Electronic Voting System

A Project report submitted in partial fulfillment of 7th semester indegree of

BACHELOR OF ENGINEERING IN COMPUTER SCIENCE AND ENGINEERING

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Submitted by

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1.INTRODUCTION

1.1 Project Overview:

Electronic Voting System

Online voting is a trend that is gaining momentum in modern society. It has great potential to decrease organizational costs and increase voter turnout. It eliminates the need to print ballot papers or open polling stations—voters can vote from wherever there is an Internet connection. Despite these benefits, online voting solutions are viewed with a great deal of caution because they introduce new threats. Online voting is a trend that is gaining momentum in modern society. It has great potential to decrease organizational costs and increase voter turnout. It eliminates the need to print ballot papers or open polling stations—voters can vote from wherever there is an Internet connection. Despite these benefits, online voting solutions are viewed with a great deal of caution because they introduce new threats. Online voting is a trend that is gaining momentum in modern society. It has great potential to decrease organizational costs and increase voter turnout. It eliminates the need to print ballot papers or open polling stations—voters can vote from wherever there is an Internet connection. Despite these benefits, online voting solutions are viewed with a great deal of caution because they introduce new threats. This technology is a beautiful replacement for traditional electronic voting solutions with distributed, non-repudiation, and security protection characteristics. The following article gives an overview of electronic voting systems based on blockchain technology. The main goal of this analysis was to examine the current status of blockchain-based voting research and online voting systems and any related difficulties to predict future developments. This study provides a conceptual description of the intended blockchain-based electronic voting application and an introduction to the fundamental structure and characteristics of the blockchain in connection to electronic voting. As a consequence of this study, it was discovered that blockchain systems may help solve some of the issues that now plague election systems. On the other hand, the most often mentioned issues in blockchain applications are privacy protection and transaction speed. For a sustainable blockchain-based electronic voting system, the security of remote participation must be viable, and for scalability, transaction speed must be addressed. Due to these concerns, it was determined that the existing frameworks need to be improved to be utilized in voting systems.

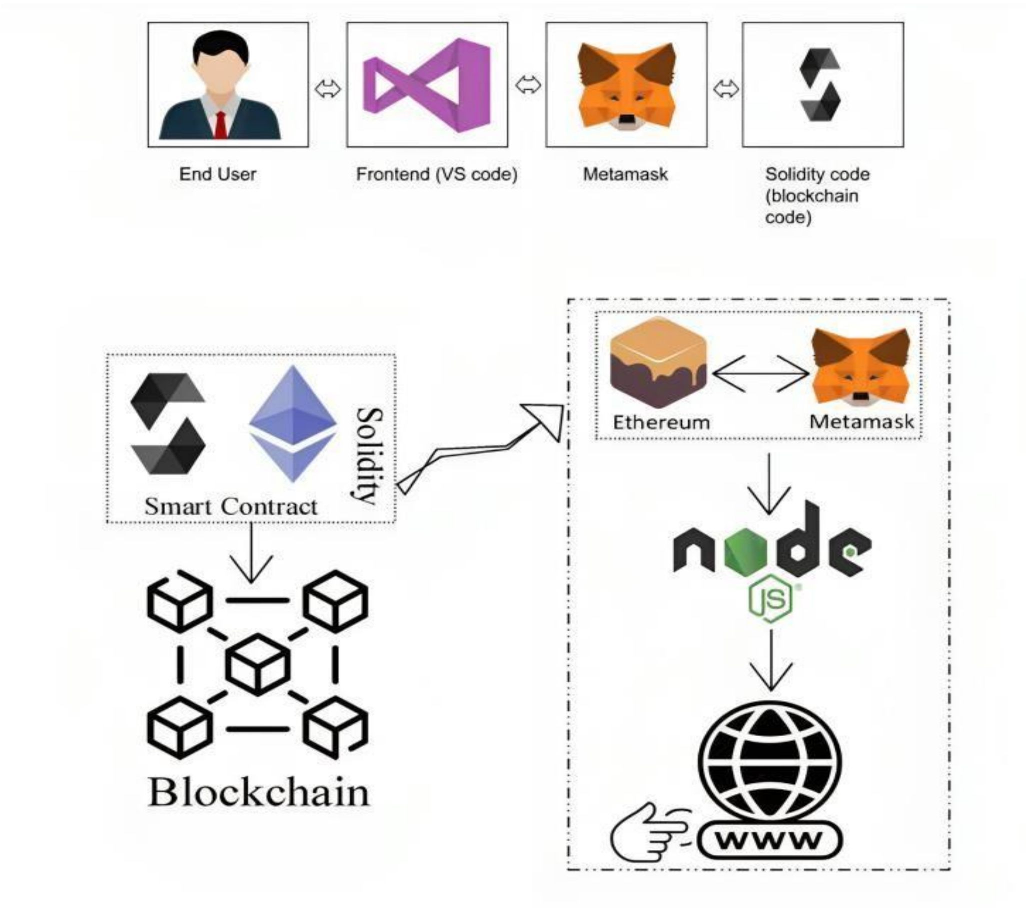


Fig:Solution Architecture Diagram

1.2 Purpose:

The A blockchain-based electronic voting system can offer several advantages and purposes when compared to traditional paper-based or electronic voting systems. Here are some of the key purposes and benefits:

1. **Transparency and Trust:**

Blockchain's inherent transparency ensures that all transactions and votes are recorded and publicly accessible. This transparency helps build trust in the voting process, as anyone can independently verify the results.

2. **Security:**

Blockchain's cryptographic features make it extremely difficult for malicious actors to tamper with or manipulate votes. This enhances the security of the voting system, reducing the risk of fraud and hacking.

3. **Immutability:**

Once a vote is recorded on the blockchain, it becomes nearly impossible to alter or delete. This immutability ensures the integrity of the voting process and prevents data manipulation.

4. **Decentralization:**

Blockchain technology can be designed to operate in a decentralized manner, meaning that no single entity has complete control over the voting process. This reduces the risk of centralized manipulation or interference.

5. **Accessibility:**

Electronic voting systems based on blockchain can potentially increase accessibility for voters, allowing them to cast their votes remotely from the convenience of their own devices. This can be especially beneficial for people with mobility issues or those living far from polling stations.

6. **Reduced Costs:**

Implementing blockchain-based voting systems can potentially reduce the costs associated with traditional voting methods, such as printing and distributing paper ballots, as well as labor costs for manual counting and verification.

7. **Efficiency:**

Blockchain-based systems can streamline the voting process by automating tasks such as vote counting, verification, and result reporting. This can lead to faster and more accurate election outcomes.

8. **Auditability:**

Blockchain's audit trail allows for easy verification of the entire voting process, from the moment a voter casts their ballot to the final tally. This transparency can aid in auditing and resolving disputes or concerns about the election.

9. **Verifiable Identity:**

Some blockchain voting systems can incorporate identity verification mechanisms, ensuring that only eligible voters can participate. This can reduce the risk of voter impersonation and fraud.

10. **Redundancy and Resilience:**

Data redundancy across multiple nodes in a blockchain network provides resilience against system failures and cyberattacks, making the voting system more robust and dependable.

11. **International Elections:**

Blockchain-based voting systems can facilitate secure and transparent voting in international elections or for geographically dispersed populations.

However, it's important to note that while blockchain-based electronic voting systems offer many benefits, they also come with their own set of challenges and considerations, such as addressing privacy concerns, ensuring inclusivity, and mitigating the risk of vote coercion or buying.

2.LITERATURE SURVEY

2.1 Existing problem

Voter Authentication and Identity Verification:

Ensuring that each voter is who they claim to be in an online environment is a significant challenge. If someone's credentials are stolen or their identity is compromised, it can lead to fraudulent voting.

Voter Privacy:

While blockchain transactions are secure, they are also transparent and permanent. Protecting voter privacy while maintaining a public ledger is a delicate balance. It's challenging to design a system that prevents vote-buying, coercion, or the exposure of an individual's vote.

