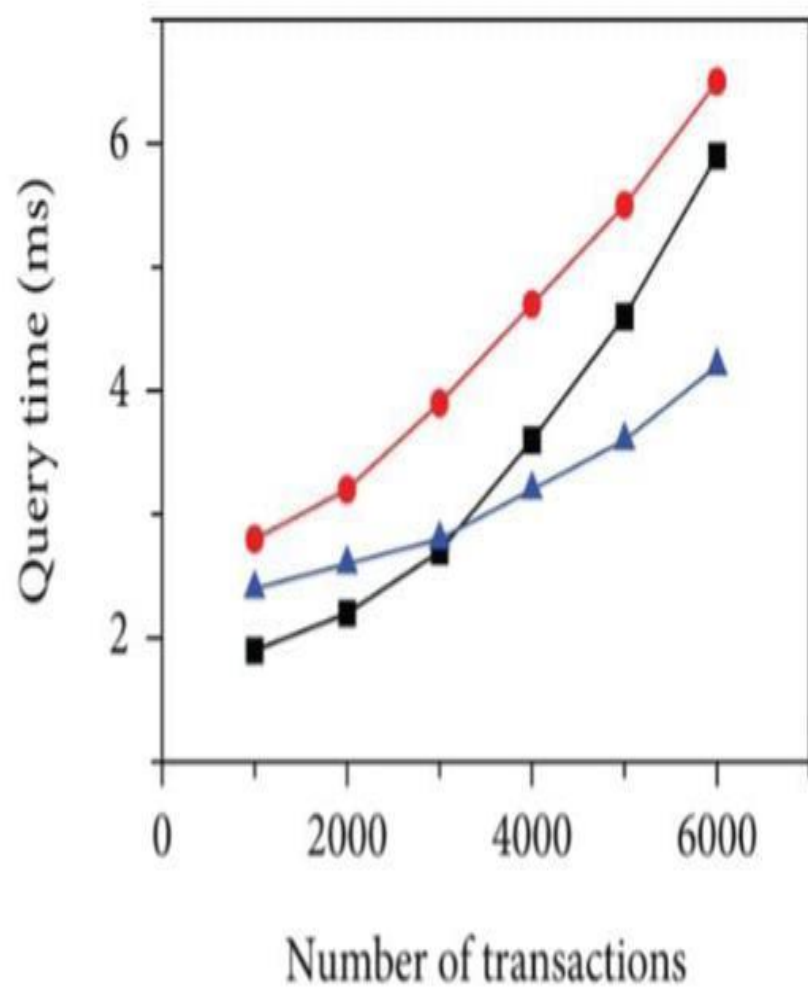
- QMS software
- Serialization software
- ERP systems
- RFID software

4.2 Feature 1

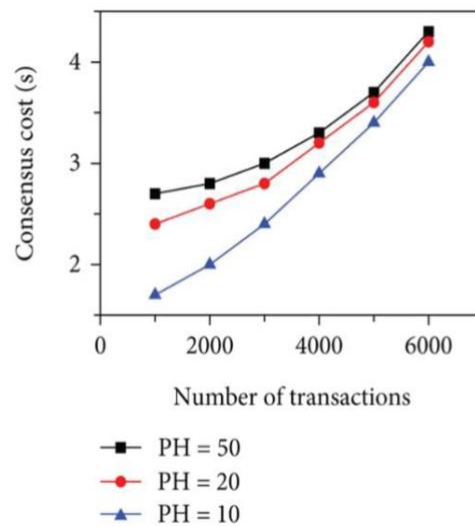
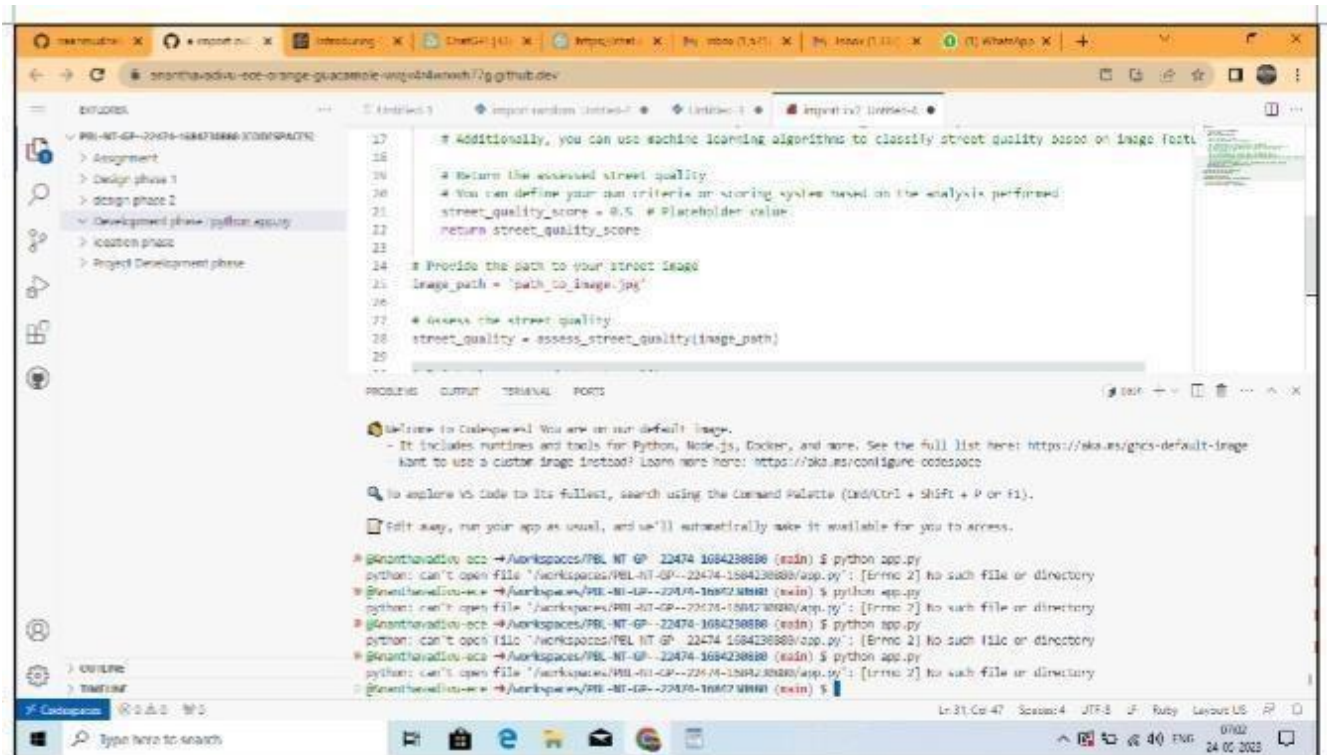








