CSE 311 SOFTWARE ENGINEERING AND PROJECT MANGEMENT

PROJECT REPORT

Election – System

Group-16

Team Members :

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Introduction :

The **Online Election System** is a web-based application designed to facilitate and streamline the election process by enabling voters to cast their votes online securely and efficiently. The system aims to provide a user-friendly platform for both voters and administrators, ensuring transparency, accuracy, and integrity throughout the entire election process.

Problem Statement :

The online election system project addresses the need for a secure, efficient, and accessible digital voting platform to streamline the electoral process. Traditional paper-based voting methods are susceptible to inefficiencies and fraud, whereas an online system can enhance transparency and ease of access for eligible voters. This project aims to develop a robust system with secure user authentication, real-time vote recording, and stringent data integrity measures. Utilizing a PostgreSQL database, it will manage voter, candidate, and election data while implementing audit logs and notifications to ensure accountability and maintain public trust in the digital voting process.

Objective / Purpose :

- Protect voter data with encryption and multi-factor authentication to prevent unauthorized access and maintain vote privacy.
- Streamline voter registration and eligibility verification for quick and easy access to the election platform.
- Implement logs and audit trails to track actions, ensuring accountability and transparency without revealing voter identities.

Feasibility Study :

- **Technical Feasibility :** Election – system is developed using prominent web technologies like react, postgres and integrates with fastapi.
- **Economic Feasibility :** The economic feasibility of the online election system ensures that the benefits and efficiencies gained from digitizing the election process outweigh the costs of development, deployment, and maintenance.

  The system is economically feasible and if it achieves widespread adoption, offers clear benefits.
- **Operational Feasibility :** The operational feasibility of the online election system assesses whether the platform can be smoothly integrated into existing election processes, is user-friendly for both administrators and voters, and reliably supports secure, efficient, and scalable voting operations.
- **Legal Feasibility :** The legal feasibility of the online election system ensures that the platform complies with electoral laws, data protection regulations, and privacy standards, safeguarding voter rights and election integrity while meeting all legal requirements for secure, valid digital voting.

Functional Requirements :

These requirements describe the system's behavior and the specific functions it must perform to support voters, administrators, and candidates during the election process.

User Registration with Organization Email Verification

Requirement: The system must allow voters to register using Google OAuth with their organization-issued email addresses (e.g., @organization.com). Only email domains associated with the organization should be permitted, ensuring that only eligible organization members can register for the election system.

User Verification through Google OAuth and Organization ID Check

Requirement: The system should verify user eligibility by ensuring they authenticate through Google OAuth with a valid organization email address. If additional verification is required, the system may prompt for organizational ID information (e.g., studentID) to finalize eligibility.

Candidate Enrollment:

Requirement: The system must allow eligible users to register as candidates in the election by filling out a candidate application form, including details like name, college ID, department, and position they intend to run for.

Candidate Verification and Approval :

- *Requirement*: The system should automatically verify candidates' eligibility based on college policies (such as academic standing, age, or department) and may require additional approval by election administrators.

Election Management :

- This module enables administrators to set up and manage election cycles, including defining schedules, approving candidates, and managing voter lists. It supports ballot customization, monitors voting progress, and securely calculates and publishes results. These tools ensure a fair and transparent election process, aligning with college guidelines.

Non – Functional Requirements :

Performance Requirements :

- **Scalability**: Handle high user traffic, especially on election day
- **Availability**: 99.9% uptime during critical periods.
- **Load Handling**: Support a high number of transactions per second.

Safety and Security Requirements :

- **Data Encryption**: Encrypt all sensitive data (e.g., votes, personal information) during transmission and storage.

- **Authentication and Authorization**: Implement strong authentication methods (e.g., multi-factor authentication) for users and also ensure proper access controls and permissions to restrict access based on their roles.