Usability:

Some blockchain-based voting systems may be complex and difficult for the average voter to understand and use. This could result in a reduced turnout, particularly among older or less tech-savvy voters.

Scalability:

Processing a large number of votes on a blockchain can be a slow and resource-intensive process. Ensuring that a voting system can handle a high volume of transactions is essential for large-scale elections.

Vulnerabilities in the Software:

The software used to build and run the blockchain-based voting system can have vulnerabilities. If hackers find and exploit these vulnerabilities, it could compromise the integrity of the election.

End-User Security:

The security of individual devices used for voting (smartphones, tablets, or computers) can be compromised. Malware or other malicious software could potentially tamper with votes.

Regulatory and Legal Challenges:

Many countries have strict regulations around voting processes. Adapting to these regulations while maintaining the advantages of blockchain can be complex.

Cost and Infrastructure:

Implementing a secure and reliable blockchain-based voting system can be expensive, and it requires significant infrastructure. Smaller or less wealthy regions might struggle to implement such a system effectively.

Accessibility:

While blockchain-based systems can increase accessibility for some, they may also exclude individuals without access to the necessary technology, internet access, or those with disabilities.

Immutable Mistakes:

Once a vote is recorded on a blockchain, it's difficult to change. If a mistake is made, it's not as simple as correcting it in a traditional paper-based system. This can be problematic if errors are discovered after the fact.

Smart Contract Issues:

Some blockchain voting systems use smart contracts to execute and record votes. These smart contracts need to be free of bugs or vulnerabilities that could lead to unexpected behavior.

Resistance to Change:

Traditional voting systems have been in place for a long time, and there can be resistance to adopting new technologies, especially in political or governmental contexts.

Solving these problems and successfully implementing a secure and effective blockchain-based electronic voting system requires careful planning, robust security measures, and thorough testing. Additionally, regulatory and legal frameworks must be adapted to accommodate these new technologies while protecting the integrity of the democratic process.

2.2 Reference

"Blockchain Technology in the Public Sector: A study of applications across various domains," World Economic Forum - This report explores the potential of blockchain technology in various public sector applications, including electronic voting systems.

"Blockchain Voting: Solving the Problems of Democracy," by Alan Myrvold - This academic paper delves into the concept of blockchain-based voting and discusses the potential benefits and challenges.

"Building a Better Election with Blockchain," by Brookings Institution - This article discusses the potential of blockchain to improve the security and transparency of elections.

"Voatz: A Security Analysis of the Blockchain-Based Mobile Voting Application," by Michael A. Specter and James Koppel - This paper provides a security analysis of the Voatz mobile voting application, which was one of the notable attempts at implementing blockchain-based voting.

"How Blockchain Voting Works: An Overview," by Coindesk - This article provides

a simple overview of the concept of blockchain-based voting and its potential advantages.

"Estonia: The Digital Republic," a documentary by BBC - Estonia is known for its innovative e-governance solutions, including blockchain-based e-residency and voting systems. This documentary provides insight into their approach.

"Democracy Earth: Sovereign Digital Identity and Liquid Democracy," by Democracy Earth Foundation - This organization focuses on blockchain-based digital identity and liquid democracy systems.

"Blockchain Voting and Democracy," by the Center for Civic Media - This research publication discusses the potential of blockchain in the context of improving democracy.

"Building a Secure Voting System," by Dan Boneh, et al. - A paper discussing the challenges and potential solutions for building secure electronic voting systems, which could include blockchain technology.

"Blockchain Voting: Can It Prevent Election Fraud?" by The Balance - This article provides a high-level overview of the potential role of blockchain in enhancing election security.

2.3 Problem Statement Definition

"In the context of modern electoral processes, the existing traditional voting systems face significant challenges, including issues related to transparency, security, and accessibility. There is a critical need for a blockchain-based electronic voting system that can address these challenges effectively. This system should ensure the integrity of the voting process, protect voter privacy, and provide a verifiable, auditable, and accessible platform for citizens to cast their votes remotely.

Key problems and requirements for such a system include:

Identity Verification and Authentication:
Establishing a secure and user-friendly method to verify and authenticate voters' identities in an online environment to prevent fraud and impersonation.

Voter Privacy:
Ensuring the confidentiality and anonymity of each vote while leveraging the transparency of blockchain technology to prevent vote-buying and coercion.

Security and Resilience:

Developing a system that is resilient to cyberattacks, tampering, and unauthorized access, protecting the integrity of the election.

Scalability:

Designing a solution that can handle a high volume of transactions, ensuring the system's effectiveness for large-scale elections with millions of voters.

Accessibility:

Creating a system that is accessible to a wide range of voters, including those with limited access to technology or those with disabilities.

Regulatory Compliance:

Adhering to legal and regulatory frameworks while accommodating the innovative aspects of blockchain technology, and ensuring that the system can be integrated into existing electoral processes.

Auditability and Transparency:

Providing a mechanism for voters to independently verify that their votes were counted correctly and allowing for audits by election authorities.

Usability:

Ensuring the system is user-friendly, intuitive, and can be easily adopted by a diverse range of voters, regardless of their technical expertise.

Cost-Effectiveness:

Developing a solution that is cost-effective for governments and electoral bodies, considering the infrastructure required for implementation.

Immutable Error Handling:

Addressing the challenge of handling errors and discrepancies in a system where votes are recorded on a blockchain, which is designed to be immutable.

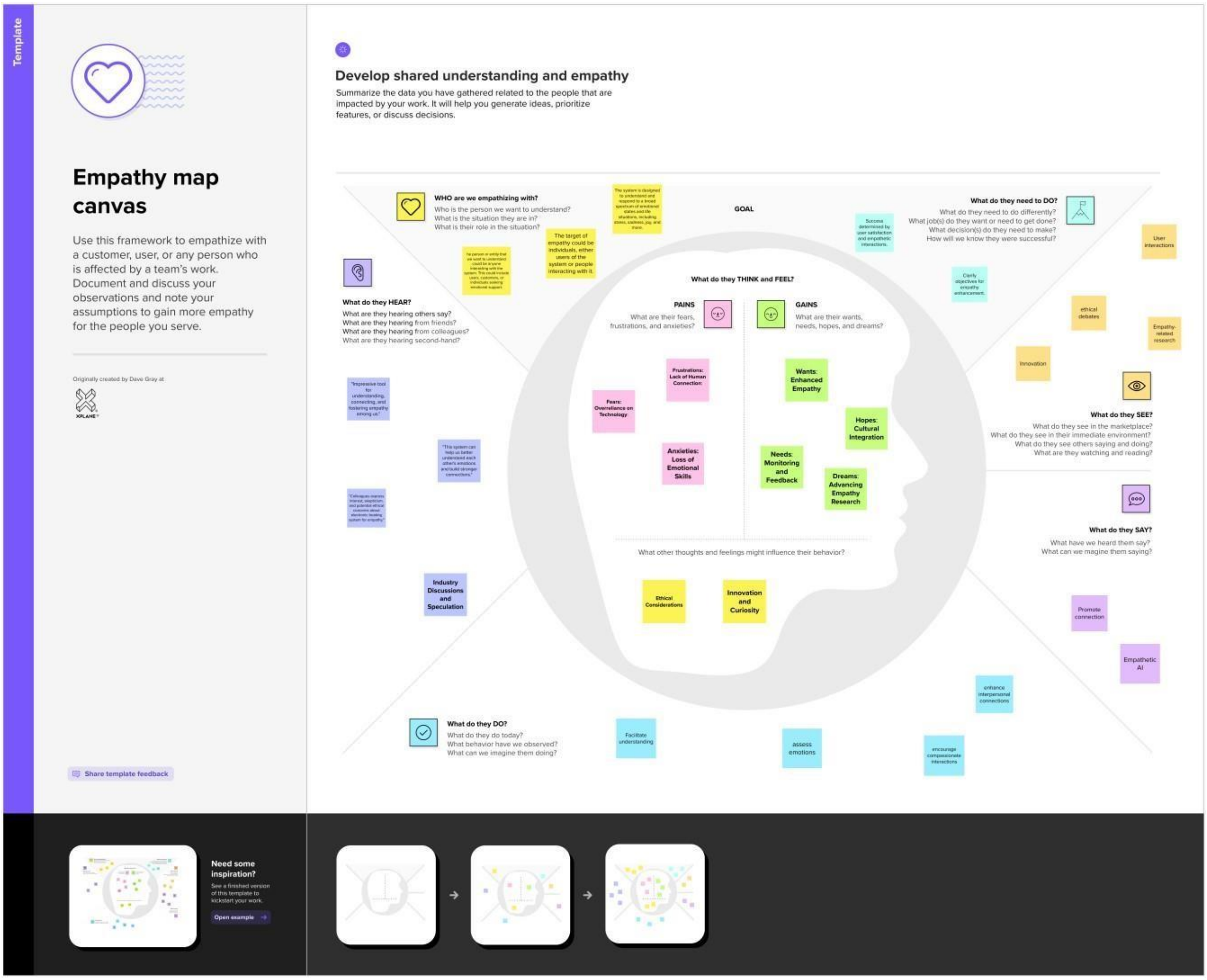
3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user’s behaviors and attitudes.

