

MASTER'S THESIS PROJECT



DIGITAL PROCESSING OF COMPLAINTS USING BLOCKCHAIN TECHNOLOGY

UNDER THE SUPERVISION OF

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PRESENTED BY :

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Problem Statement

Presently Indian Army personnel have the provision to file complaints against the grievances. These complaints are filed by an individual manually and then forwarded to the concerned officer by post for their comments/ observations. These complaints from individual person to various Headquarters of Indian Army till Army Headquarters is a manual form leading to considerable time in processing of complaints and also a wastage of time. At the same time, the concerned person does not know the status of the complaint while it is being processed through various Headquarters. There is a need to process these complaints digitally in a secure manner.

Purpose

Our Aim is to develop a Digital Processing Complaint System that utilizes blockchain technology to securely and transparently handle complaints lodged. The system aims to provide an efficient and accountable platform for citizens to report incidents, and for law enforcement personnel to verify, investigate, and resolve complaints. By using blockchain technology, the system will ensure the integrity of complaint data, enhance trust in the complaint resolution process, and provide a tamper-proof audit trail for regulatory oversight.

Literature Survey

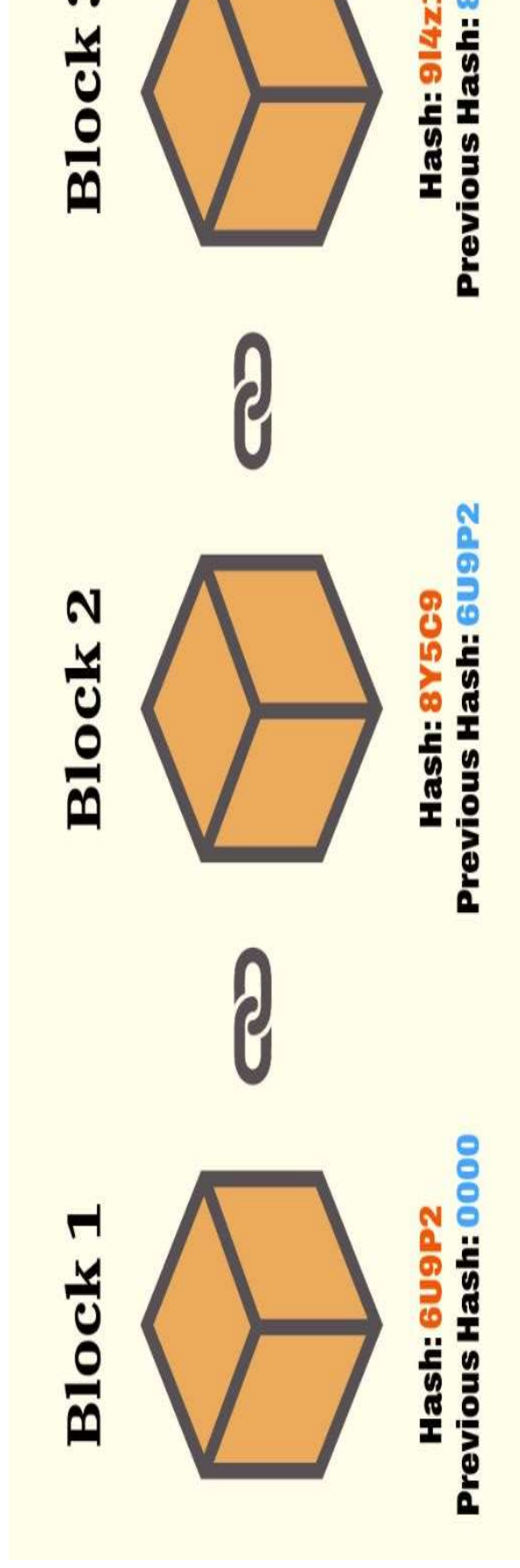
Proposed an online police complaint management system using centralized database for managing FIR and NCR . The FIR filed by the police will be not be encrypted, and stored in the Interplanetary file system(IPFS).