Software Quality Attributes:

1. **Performance:**

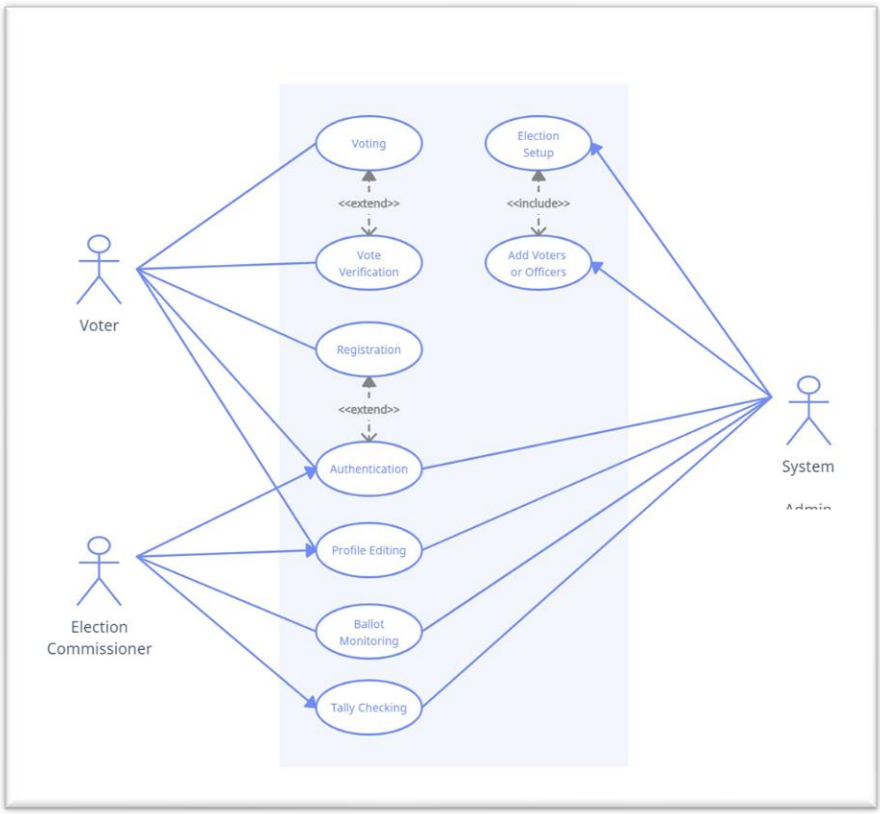
- **Description:** Measures how well the system performs under various conditions, including speed, responsiveness, and resource usage.
- **Examples:** Response time, throughput, and load handling