It is a useful tool to helps teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



3.2 Ideation& Brainstorming:

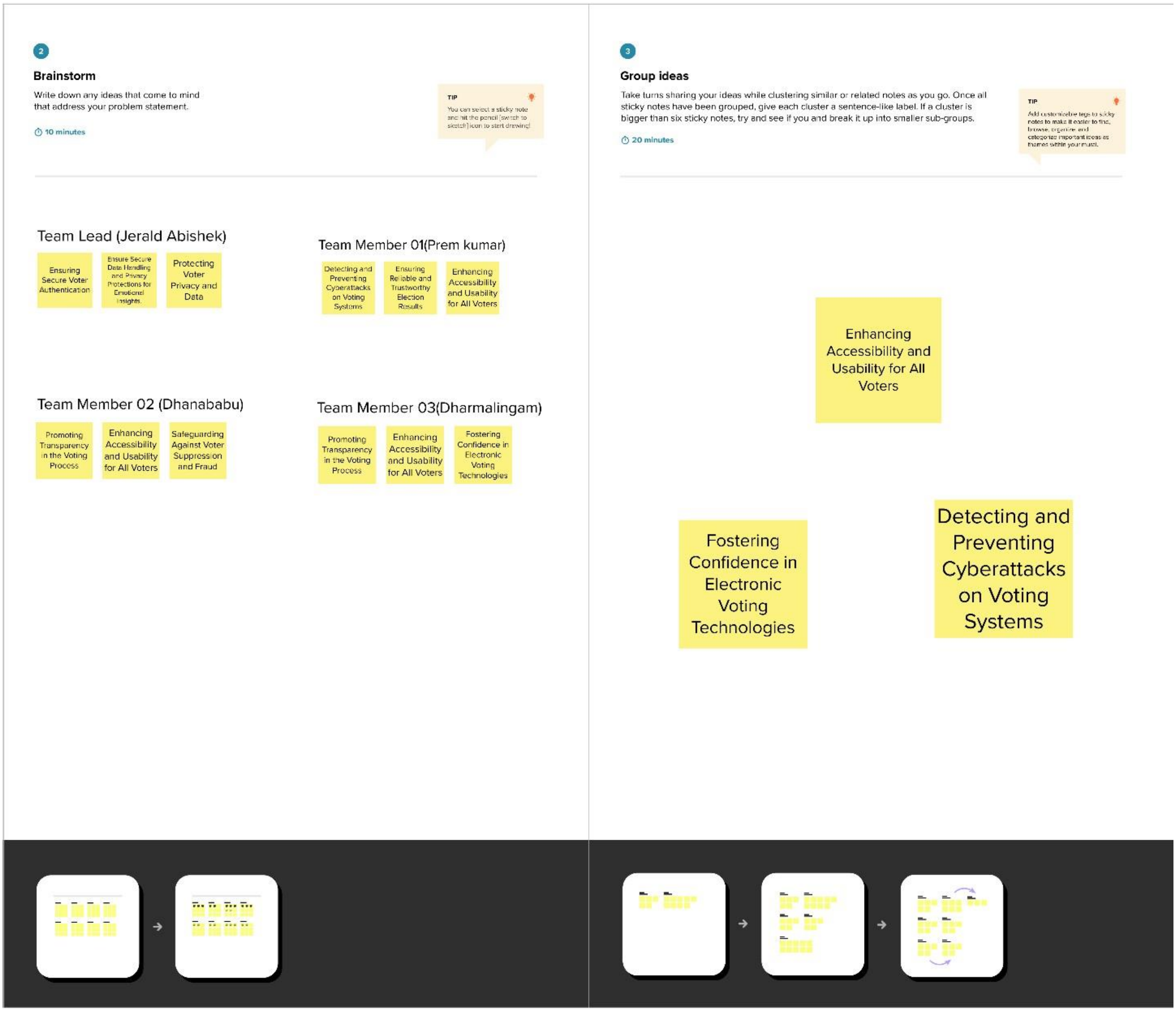
Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

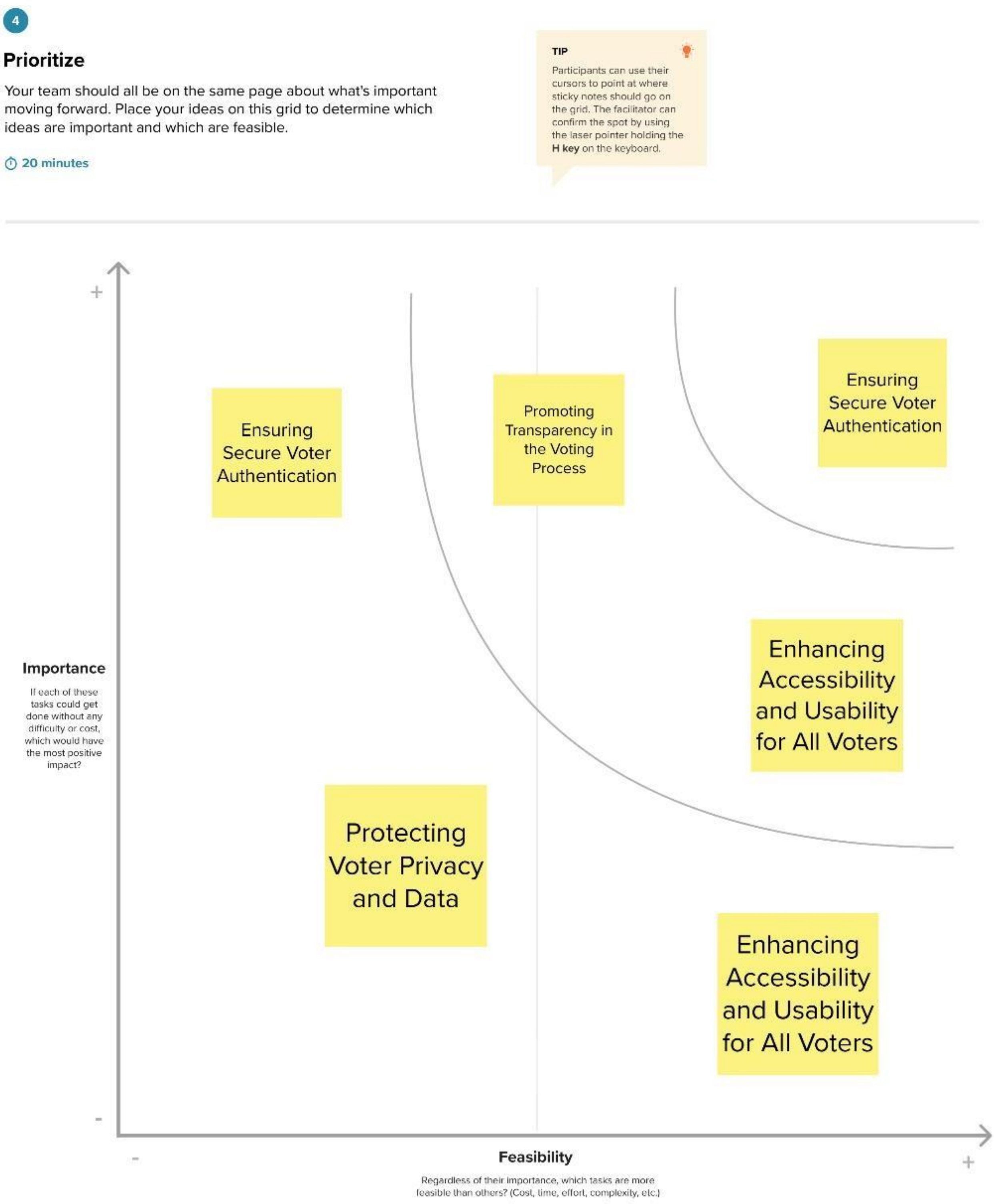
Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Step-1: Team Gathering, Collaboration and Select the Problem Statement

Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization



4 . REQUIREMENT ANALYSYS

4.1 Functional Requirements:

Requirement ID	Requirement Description	Priority	Notes
FR-001	Voter Registration	High	Eligible voters should be able to register securely.
FR-002	Ballot Creation	High	Election administrators create electronic ballots.
FR-003	Secure Voting	High	Voters can securely cast their votes electronically.
FR-004	Voter Verification	High	Verify voter identity before allowing them to vote.
FR-005	Block chain-Based Voting	High	Record all votes as transactions on the blockchain.
FR-006	Transparency and Auditing	High	Allow real-time auditing and verification of results.
FR-007	Decentralization	High	Distribute the voting process across a decentralized network.
FR-008	Smart Contracts	High	Automate aspects of the election process using smart contracts.
FR-009	Accessibility	Medium	Ensure the system is accessible to all eligible voters.
FR-010	Results Publication	High	Provide a platform for publishing election results.
FR-011	Data Protection and Privacy	High	Store voter data securely and in compliance with privacy regulations.
FR-012	Voter Support	Medium	Offer support to voters encountering technical issues.

4.2 Non-functional Requirements:

Following are the non-functional requirements of the proposed solution

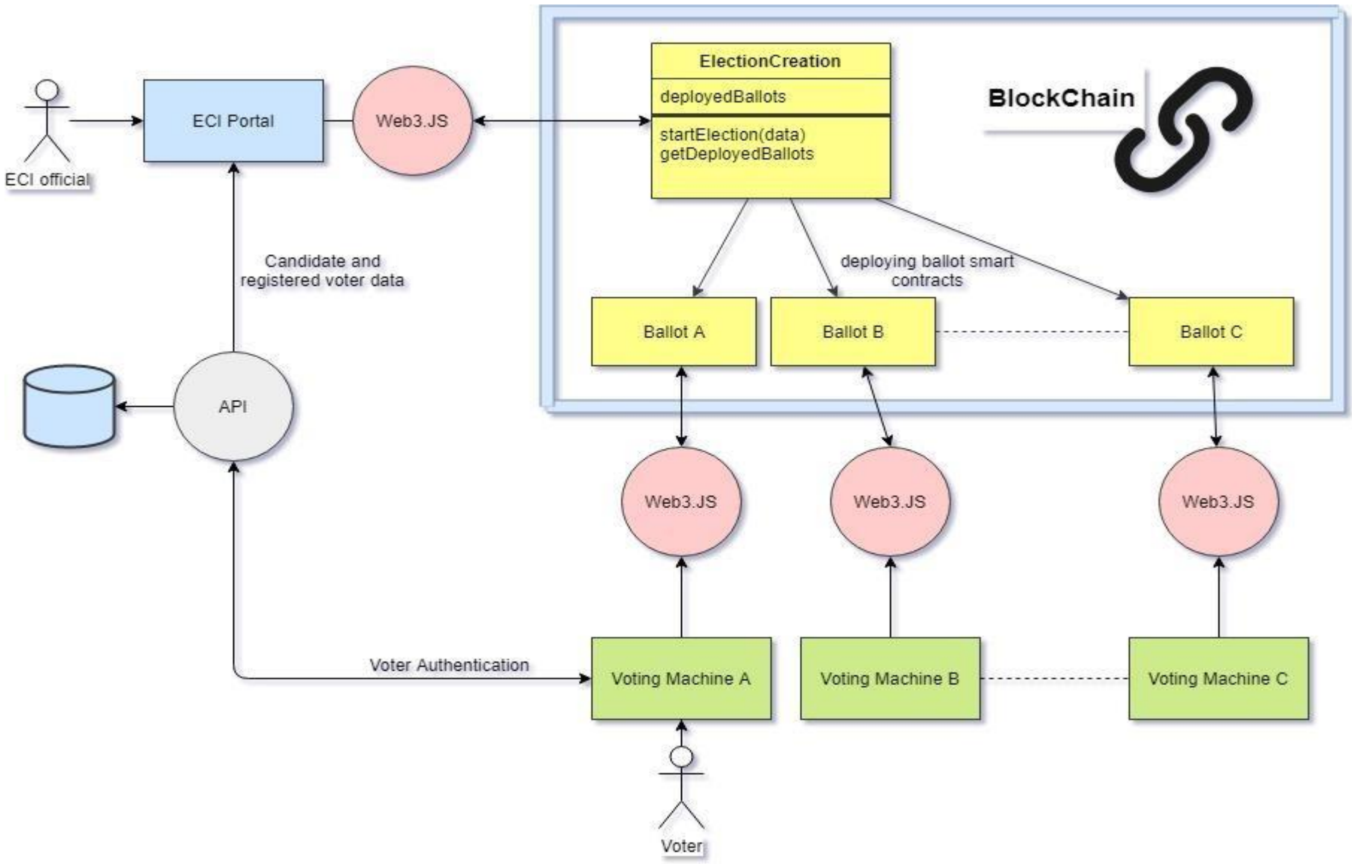
Requirement ID	Requirement Description	Priority	Notes
NFR-001	Performance: Response time	High	The system should respond to user actions within a specified time limit.
NFR-002	Security: Data encryption and protection	High	All voter data and transactions must be encrypted and protected
NFR-003	Scalability: Handling increased load	Medium	The system should be able to handle a growing number of voters
NFR-004	Reliability: System uptime	High	The system should be highly reliable with minimal downtime
NFR-005	Usability: User interface	High	The user interface should be intuitive and user-friendly
NFR-006	Compliance: Legal and regulatory requirements	Medium	The system should comply with all relevant election laws and regulations

5 . PROJECT DESIGN:

5.1 Data Flow Diagram

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows with in a system. A neat and DFD can depict the right amount of the system requirement graphically. It shows data enter and leaves the system, what changes the information, and where data is stored.

Example: DFD Level 0 (Industry Standard)



