Parshvanath Charitable Trust's
A. P. SHAH INSTITUTE OF TECHNOLOGY, THANE
(All Programs Accredited by NBA)
Department of Information Technology

A Comprehensive Blockchain Based Web Framework for Blood Banks

Group No: 4

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Contents

- Introduction
- Objectives
- Scope
- Technology Stack
- Demonstration (Desired)
- Literature Review
- References

1. Introduction

- We have observed that the flow of information from collection to consumption or disposal in blood is not clear. In a centralized blood chain, it is difficult to pinpoint the cause of blood disposal in many medical institutions.
- The problem is the tracking and allocation of the donation transparently during its useful life. Blockchain can help track provenance in the blood supply chain making it more transparent.
- National AIDS Control Organization (NACO) recently reported that 2,234 patients got infected with HIV cause of bad blood transfusion in the last 16 months.

1. Introduction

- Blockchain Technology in blood bank system is to ensure that the patient gets safe blood.
- Problem Identified :
  - Existing blood management systems in India function as information management systems that lack dynamic updates of blood usage and detailed blood trail information, starting from donation to consumption.
- Solution Proposed :
  - This can be achieved by the different entities in the chain; verifying the quality/expiry of blood from the blockchain that provides the trust factor that is required. The donor details could also be verified by the collection centers to ensure unsafe donors are excluded. As a fallout, all the stakeholders will be able to know the availability of blood in different blood banks.

2. Objectives

1. Security and Traceability.

Blockchain is a distributed ledger data structure so all the nodes will be having a copy of the blockchain. This architecture makes this system incredibly secure and tamper-proof because if anyone tampers with a single block then the whole chain will become invalid and we can verify from other nodes.

2. Transparency.

Being a decentralized platform, one of the most beneficial advantages of blockchain is transparency. All the nodes will have a copy of the blockchain which makes it easy to verify the donor history from each node in the blockchain.

3. Availability.

Along with the other things it is necessary that people should know the availability of blood bags. Lack of proper updates can be detrimental for patients. As blockchain is a decentralized and distributed platform it will be simple to check the availability of blood concerning blood banks

3. Scope

1. The proposed system, brings more transparency to the blood donation process by tracking the blood trail and also helps to curb unwarranted wastage of blood by providing a unified platform for the exchange of blood and its derivatives between blood banks.

2. Proposed system, can be applied in areas where political interference and chances of data tampering for personal benefits are high.

3. Due to presence of web application, system becomes more user friendly and can be reached to more population.

4.Technology Stack

1.-Ethereum Blockchain (ganache)