2. **Reliability:**

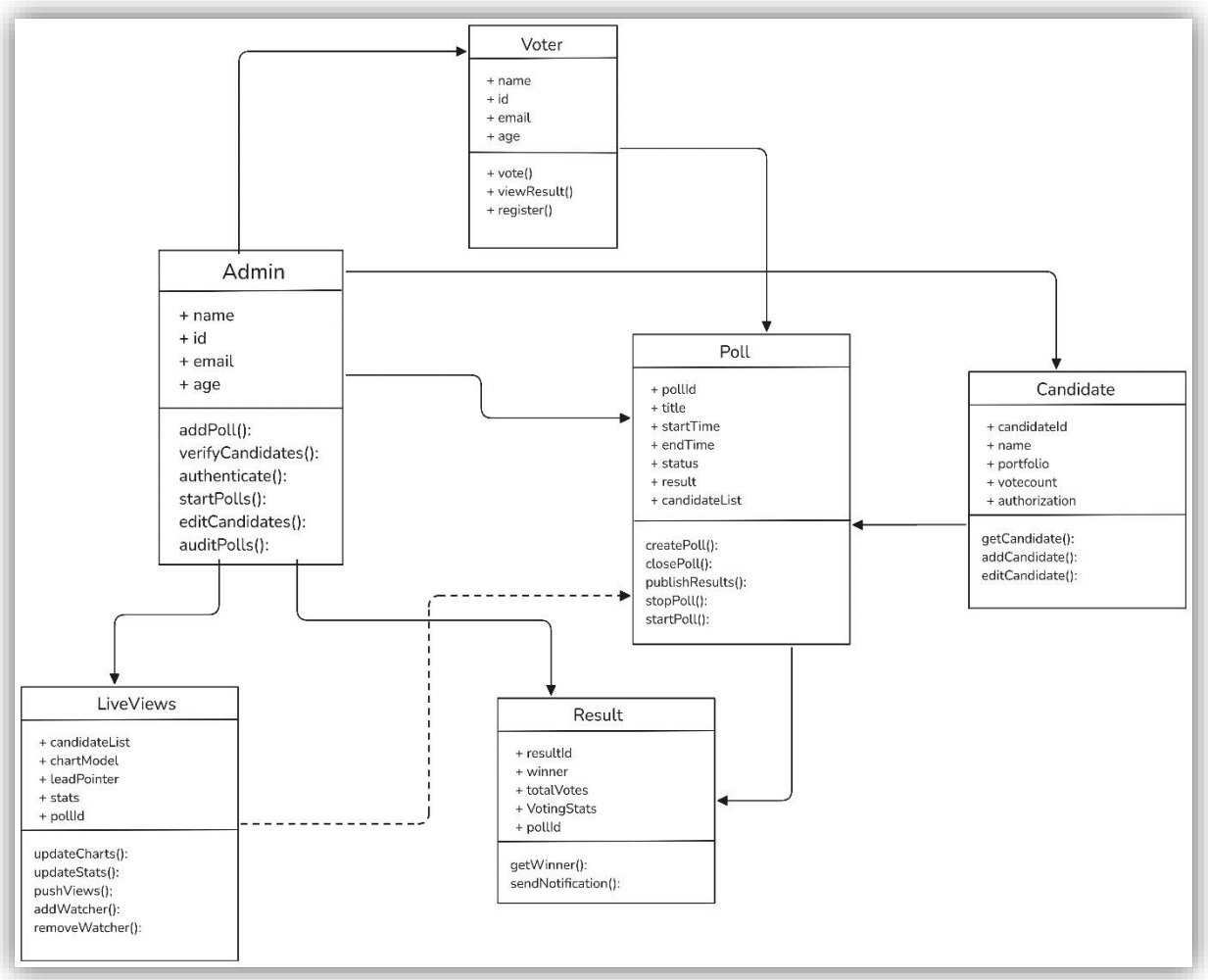
- **Description:** Indicates the system's ability to consistently perform its functions without failure over time.
- **Examples:** System uptime, error rates, and fault tolerance.

UML Diagrams :