Gaps in this paper:

1. Data can be tampered very easily.
2. Single point of Failure.
3. Limited Availability and Reliability of data.
4. Complexity in Data Migration and Backup.

What is Blockchain Technology

- Blockchain is a decentralized ledger technology that contains records transactions across in a secure and tamper-proof manner.
- Each block in the blockchain contains a hash of the previous block, ensuring the immutability of the data.
- Link for the Blockchain Demo - <https://andersbrownworth.com/blockchain/block>



Why we use Blockchain?

- **Once something is stored on the blockchain, it can't be deleted or changed.**
- We need a completely decentralized system to assuring that there is no central point of failure in the system and complaints are managed securely and protected from unauthorized access. **The blockchain used the proof of work concept.**
- The use of blockchain in the Complaint Management System provides transparent data integrity, and a verifiable audit trail, enhancing the credibility and accountability of the complaint resolution process.

Specific Requirements

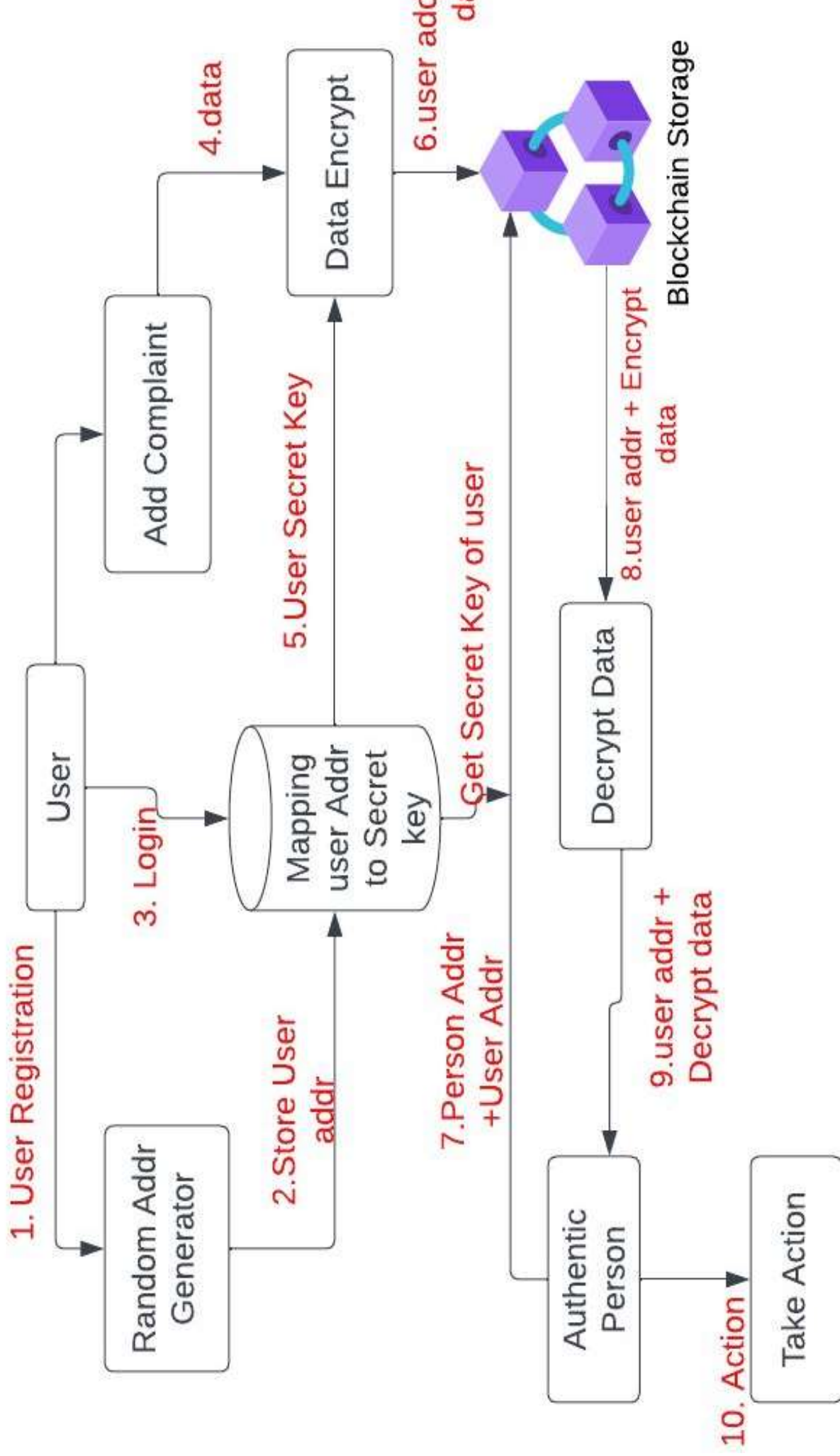
Functional Requirements

- User Registration
- Complaint Verification
- Complaint Submission
- Complaint Tracking