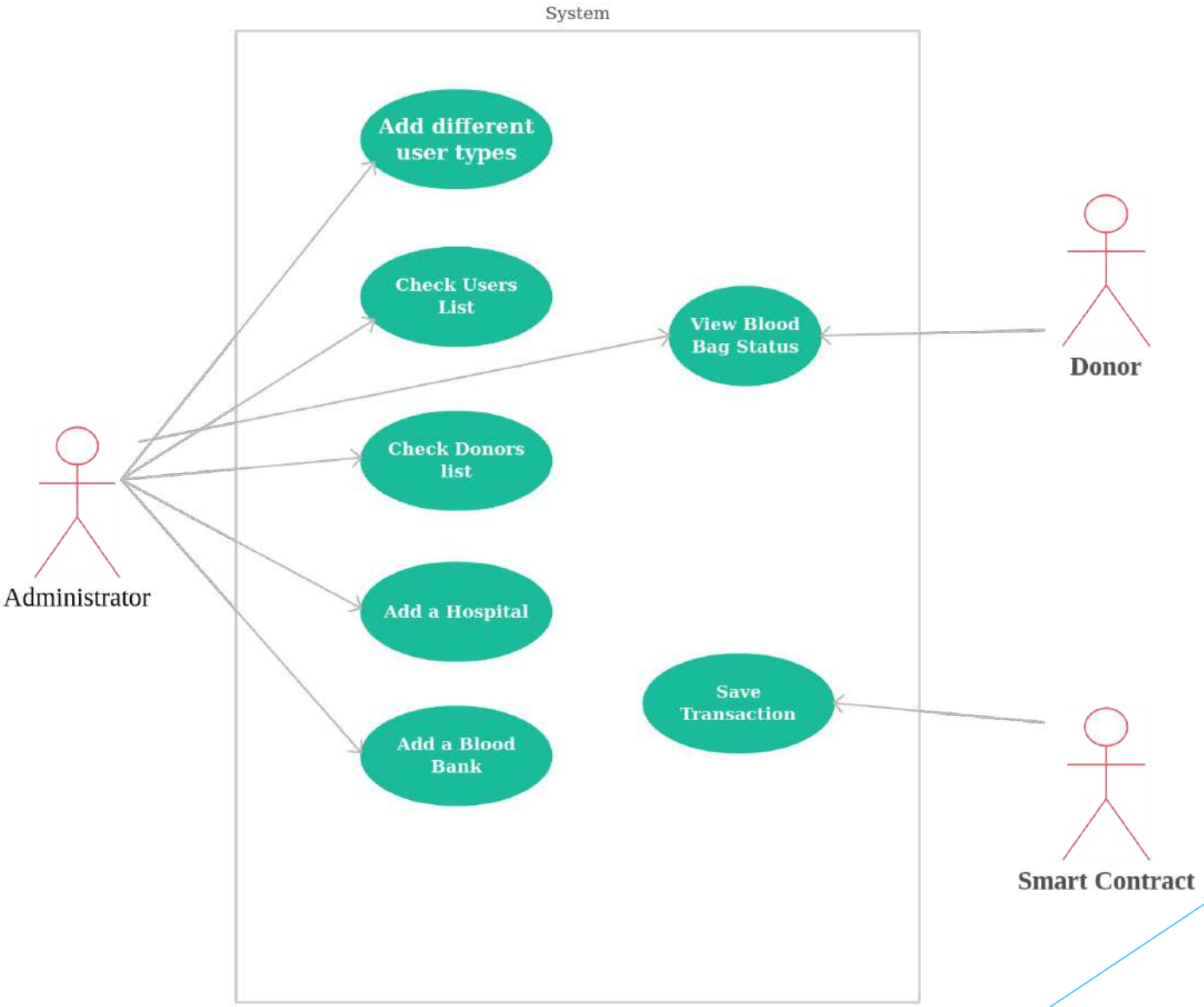
2.-Solidity (smart contracts)

3.-Truffle framework (to compile and deploy smart contracts)

4.-npm, reactjs, web3.js (web framework)