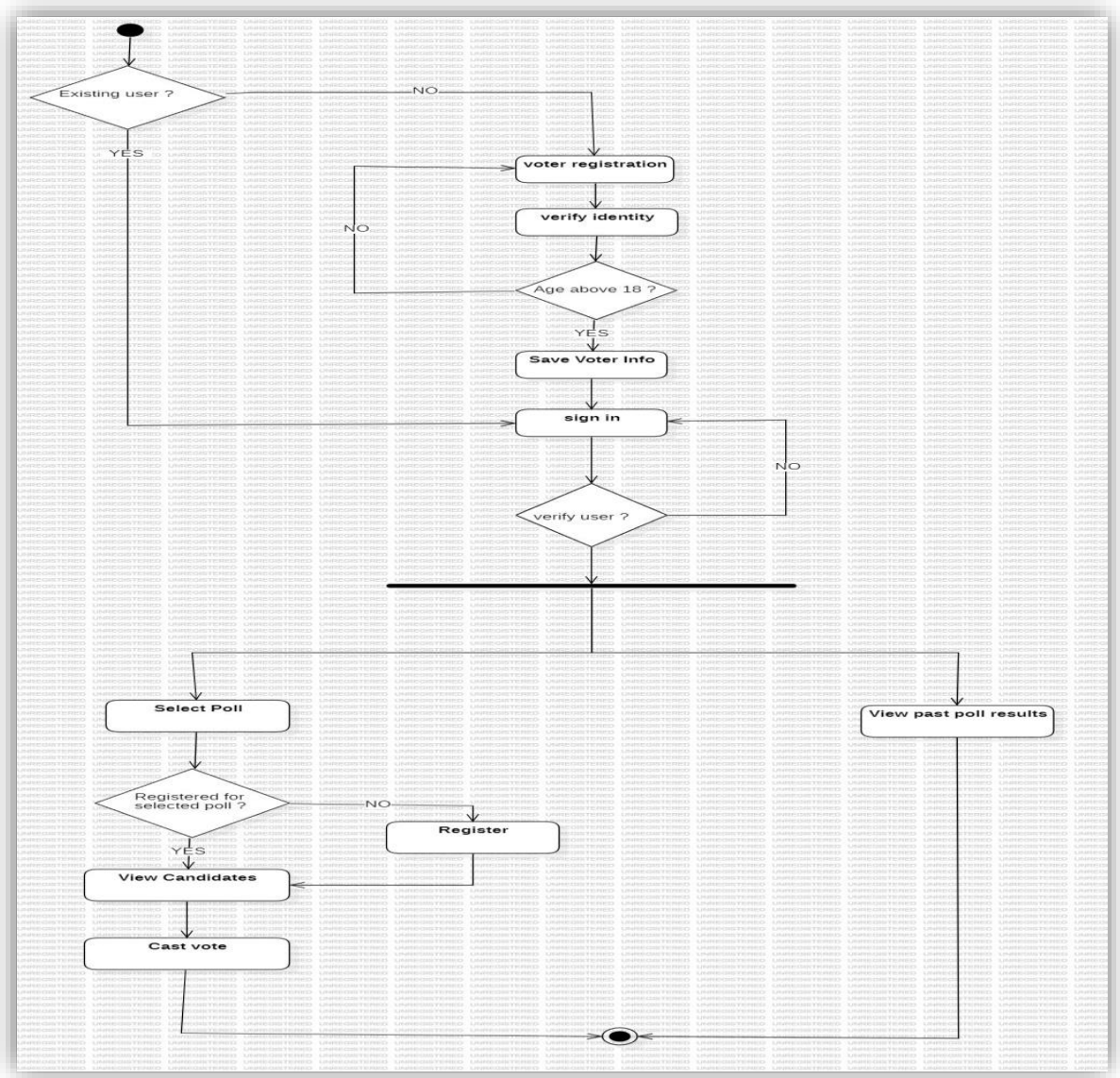
Use-case Diagram :



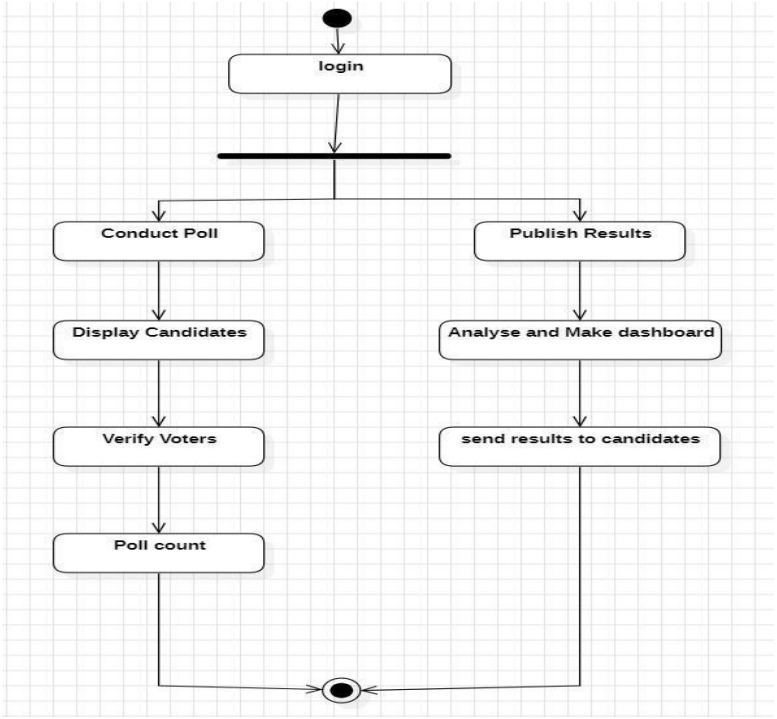
Class Diagram :