5.2 Solution Architecture

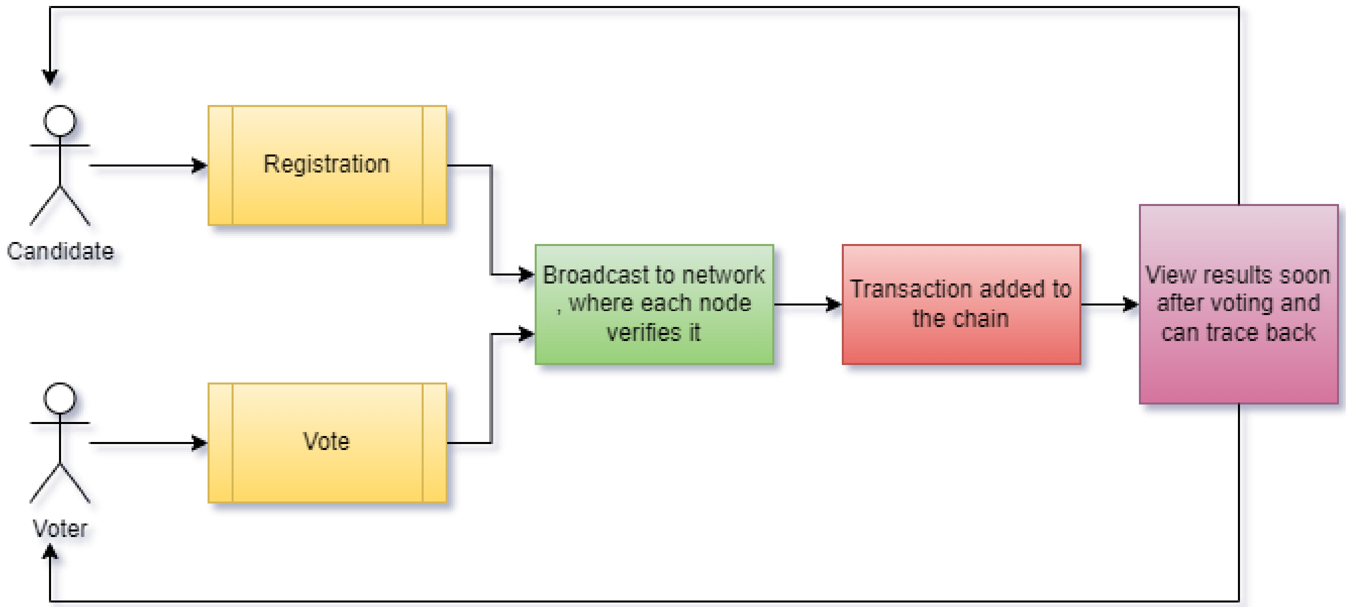
Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problem sand technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.

- Define features, development phases, and solution requirements.

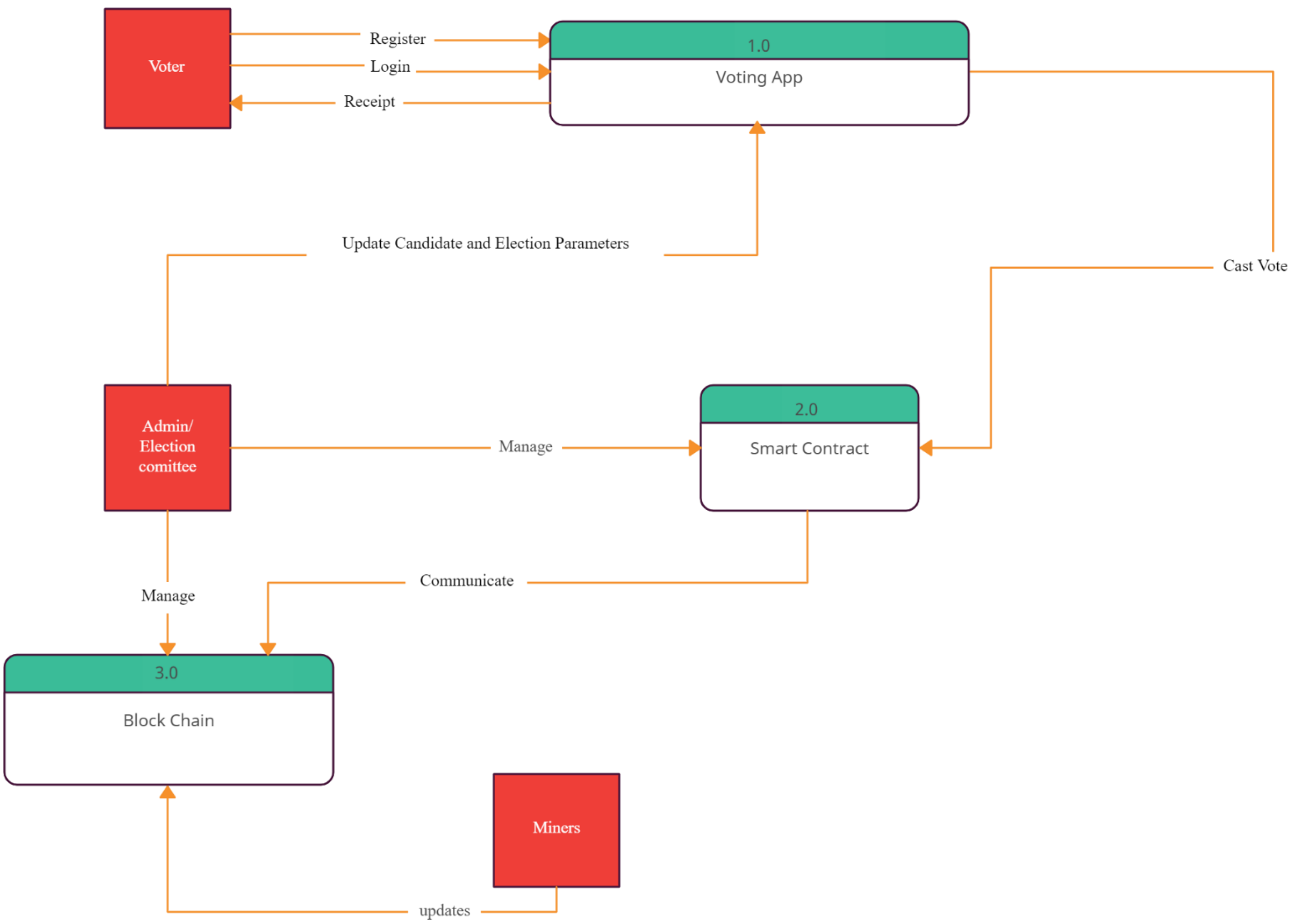
Example: Solution Architecture Diagram:



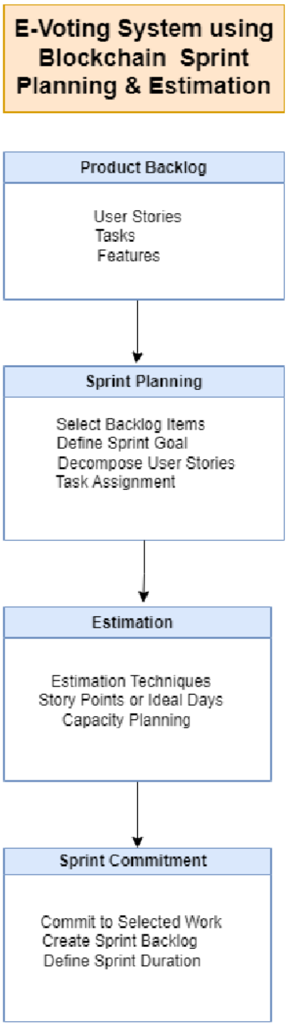
6 . PROJECTPLANNING AND SCHEDULING:

6.1 Technical Architecture:

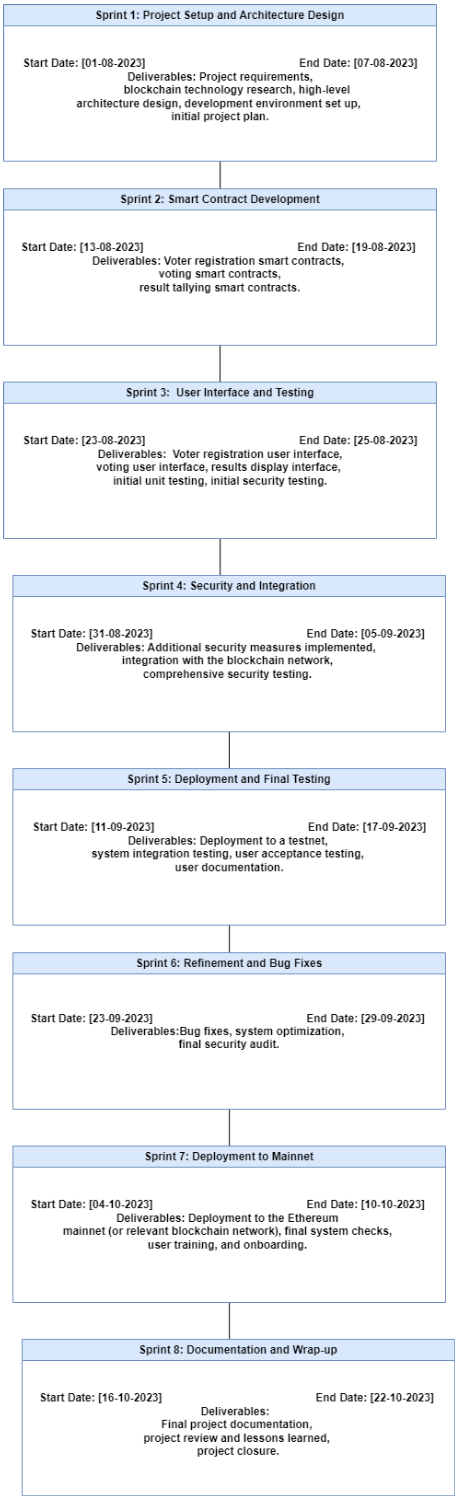
Technical Architecture (TA) is a form of IT architecture that is used to design computer systems. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.