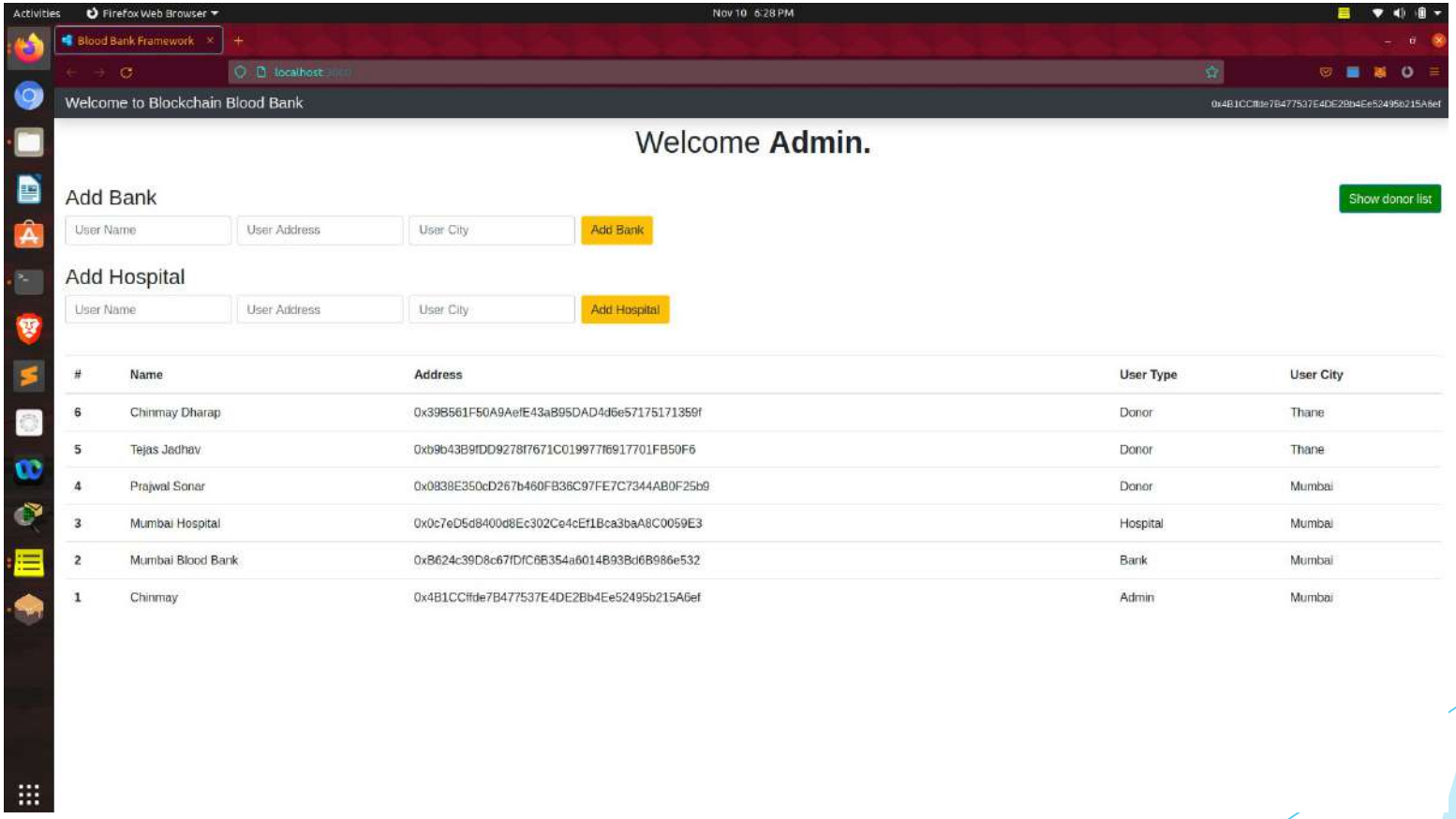
5.-Metamask (cryptocurrency wallet)