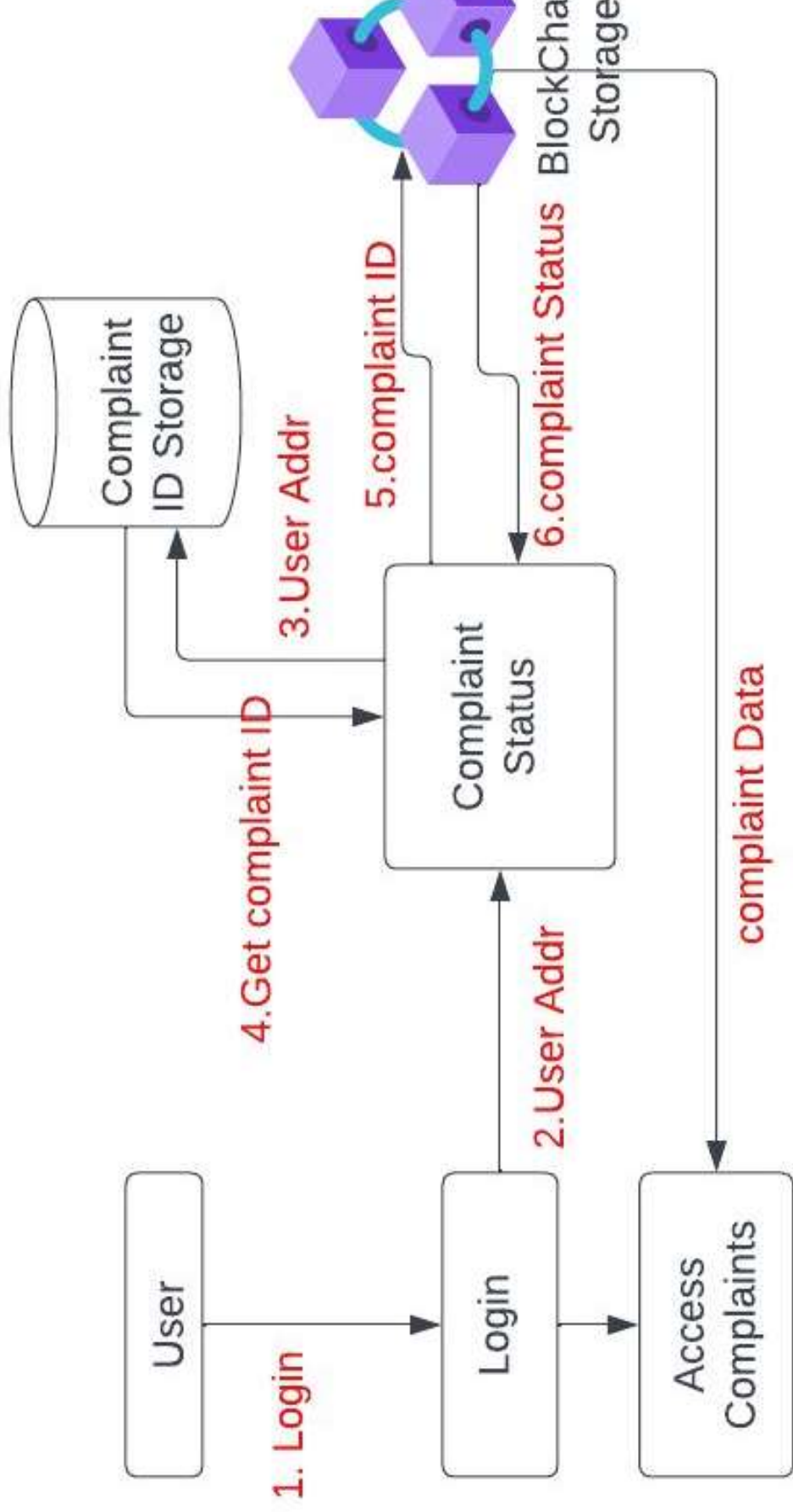
Non-Functional Requirements

- Security
- Performance
- Scalability
- Reliability

How it Works (Overview) ?



Complaint Track Workflow



Technologies and Tools to be Used

- **Blockchain Platform:** The blockchain platform that we will be using is **Ethereum platform**.
- **Smart Contract Development:** Smart contracts are the backbone of our blockchain website's functionality. **Use Solidity language to implement functionality.**
- **Blockchain Integration:** Use web3.js (for Ethereum) to connect your front-end blockchain network and interact with smart contracts.
- And other tools using which is - Truffle, Ganache, Infura.
- **Why used Truffle?** (build decentralized application (Dapps) on the Ethereum Blockchain other compatible blockchain)
- **Why used Ganache ?** (It is a local blockchain simulator(means we can run a local blockchain network on our system).
- **Why used Infura?** (node which can connect Ethereum blockchain & deploy contracts easily)

Technologies and Tools to be Used (Contd.)

- **Web Development Tools:** For the front-end of website, we will need HTML, CSS, and JavaScript. Libraries like React, Angular help to build interactive and dynamic interfaces.
- **Backend Technologies:** We will be using a server-side scripting language like Node.js to handle interactions between your front-end, smart contracts and database.

PROGRESS ON PROJECT

- Studied about blockchain and how it works, blockchain mining, Bitcoin algorithm, consensus protocol, cryptocurrency.