4.3 Feature 2



RESULTS

Enhanced drug traceability improves supply chain security and ensures product authenticity. Effective drug traceability enhances safety and accountability in the pharmaceutical supply chain.

4.4 Performance Metrics

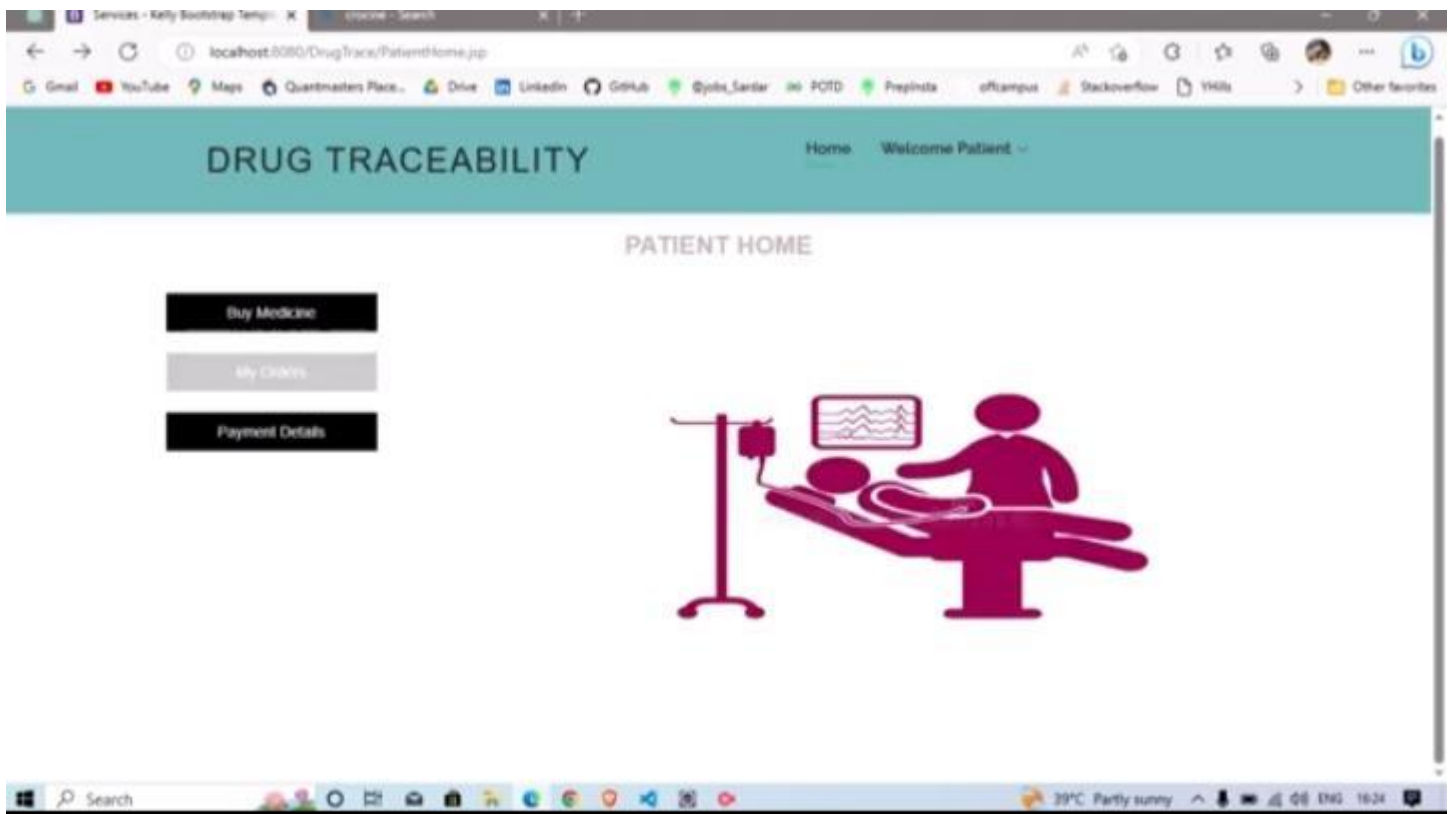
Parameter:

- Merits

Value:

- Wowki Execution time and output Screenshot
(Or)
- Python accuracy of prediction Output screenshot

Screenshot:



5 ADVANTAGES & DISADVANTAGES:

ADVANTAGES :

- Supply chain visibility
- Patient safety
- Enhanced quality control
- Building consumer trust
- Efficient distribution
- Regulatory compliance
- Counterfeit prevention

DISADVANTAGES :

- Cost of Implementation
- Data security and privacy concerns
- Maintenance and updates
- Global standardization

6 CONCLUSION

In conclusion, drug traceability is a crucial aspect of pharmaceutical systems, ensuring transparency, accountability, and safety throughout the supply chain. By implementing robust traceability measures, we can enhance the ability to track and monitor pharmaceuticals from production to distribution, thereby safeguarding public health and mitigating the risks associated with counterfeit drugs. Embracing advanced technologies and international collaboration further strengthens the effectiveness of drug traceability, promoting a safer and more secure global pharmaceutical landscape.

7 FUTURE SCOPE

The future scope of drug traceability holds promising advancements, driven by emerging technologies. Integration of blockchain, Internet of Things (IoT), and artificial intelligence will likely revolutionize traceability systems, providing real-time monitoring, enhanced security, and more accurate data analytics. Additionally, increased collaboration between stakeholders, standardization of traceability protocols, and global regulatory frameworks will play pivotal roles in shaping the future landscape. As pharmaceutical industries embrace innovation, the future of drug traceability holds the potential to further elevate safety standards, combat counterfeiting, and ensure the integrity of global healthcare supply chains.

APPENDIX

Source Code

```
import uuid
from datetime import datetime

class Drug:
    def __init__(self, name, batch_number, manufacturer):
        self.id = str(uuid.uuid4())
        self.name = name
        self.batch_number = batch_number
        self.manufacturer = manufacturer
        self.transactions = []

    def add_transaction(self, location):
        timestamp = datetime.now().strftime("%Y-%m-%d %H:%M:%S")
        transaction = {"timestamp": timestamp, "location": location}
        self.transactions.append(transaction)

class Manufacturer:
    def __init__(self, name):
        self.id = str(uuid.uuid4())
        self.name = name

class DrugTraceabilitySystem:
    def __init__(self):
        self.drugs = []
        self.manufacturers = []

    def add_manufacturer(self, name):
        manufacturer = Manufacturer(name)
        self.manufacturers.append(manufacturer)
        return manufacturer

    def add_drug(self, name, batch_number, manufacturer):
        drug = Drug(name, batch_number, manufacturer)
        self.drugs.append(drug)
        return drug

    def ship_drug(self, drug, distributor):
        drug.add_transaction(f"Shipped to {distributor.name}")

# Example Usage:
system = DrugTraceabilitySystem()

manufacturer1 = system.add_manufacturer("ABC Pharma")
manufacturer2 = system.add_manufacturer("XYZ Meds")

drug1 = system.add_drug("DrugA", "12345", manufacturer1)
drug2 = system.add_drug("DrugB", "67890", manufacturer2)
```

```
distributor = Manufacturer("Distributor Inc.")

system.ship_drug(drug1, distributor)
system.ship_drug(drug2, distributor)

# Print drug traceability information
for drug in system.drugs:
    print(f"Drug ID: {drug.id}")
    print(f"Name: {drug.name}")
    print(f"Batch Number: {drug.batch_number}")
    print(f"Manufacturer: {drug.manufacturer.name}")
    print("Transactions:")
    for transaction in drug.transactions:
        print(f" - {transaction['timestamp']} : {transaction['location']}")
    print("\n")
...

```

GitHub & Project Video Demo Link:

Github link : <https://github.com/naanmudhalvan-SI/PBL-NT-GP--22499-1684231301/tree/main>

Demo link: <https://drive.google.com/file/d/14h1v2-jVx3YSs3UCoWi4DU9zvaiuQd1x/view?usp=drivesdk>