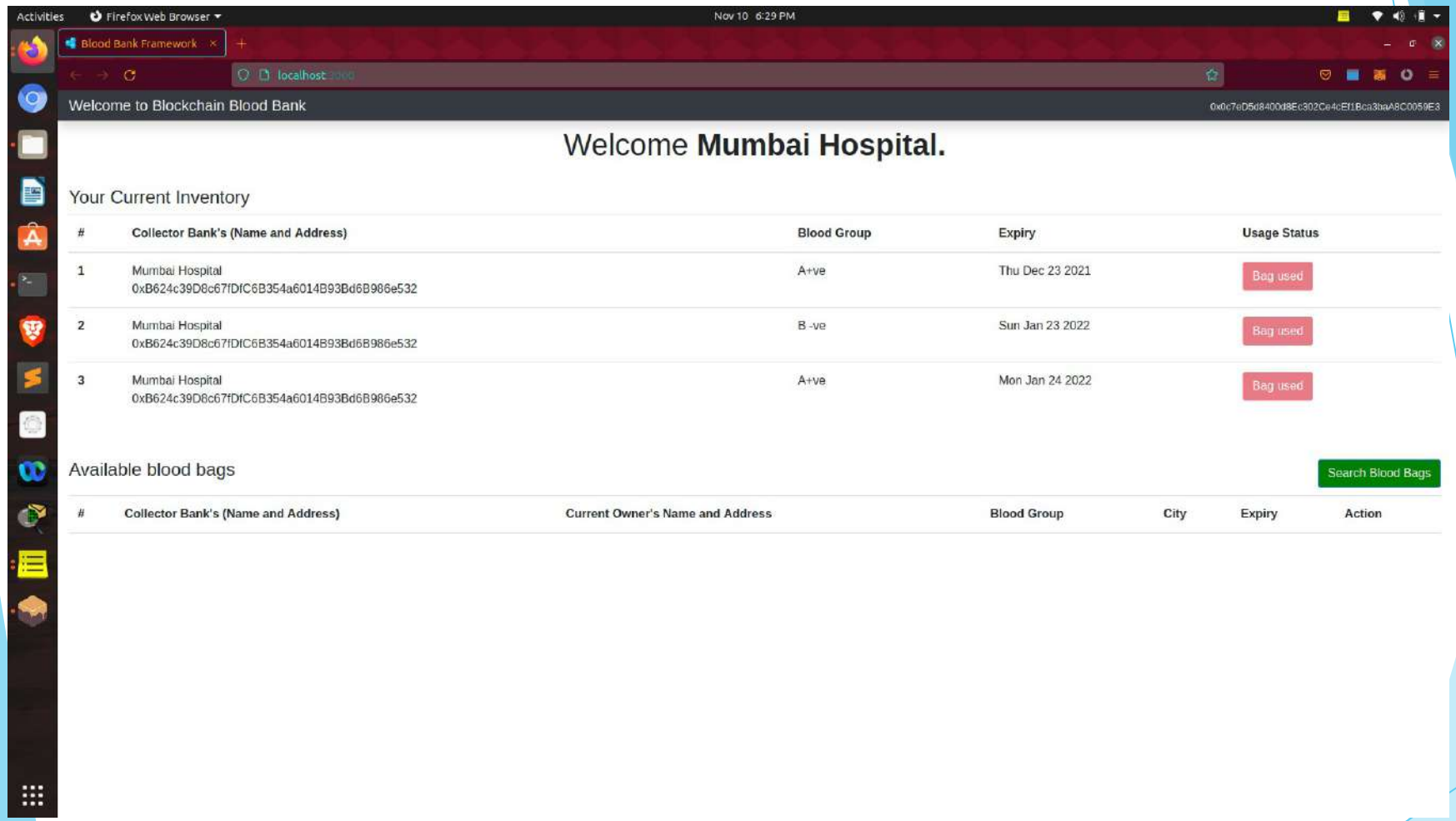
5.Use Case Diagram

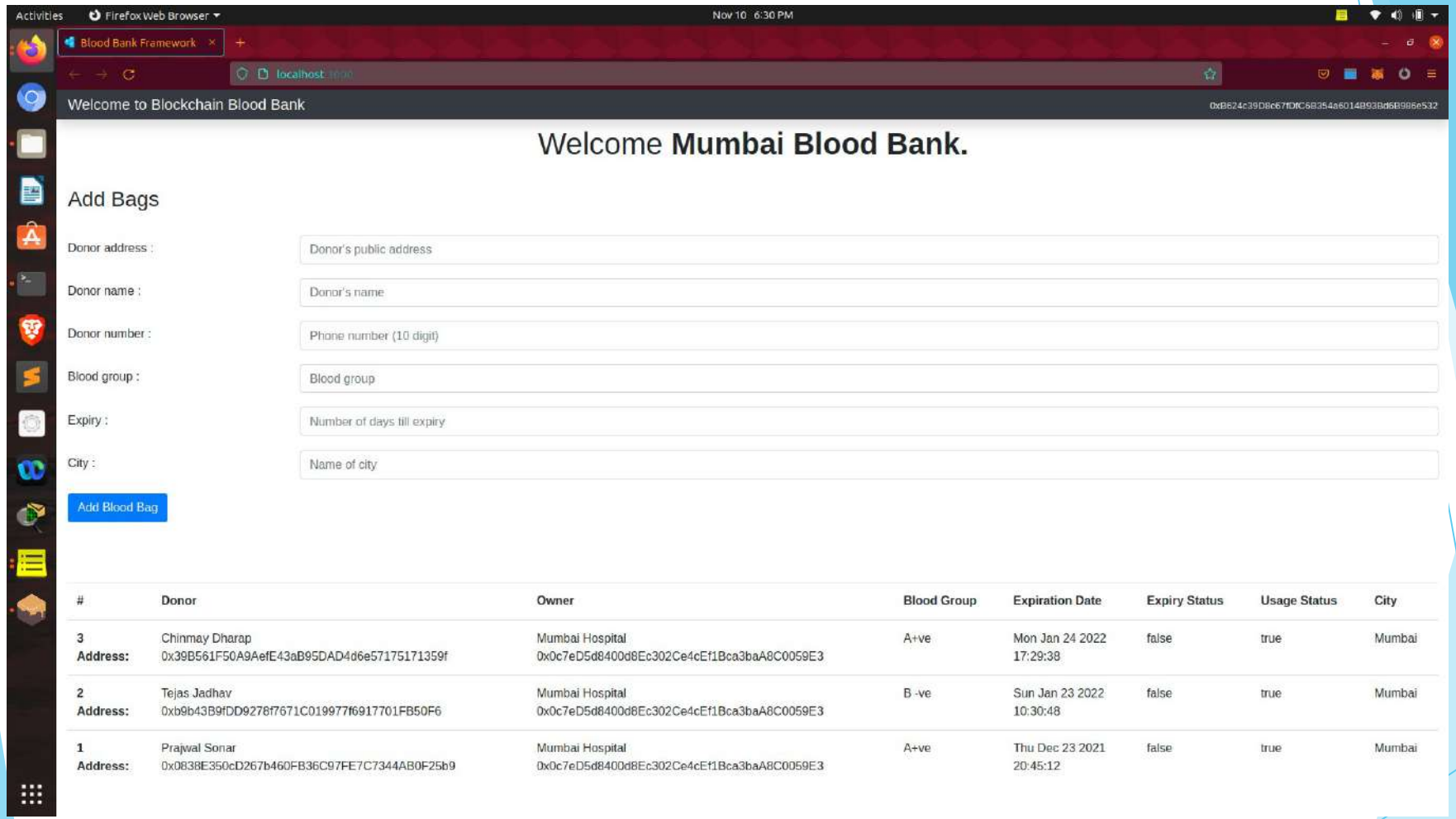