- Studied about Ethereum which was developed by Vitalik Buterin 19 which is an open source blockchain based platform
- Studied about Ethereum account, smart contract, Ethereum gas, Ether price, gas limit, proof of stakes and proof of work.
- We are going to develop project on using Ethereum Platform.

PROGRESS ON PROJECT

- We studied about solidity Language.
- Went through on how remix ide run using Ethereum.org and Metamask platform (which cryptocurrency wallet used to interact with the Ethereum blockchain) works.
- Created some project using solidity language and remix ide platform (Example: Lottery)
- Studied about Testnet Faucets where we can send fake ether from different platform on network which could be Rinkeby, Ropsten, etc.
- Studied about React JS and Javascript .

PROGRESS ON PROJECT

- Studied about web3.js.
- Created an project named Todo list using react js.
- Learnt about Node.js, Truffle, Ganache, Infura.
- **Why used Truffle?** (to make big project truffle is required)
- **Why used Ganache ?** (It is a local blockchain simulator(means we can run a local blockchain system).
- **Why used Infura?** (node through which we can connect Ethereum blockchain & deploy easily)
- Studied about the working principal Truffle, real website and Ganache

Project based on Solidity: Lottery System

Remix - Ethereum IDE

+

remix.ethereum.org/#lang=en&optimize=false&runs=200&evmVersion=soljson-v0.8.18+commit.87f61d96.js

DEPLOY & RUN TRANSACTIONS

ENVIRONMENT

Remix VM (Shanghai)

ACCOUNT

Ox787...cabaB (98.99999999 ether)

Ox5B3...eddC4 (99.99999999999948253 ether)

OxA68...35cb2 (98.99999999999934547 ether)