6.2 Sprint Planning & Estimation



6.3 Spring Delivery Schedule



7. CODING & SOLUTIONING:

7.1 Navbar with wallet connect:

Navbar.js

```
import { useState } from "react";
import './style.css';

export const Navbar = () => {
	const [CurrentAccount, setCurrentAccount] = useState("");

	const walletConnect = async () => {
		if (!window.ethereum) {
			return alert("please install metamask");
		}
		const addr = await window.ethereum.request({ method:
"eth_requestAccounts" });
		setCurrentAccount(addr[0]);
	};

	return (
		<header className="bg-white">
			<nav className="">
				<div className="container mx-auto">
					<div className="navbar-div flex flex-col sm:flex-row
justify-between items-center p-3">
						<a href="/" className="brand text-3xl font-
bold">
							Election Commission of India
						</a>
						<ulclassName="text-gray-400 mt-3 sm:mt-0
sm:self-center text-xl border-t sm:border-nonesm:flex sm:space-x-4">
							<li className="sm:inline-block">
								{!CurrentAccount ? (
									<button
onClick={walletConnect} className="p-3 hover:text-white">
										Connect Wallet
									</button>
								) : (
									<p>{CurrentAccount}</p>
```

```
                                        )}
                                    </li>
                                </ul>
                            </div>
                        </div>
                    </nav>
                </header>
        );
};
```