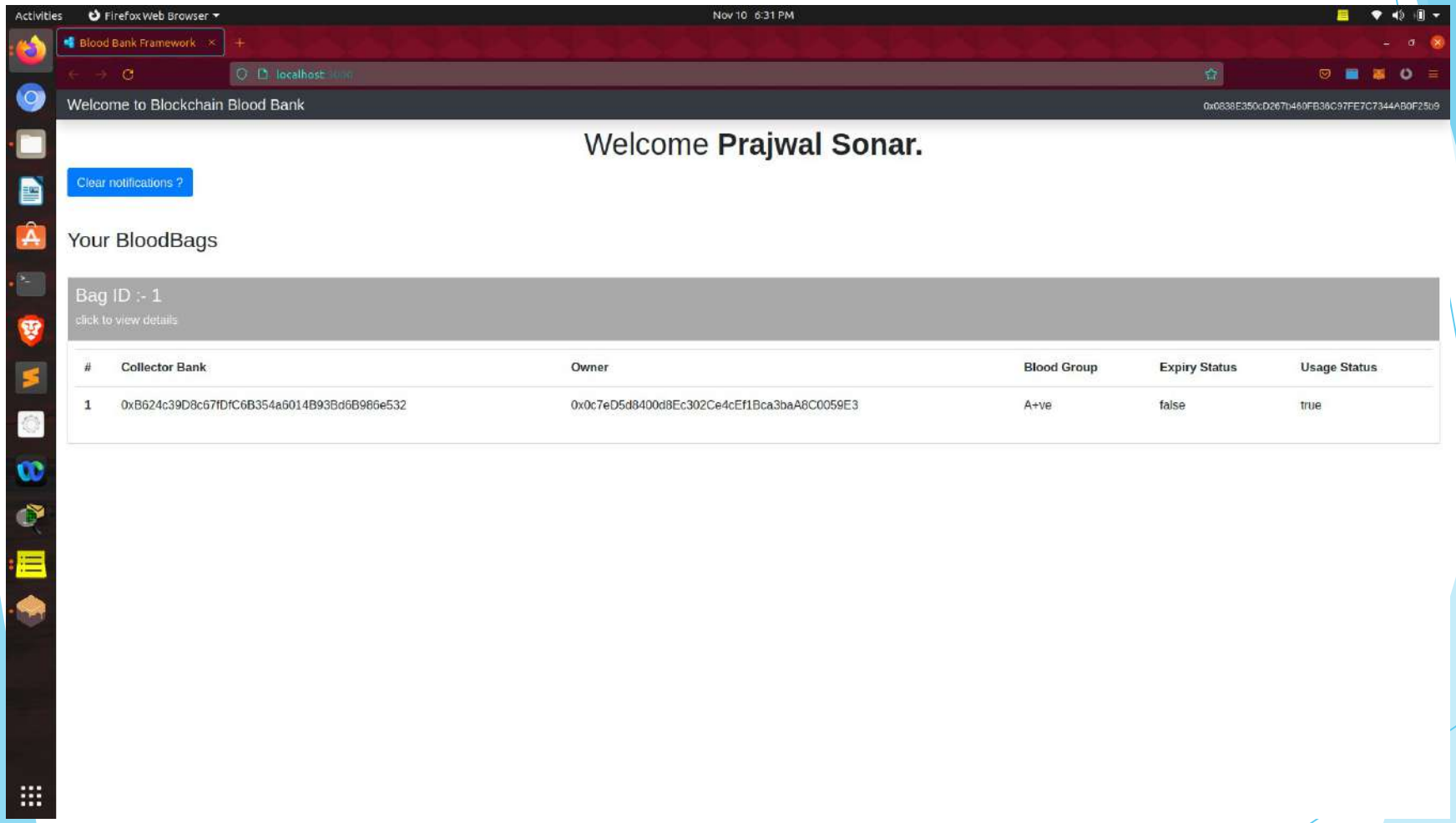
6. Demonstration