Ox4B2...C02db (98.99999999999951647 ether)

Ox787...cabaB (98.99999999999951647 ether)

Ox617...5E7f2 (100 ether)

Ox17F...8c372 (100 ether)

Ox5c6...21678 (100 ether)

Ox03C...D1Ff7 (100 ether)

Ox1aE...E454C (100 ether)

Ox0A0...C70DC (100 ether)

OxCA3...a733c (100 ether)

Ox147...C160C (100 ether)

Ox4B0...4D2dB (100 ether)

Ox583...40225 (100 ether)

OxD8...92148 (100 ether)

At Address

Load contract from Address

contract Lottery{

address public manager;

address payable[] public players;

constructor(){

manager = msg.sender;

}

receive() external payable {

require(msg.value == 1 ether);

players.push(payable(msg.sender));

}

function getBalance() public view returns(uint){

require(msg.sender == manager, 'You are not the manager');

return address(this).balance;

}

function random() public view returns(uint){

return uint(keccak256(abi.encodePacked(block.difficulty, block.timestamp, players.length)));

}

function pickWinner() public{

require(msg.sender == manager);

require (players.length >= 3);

}

Transactions recorded

Deployed Contracts

LOTTERY AT 0xD91...39138 (MEI)

Balance: 3 ETH

pickWinner

getBalance

Transact to Lottery. (receive) pending ...

[vm] from: 0x482...c02db to: Lottery. (receive) 0xd91...39138 value: 1000000000000000000 wei data: 0x hash: 0x282...3ebbb2

transact to Lottery. (receive) pending ...

[vm] from: 0x787...cabaB to: Lottery. (receive) 0xd91...39138 value: 1000000000000000000 wei data: 0x hash: 0xcd4...cc34a

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DEPLOY & RUN TRANSACTIONS

CONTRACT

Lottery - lotterySystem.sol

evm version: paris

Deploy

☐ Publish to IPFS

At Address

Load contract from Address

Transactions recorded 5

Deployed Contracts

LOTTERY AT 0XD91...39138 (MEI)

Balance: 0 ETH

pickWinner

getBalance

0: uint256: 0

manager

0: address: 0x58380a6a701c568545dcfc083fc8875f56beddc4

players

uint256

random

Low level interactions

CALLDATA

Transact

lotterySystem.sol

Home

contract Lottery{

address public manager;