7.2 Voting Process (Registraton , Voting , Result)

Voting.js

```
import React, { useState } from "react";
import { votingContract } from "../utils/constants";
import './style.css';

function Voting() {
        const [CandidateName, setCandidateName] = useState("");
        const [CandidateAge, setCandidateAge] = useState("");
        const [CandidateID, setCandidateID] = useState("");
        const [VoterID, setVoterID] = useState("");
        const [VoterName, setVoterName] = useState("");
        const [VoterAge, setVoterAge] = useState("");
        const [VoterVoteID, setVoterVoteID] = useState("");
        const [PartyID, setPartyID] = useState("");
        const [VoteCount1, setVoteCount1] = useState("");
        const [VoteCount2, setVoteCount2] = useState("");
        const [VoteCount3, setVoteCount3] = useState("");
        const [HighestCount, setHighestCount] = useState("");

        const handleCandidatename = (e) => {
                setCandidateName(e.target.value);
        };

        const handleCandidateAge = (e) => {
                const value = e.target.value.replace(/\D/g, "");
                setCandidateAge(Number(value));
        };

        const handleCandidateID = async (e) => {
                const value = e.target.value.replace(/\D/g, "");
                setCandidateID(Number(value));
```

```
        };

        const handleCandidateRegistration = async (e) => {
                e.preventDefault();
                const enrollCanddidateTx = await
votingContract.enrollCandidate(CandidateID, CandidateName,
CandidateAge);
                await  enrollCanddidateTx.wait();
                console.log(enrollCanddidateTx);
                alert(enrollCanddidateTx.hash);
        };

        const handleVoterID = async (e) => {
                const value = e.target.value.replace(/\D/g, "");
                setVoterID(Number(value));
        };

        const handleVoterName = (e) => {
                setVoterName(e.target.value);
        };

        const handleVoterAge = async (e) => {
                const value = e.target.value.replace(/\D/g, "");
                setVoterAge(Number(value));
        };

        const handleVoterRegistration = async (e) => {
                e.preventDefault();
                const enrollVoterTx = await
votingContract.enrollVoter(VoterID, VoterName, VoterAge);
                await  enrollVoterTx.wait();
                console.log(enrollVoterTx);
                alert(enrollVoterTx.hash);
        };

        const handlePartyID = async (e) => {
                setPartyID(Number(e.target.value));
        };

        const handleVoterVoteID = async (e) => {
                const value = e.target.value.replace(/\D/g, "");
                setVoterVoteID(Number(value));
        };
```

```
        const handleVote = async (e) => {
                e.preventDefault();
                const voteTx = await votingContract.vote(PartyID,
VoterVoteID);
                await  voteTx.wait();
                console.log(voteTx);
                alert(voteTx.hash);
        };

        const handleQuery1 = async (e) => {
                let vote = Number(e.target.id);
                const voteCountTx = await
votingContract.getVotecountOf(vote);
                setVoteCount1(voteCountTx.toString());
        };

        const handleQuery2 = async (e) => {
                let vote = Number(e.target.id);
                const voteCountTx = await
votingContract.getVotecountOf(vote);
                setVoteCount2(voteCountTx.toString());
        };

        const handleQuery3 = async (e) => {
                let vote = Number(e.target.id);
                const voteCountTx = await
votingContract.getVotecountOf(vote);
                setVoteCount3(voteCountTx.toString());
        };

        const handleResult = async () => {
                let number1 = await votingContract.getVotecountOf(1);
                let number2 = await votingContract.getVotecountOf(2);
                let number3 = await votingContract.getVotecountOf(3);

                let num1 = number1.toString();
                let num2 = number2.toString();
                let num3 = number3.toString();

                if (num1 > num2 && num1 > num3) {
                        setHighestCount("BJP");
                } else if (num2 > num1 && num2 > num3) {
```

```
                setHighestCount("TRS");
            } else if (num3 > num1 && num3 > num2) {
                setHighestCount("Congress");
            } else {
                setHighestCount("");
            }
        };

        return (
            <div>
                <div className="flex flex-row space-x-52 mt-10 ml-
96">
                    <div className="register-container">
                        <div className="form-box">
                            <h3 className="text-2xl form-
head">Candidate Registration</h3>
                            <form
onSubmit={handleCandidateRegistration}>
                                <div className="form-
group mb-6">
                                    <div className="mt-
3"></div>
                                    <div
className="space-y-2">
                                        <div
className="form-ele">
                                            <label>

        Candidate ID :
                                            </label>
                                            <select
className="w-64 ml-2 rounded-full text-slate-900"
value={CandidateID} onChange={handleCandidateID}>

        <option name="BJP">1</option>

        <option name="TRS">2</option>

        <option name="CONGRESS">3</option>

        </select>
                                        </div>
                                        <div
```

```
className="form-ele">
                                                            <label>

      Candidate Name :
                                                            </label>
                                                            <span>

      <input className="ml-2 rounded-full text-slate-900"
value={CandidateName} onChange={handleCandidatename} />
                                                            </span>
                                                      </div>
                                                      <div
className="form-ele">
                                                            <label>

      Candidate age :
                                                            </label>
                                                            <span>

      <input className="ml-2 rounded-full text-slate-900"
value={CandidateAge} onChange={handleCandidateAge} />
                                                            </span>
                                                      </div>
                                                </div>
                                                <input
className="bg-blue-500 hover:bg-blue-900 text-white font-bold py-1
px-2 rounded-full mt-4" type="submit" value="Register" />
                                          </div>
                                    </form>
                              </div>
                              <div className="form-box">
                                    <h3 className="text-2xl form-
head">Voter Registration</h3>
                                    <form
onSubmit={handleVoterRegistration}>
                                          <div className="form-
ele">
                                                <label>
                                                      VotedID :
                                                </label>
                                                <span
className="ml-2 mr-2">
                                                      <input
```

```
className="rounded-full text-slate-900" value={VoterID}
onChange={handleVoterID} />
                                        </span>
                                    </div>
                                    <div className="form-
ele">
                                        <label>
                                            Voter Name :
                                        </label>
                                        <span
className="ml-2 mr-2">
                                            <input
className="rounded-full text-slate-900" value={VoterName}
onChange={handleVoterName} />
                                        </span>
                                    </div>
                                    <div className="form-
ele">
                                        <label>
                                            Voter Age :
                                        </label>
                                        <span
className="ml-2 mr-2">
                                            <input
className="rounded-full text-slate-900" value={VoterAge}
onChange={handleVoterAge} />
                                        </span>
                                    </div>
                                    <button className="bg-
blue-500 hover:bg-blue-900 text-white font-bold py-1 px-2 rounded-full
mt-2">Register</button>
                                </form>
                            </div>
                        </div>
                        <div className="vote-section">
                            <div className="voting-container">
                                <form onSubmit={handleVote}>
                                    <p className="voting-
head">Vote</p>
                                    <div className="voting-
ele">
                                        <div>
                                            <img
```

```
        className="max-w-sm max-h-40 full-auto"

        src="https://encrypted-
tbn0.gstatic.com/images?q=tbn:ANd9GcT1PeilVpA3QSlwxU5Z34Oc1Y-
x_Idy3bU8nLrhTLtUhQ&s"

        alt="BJP"
                                    />
                                </div>
                                <div
className="voting-vote">
                                    <input

        className="form-check-input appearance-none rounded-full h-4
w-4 border border-black border-x-2 border-y-2 bg-white checked:bg-
blue-600 checked:border-blackfocus:outline-none transition duration-
200 mt-1 align-top bg-no-repeat bg-center bg-contain mr-2 cursor-
pointer"

        type="radio"

        name="flexRadioDefault"

        value="1"

        onChange={handlePartyID}
                                    />
                                    <label
className="form-check-label text-gray-800"
htmlFor="flexRadioDefault1">
                                        BJP ID -
1
                                    </label>
                                </div>
                            </div>
                            <div className="voting-
ele">
                                <div>
                                    <img

        className="w-56 max-h-40 full-auto"
```

```
        src="https://4.bp.blogspot.com/-
usfE8G6o_wY/WsjahdsdZGI/AAAAAAAAWBI/dexdE3O-
Jt0XN0v2GvdWswfDww8HuVbAQCLcBGAs/s1600/trs03%2Bcopy.jpg"

        alt="TRS"
                                                        />
                                                    </div>
                                                    <div
className="voting-vote">
                                                        <input

        className="form-check-input appearance-none rounded-full h-4
w-4 border border-black border-x-2 border-y-2 bg-white checked:bg-
blue-600 checked:border-blackfocus:outline-none transition duration-
200 mt-1 align-top bg-no-repeat bg-center bg-contain mr-2 cursor-
pointer"

        type="radio"

        name="flexRadioDefault"

        value="2"

        onChange={handlePartyID}
                                                        />

                                                        <label
className="form-check-label text-gray-800"
htmlFor="flexRadioDefault1">
                                                            TRS ID -
2
                                                        </label>
                                                    </div>
                                                </div>
                                                <div className="voting-
ele">
                                                    <div>
                                                        <img

        className="max-w-sm max-h-40 full-auto"

        src="https://encrypted-
tbn0.gstatic.com/images?q=tbn:ANd9GcRTLtqW8T4TEv-Ni-
```

```
3NbGT28sFKUQOkoUEnOCryW3ZGuA&s"

        alt="CONGRESS"
                                                  />
                                              </div>
                                              <div
className="voting-vote">
                                                  <input

        className="form-check-input appearance-none rounded-full h-4
w-4 border border-black border-x-2 border-y-2 bg-white checked:bg-
blue-600 checked:border-blackfocus:outline-none transition duration-
200 mt-1 align-top bg-no-repeat bg-center bg-contain mr-2 cursor-
pointer"

        type="radio"

        name="flexRadioDefault"

        value="3"

        onChange={handlePartyID}
                                                  />
                                                  <label
className="form-check-label text-gray-800"
htmlFor="flexRadioDefault1">

        CONGRESS ID - 3
                                                  </label>
                                              </div>
                                          </div>
                                          <div className="mt-5
vote-id-box">
                                              <label>
                                                  VotedID :
                                              </label>
                                              <span
className="ml-2 mr-2 ">
                                                  <input
className="rounded-full w-20 text-slate-900" value={VoterVoteID}
onChange={handleVoterVoteID} />
                                              </span>
                                              <input
```

```
className="bg-red-500 hover:bg-blue-900 text-white font-bold py-3
px-16 rounded-full mt-4" type="submit" value="Vote" />
                    </div>
                </form>
            </div>
            {/*
=>>>>>>>............................................................................ */}
            <div className="result-container">
                <h2 className="text-2xl">Result
</h2>
                <div className="result-btn">
                    <div className="mt-
12"></div>
                    <button
onClick={handleQuery1} id="1" className="bg-blue-500 hover:bg-blue-
900 text-white font-bold py-1 px-2 rounded-full mt-2">
                        BJP
                    </button>
                    <p>{VoteCount1}</p>
                </div>
                <div className="result-btn">
                    <div></div>
                    <button
onClick={handleQuery2} id="2" className="bg-blue-500 hover:bg-blue-
900 text-white font-bold py-1 px-2 rounded-full mt-2">
                        TRS
                    </button>
                    <p>{VoteCount2}</p>
                </div>
                <div className="result-btn">
                    <button
onClick={handleQuery3} id="3" className="bg-blue-500 hover:bg-blue-
900 text-white font-bold py-1 px-2 rounded-full mt-2">
                        CONGRESS
                    </button>
                    <p>{VoteCount3}</p>
                </div>
                <div className="result-btn">
                    <button
onClick={handleResult} className="bg-red-500 hover:bg-blue-900 text-
white font-bold py-3 px-5 rounded-full ">
                        Winner
                    </button>
```

```
                                        <p className="text-
3xl">{HighestCount}</p>
                                    </div>
                                </div>
                            </div>
                            {/*
=>>>>>>>............................................................... */}

                        </div>
                    </div>
        );
}

export default Voting;
```

Source Code:

https://drive.google.com/file/d/1wFf3E7U0So7ZedJMSmeEKzjMFRgxhriH/view?usp=sharing

8.PERFORMANCE TESTING:

8.1 Performance Metrics

1. **Transaction Processing Speed:**
   Measurement of the time it takes to record and validate a vote on the blockchain. A faster processing speed ensures that the voting process is efficient and responsive, reducing voter wait times and enhancing user experience.
2. **Scalability:**
   The system's ability to handle a large number of concurrent voters and transactions. Scalability is crucial to accommodate growing voter populations and to ensure that the system remains responsive under high loads during elections.
3. **Security and Data Integrity:**
   The system's ability to protect against unauthorized access, tampering, or manipulation of voting data. Security metrics include the number of attempted breaches, the detection of anomalies, and the system's ability to maintain the integrity of the vote records.
4. **Voter Accessibility and Usability:**
   Evaluation of how accessible and user-friendly the system is for a diverse range of voters. Metrics could include the percentage of successfully registered voters, the average time taken to cast a vote,