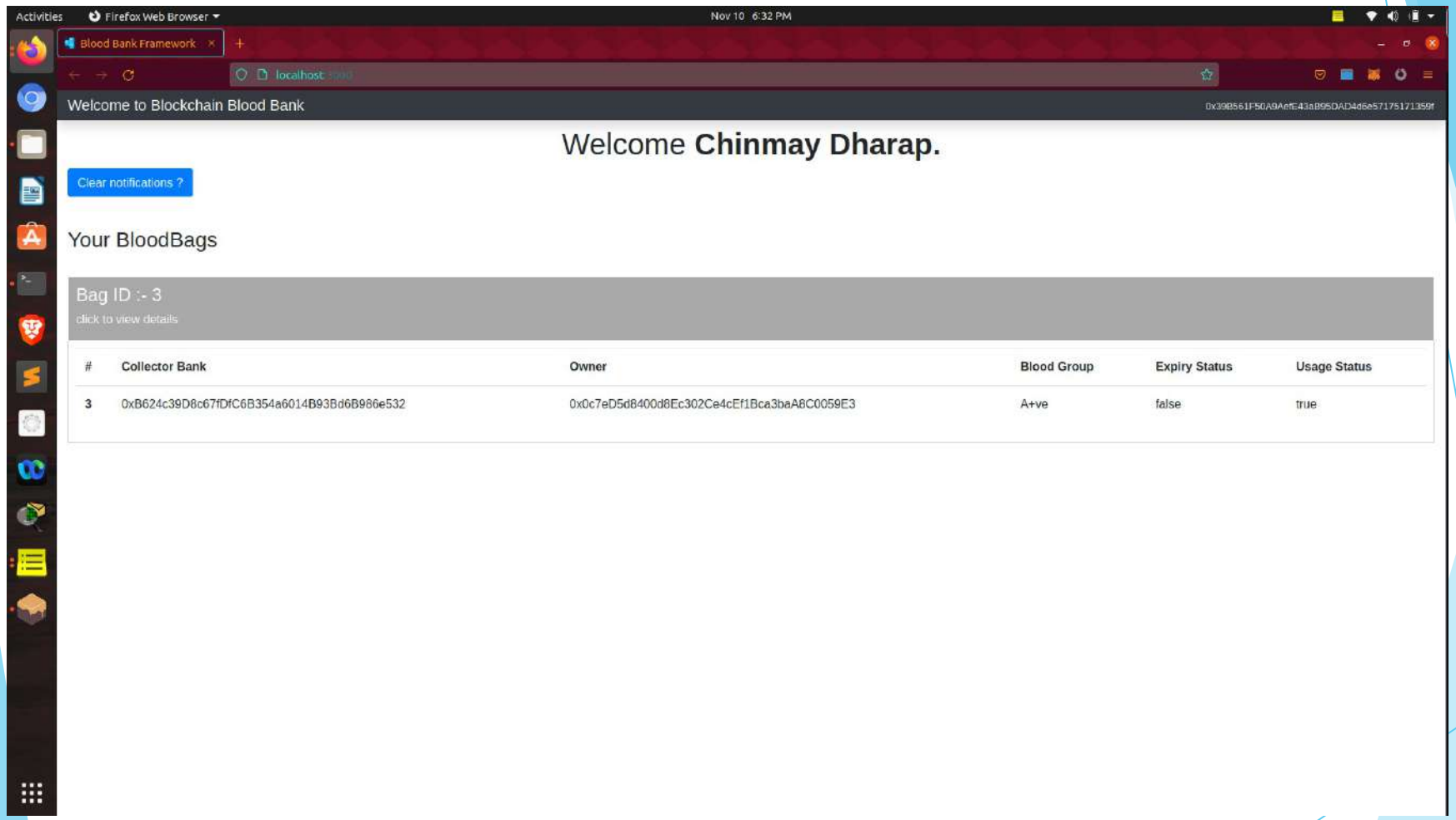
Desired Small Scale Orchestration based on Technology Stack