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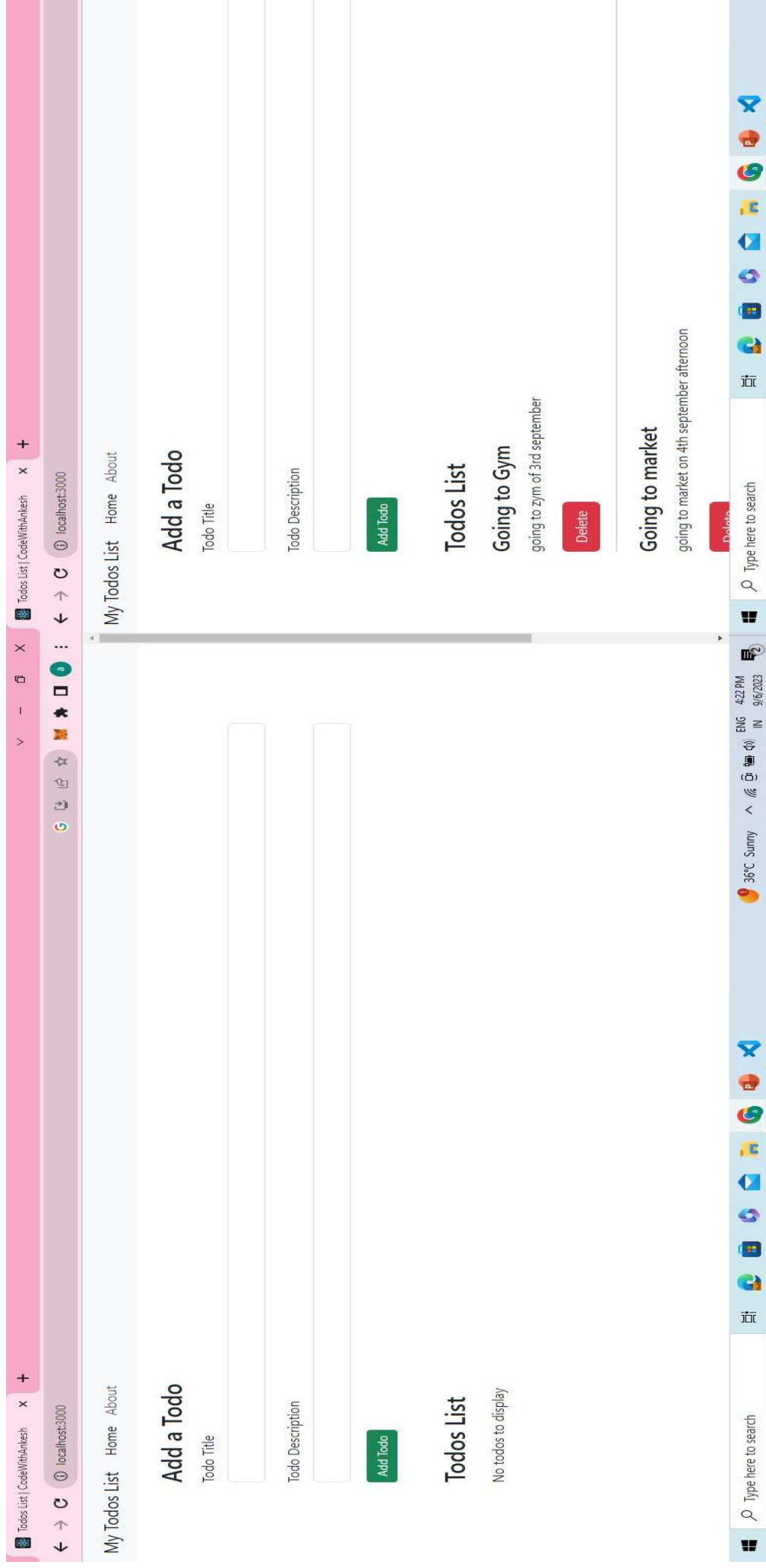
transact to Lottery.pickWinner pending ...

[vm] from: 0x583...eddC4 to: Lottery.pickWinner() 0xd91...39138 value: 0 wei data: 0x5d4...95aaa logs: 0 hash: 0xd979...