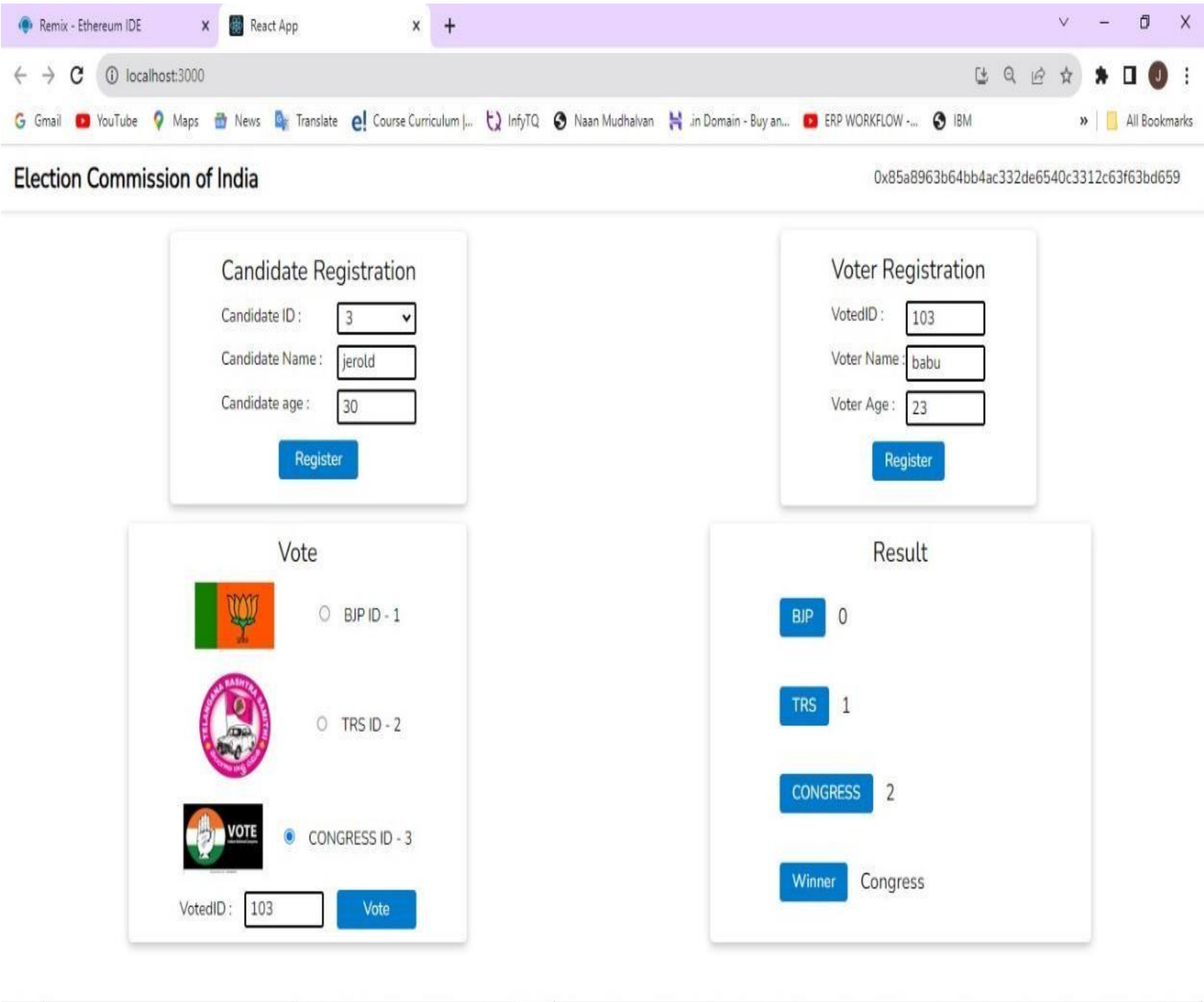
and feedback from voters regarding the user interface and overall experience.

5. **Fault Tolerance and Redundancy:**

Assessment of the system's ability to continue functioning in the event of hardware or network failures. Metrics can include system uptime during an election, the number of instances of system recovery, and the redundancy mechanisms in place to ensure uninterrupted service

9. RESULTS

9.1 Output Screenshots



10. ADVANTAGES & DISADVANTAGES:

Advantages of e-voting systems using blockchain technology:

1. **Enhanced Transparency and Trust:**
   Blockchain's decentralized and immutable ledger ensures that once a vote is recorded, it cannot be altered. This transparency and tamper resistance build trust in the electoral process.
2. **Security and Integrity:**
   Blockchain's cryptographic features make it highly secure, reducing the risk of hacking, fraud, or data manipulation. Votes are cryptographically protected, enhancing data integrity.
3. **Accessibility and Convenience:**
   E-voting systems can make it easier for voters to cast their ballots remotely, reducing the need for physical polling places. This can enhance accessibility for people with mobility challenges or living in remote areas.
4. **Reduced Administrative Burden:**
   Streamlining the voting process through automation can reduce the administrative burden on election authorities. It can also speed up the tallying of results, potentially providing faster election outcomes.
5. **Cost Savings:**
   Over the long term, e-voting systems can potentially reduce the cost of printing ballots, setting up polling stations, and manual vote counting. This can lead to cost savings for electoral bodies.

Disadvantages of e-voting systems using blockchain technology:

1. **Cybersecurity Risks:**
   While blockchain is generally secure, e-voting systems are not immune to cybersecurity threats. Hacks, DDoS attacks, and vulnerabilities in the software can compromise the system's integrity.
2. **Digital Divide:**
   Not all citizens have equal access to the internet or the technological skills to use e-voting systems. This can create disparities in voting access, potentially disenfranchising certain populations.
3. **Complexity and Usability Issues:**
   E-voting systems, particularly blockchain-based ones, can be complex for voters to understand and use. Usability issues may deter participation, particularly among older or less tech-savvy voters.
4. **Identity Verification Challenges:**
   Verifying the identity of online voters without compromising

privacy can be a significant challenge. Ensuring that voters are who they claim to be remains a complex issue.

5. **Legal and Regulatory Hurdles:**

Many countries have strict regulations and laws surrounding voting procedures. Adapting these regulations to accommodate blockchain-based voting can be a complex and time-consuming process.

11.CONCLUSION:

In conclusion, the adoption of a blockchain-based electronic voting system offers a promising path towards redefining the democratic processes of the 21st century. This innovative technology brings with it a host of advantages, notably the assurance of security and transparency. The immutable nature of blockchain ensures that each vote cast is recorded in an indelible ledger, safeguarding the sanctity of the electoral process. Voters can verify their choices, and the decentralized structure reduces the risk of tampering or manipulation.

Furthermore, blockchain voting systems enhance accessibility and inclusivity, enabling citizens, regardless of their location or physical abilities, to participate in the electoral process. Cross-border voting becomes a reality, and the need for physical polling stations diminishes, resulting in substantial cost savings. This technological advancement opens doors to customization, innovation, and greater voter engagement.

While blockchain-based electronic voting systems hold immense potential, challenges related to privacy, identity verification, and regulatory adjustments must be diligently addressed to ensure their widespread adoption. Nonetheless, as governments, tech companies, and blockchain developers collaborate and adapt to evolving needs, this technology promises to reshape the very foundations of democracy, ensuring that the voices of citizens are not only heard but also securely and transparently counted. The future of elections is bright, driven by the assurance of trust and the empowerment of every voter.

12. FUTURE SCOPE:

The future scope of blockchain-based electronic voting systems is promising and holds the potential to address various challenges in the current voting processes. Here are some key aspects of its future scope:

Enhanced Security and Transparency:

Blockchain offers immutable and tamper-resistant records, making it highly secure. Transparency in the voting process allows voters to verify their votes and ensures election integrity.

Remote and Secure Voting:
Facilitates remote voting, which can improve accessibility for voters, especially those living abroad.
Advanced encryption and authentication mechanisms enhance security.

Reduced Fraud and Manipulation:
Eliminates the risk of double voting and other forms of fraud.
Prevents manipulation of results due to the decentralized and transparent nature of blockchain.

Streamlined Verification:
Simplifies the verification process, reducing the need for manual checks.
Accelerates the counting and verification of votes.

Cost Reduction:
Reduces the cost of printing physical ballots and conducting manual vote counting.
Minimizes the need for physical polling stations.

13. APPENDIX:

Source Code:

https://drive.google.com/file/d/1wFf3E7U0So7ZedJMSmeEKzjMFRgxhriH/view?usp=sharing

GitHub:

https://github.com/JeraldAbishek/NM2023TMID00172.git

Demo Video Link:

https://drive.google.com/file/d/1HRNFp_hKOBmBVWxixG8BwCcTp17EmYk-/view?usp=sharing