Activities
Firefox Web Browser
Nov 10 6:29 PM
Blood Bank Framework
localhost
Welcome to Blockchain Blood Bank
0x0c7eD5d8400d8Ec302Ce4cEf1Bca3baA8C0059E3
Welcome Mumbai Hospital.
Your Current Inventory
Collector Bank's (Name and Address) Blood Group Expiry Usage Status
1 Mumbai Hospital 0xB624c39D8c67fDfC6B354a6014B93Bd6B986e532 A+ve Thu Dec 23 2021 Bag used
2 Mumbai Hospital 0xB624c39D8c67fDfC6B354a6014B93Bd6B986e532 B -ve Sun Jan 23 2022 Bag used
3 Mumbai Hospital 0xB624c39D8c67fDfC6B354a6014B93Bd6B986e532 A+ve Mon Jan 24 2022 Bag used
Available blood bags
Search Blood Bags
Collector Bank's (Name and Address) Current Owner's Name and Address Blood Group City Expiry Action


Activities
Firefox Web Browser
Nov 10 6:30 PM
Blood Bank Framework
localhost:3000
Welcome to Blockchain Blood Bank
0xB624c39D8c67fDfC68354a6014B93Bd6B986e532
Welcome Mumbai Blood Bank.
Add Bags
Donor address :
Donor's public address
Donor name :
Donor's name
Donor number :
Phone number (10 digit)
Blood group :
Blood group
Expiry :
Number of days till expiry
City :
Name of city
Add Blood Bag
Donor Owner Blood Group Expiration Date Expiry Status Usage Status City
3 Address: Chinmay Dharap 0x39B561F50A9AefE43aB95DAD4d6e57175171359f Mumbai Hospital 0x0c7eD5d8400d8Ec302Ce4cEf1Bca3baA8C0059E3 A+ve Mon Jan 24 2022 17:29:38 false true Mumbai
2 Address: Tejas Jadhav 0xb9b43B9fDD9278f7671C019977f6917701FB50F6 Mumbai Hospital 0x0c7eD5d8400d8Ec302Ce4cEf1Bca3baA8C0059E3 B -ve Sun Jan 23 2022 10:30:48 false true Mumbai
1 Address: Prajwal Sonar 0x0838E350cD267b460FB36C97FE7C7344AB0F25b9 Mumbai Hospital 0x0c7eD5d8400d8Ec302Ce4cEf1Bca3baA8C0059E3 A+ve Thu Dec 23 2021 20:45:12 false true Mumbai