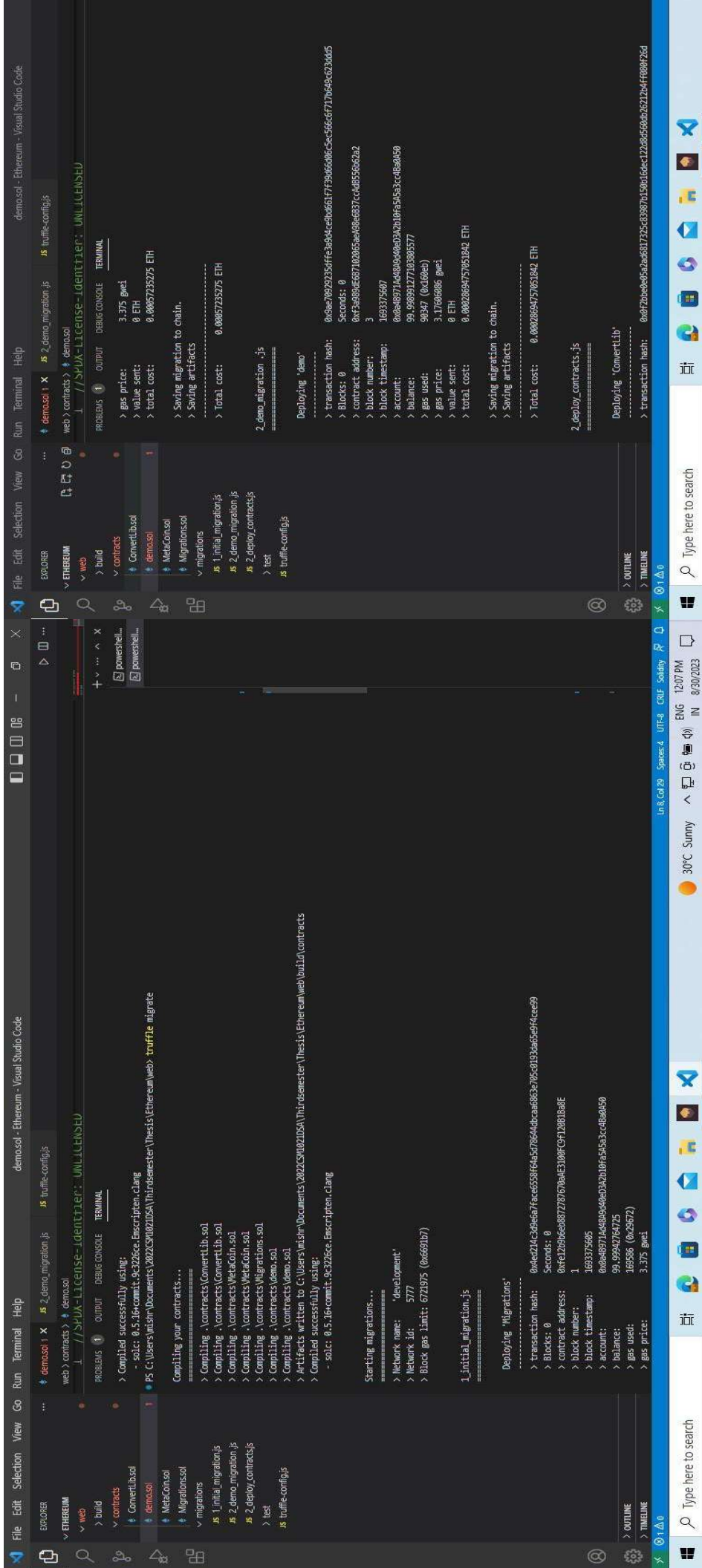
call to Lottery.getBalance

[call] from: 0x58380a6a701c568545dcfc083fc8875f56beddc4 to: Lottery.getBalance() data: 0x120...65fe0

Project Based on React.js : Todo - List



WORKING PROJECT EXAMPLE OF TRUFFLE WEB3.JS AND GANACHE



WORKING MECHANISM OF TRUFFLE AND GAN

[illegible]



ACCOUNTS



BLOCKS



TRANSACTIONS



CONTRACTS



EVENTS



LOGS

SEARCH FOR BLOCK NUMBER

CURRENT BLOCK

7

GAS PRICE

200000000000

GAS LIMIT

6721975

HARDFORK

MERGE

NETWORK ID

5777

RPC SERVER

HTTP://127.0.0.1:7545

MINING STATUS

AUTOMINING

WORKSPACE

QUICKSTART



BACK

BLOCK 3

GAS USED

90347

GAS LIMIT

6721975

MINED ON

2023-08-30 11:51:47

BLOCK HASH

0x9ef5d08beb85be9ef8e5b21cfd1b7f41d2f7ae9993a

TX HASH

0x9ae70929235df3a9d4ce9bd661f7f39d66d06c5ec566c6f717b649c623ddd5

FROM ADDRESS

0x0a4B971Ad48A9d40eD3A2b10fa5A5a3cc4Ba0A50

CREATED CONTRACT ADDRESS

0xf3a989dE687102065aeA98e6837ccAdB556b62a2

GAS USED

90347



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REFERENCE

<https://andersbrownworth.com/blockchain/>

Hingorani, I., Khara, R., Pomendkar, D., & Raul, N. (2021). Police Complaint Management System. Department Of Computer Engineering, Sardar Patel Institute of Technology, Mumbai, India.

THANKYOU