Activities
Firefox Web Browser
Nov 10 6:31 PM
Blood Bank Framework
localhost:3000
Welcome to Blockchain Blood Bank
0x0838E350cD267b460FB36C97FE7C7344AB0F25b9
Welcome Prajwal Sonar.
Clear notifications ?
Your BloodBags
Bag ID :- 1
click to view details
Collector Bank Owner Blood Group Expiry Status Usage Status
1 0xB624c39D8c67fDfC6B354a6014B93Bd6B986e532 0x0c7eD5d8400d8Ec302Ce4cEf1Bca3baA8C0059E3 A+ve false true


Activities
Firefox Web Browser
Nov 10 6:32 PM
Blood Bank Framework
localhost
Welcome to Blockchain Blood Bank
0x39B561F50A9AefE43aB95DAD4d6e57175171359f
Welcome Chinmay Dharap.
Clear notifications ?
Your BloodBags
Bag ID :- 3
click to view details
Collector Bank Owner Blood Group Expiry Status Usage Status
3 0xB624c39D8c67fDfC6B354a6014B93Bd6B986e532 0x0c7eD5d8400d8Ec302Ce4cEf1Bca3baA8C0059E3 A+ve false true

7.Literature Review

- In today’s era of a globalized supply chain of goods and services, the supply chain has now involved various actors and entities from different parts of the globe who have never seen each other and may not trust the genuineness of either one or multiple parties/actors. With such complex issues in hand, the main concerns are the lack of transparency and traceability[1].
- This is where Blockchain technologies can help us create more efficient and effective supply chains with the above concerns minimized or even completely diminished in some cases. Blockchain Technology has been accepted and adopted in past years throughout the technological globe. A blockchain is a form of database storage that is non-centralized, reliable, and difficult to use for fraudulent purposes[2].
- Ethereum is explained as a Next-Generation Smart Contract and Decentralized Application Platform that was created by a cryptocurrency researcher and programmer named Vitalik Buterin [3]. It uses a Blockchain-based distributed computing platform with a Turing complete scripting language that enables the processing of smart-contracts on blockchain. It is also now used in healthcare industry to protect patient privacy, procure untampered history.

8. References

1. S. Zhu, H. Hu, Y. Li and W. Li, "Hybrid Blockchain Design for Privacy Preserving Crowdsourcing Platform," 2019 IEEE International Conference on Blockchain (Blockchain), 2019, pp. 26-33, doi: 10.1109/Blockchain.2019.00013.

2 Z. Zheng, S. Xie, H. Dai, X. Chen and H. Wang, "An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends," 2017 IEEE International Congress on Big Data (BigData Congress), 2017, pp. 557-564, doi: 10.1109/BigDataCongress.2017.85.

3. P. Tasatanattakool and C. Techapanupreeda, "Blockchain: Challenges and applications," 2018 International Conference on Information Networking (ICOIN), 2018, pp. 473-475, doi: 10.1109/ICOIN.2018.834316 S. Zhu, H. Hu, Y. Li and W. Li, “Hybrid Blockchain Design for Privacy Preserving Crowdsourcing Platform,” 2019 IEEE International Conference on Blockchain (Blockchain), 2019, pp. 26-33, doi: 10.1109/Blockchain.2019.00013.

5. Z. Zheng, S. Xie, H. Dai, X. Chen and H. Wang, “An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends,” 2017 IEEE International Congress on Big Data (BigData Congress), 2017, pp. 557-564, doi: 10.1109/BigDataCongress.2017.85.

6. P. Tasatanattakool and C. Techapanupreeda, “Blockchain: Challenges and applications,” 2018 International Conference on Information Networking (ICOIN), 2018, pp. 473-475, doi: 10.1109/ICOIN.2018.8343163

Thank You...!!