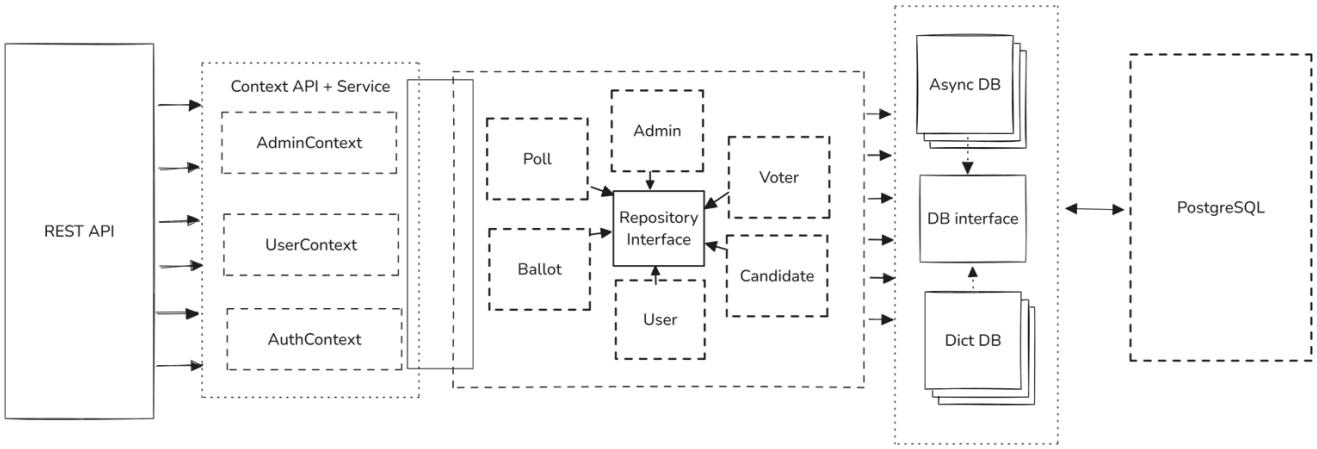
State chart Diagram :



Activity Diagram :



System Architecture :



Implementation Details :

- React js : Build Dynamic UI's faster than ever
- FastApi : Blazing fast API's, built in flash. FastApi – speed meets simplicity.
- Postgres : Powerful, reliable, open-source. Trust in tour data with PostgreSQL.
- SQLAlchemy : Effortless database interaction,

  Python-style.SQLAlchemy – SQL,simplified.
- 12 – Factor App : Code once scale anywhere

TEST CASE AND REPORTS:

Test ID	Operations	Input	Expected Output	Actual Output	Result
1	Login	User name and password are taken as input	Navigate to authentication page	Navigates to authentication page	Pass
2	Register	All inputs are given correct where mail id number is primary key	Navigate to login page	Navigates to login page	Pass
3	Join poll	Click	Confirm the user that he/she had successfully joined or not	Confirm the user that he/she had successfully joined or not	Pass
4	Cast vote	Click	Stores the vote and navigates to thankyou page	Stored the vote and navigates to thankyou page	Pass
4	Enter captcha	Captcha	Navigates to voting page	Navigates to voting page	Pass
5	Logout	Click	Logout	Logouts and shows home page	Pass

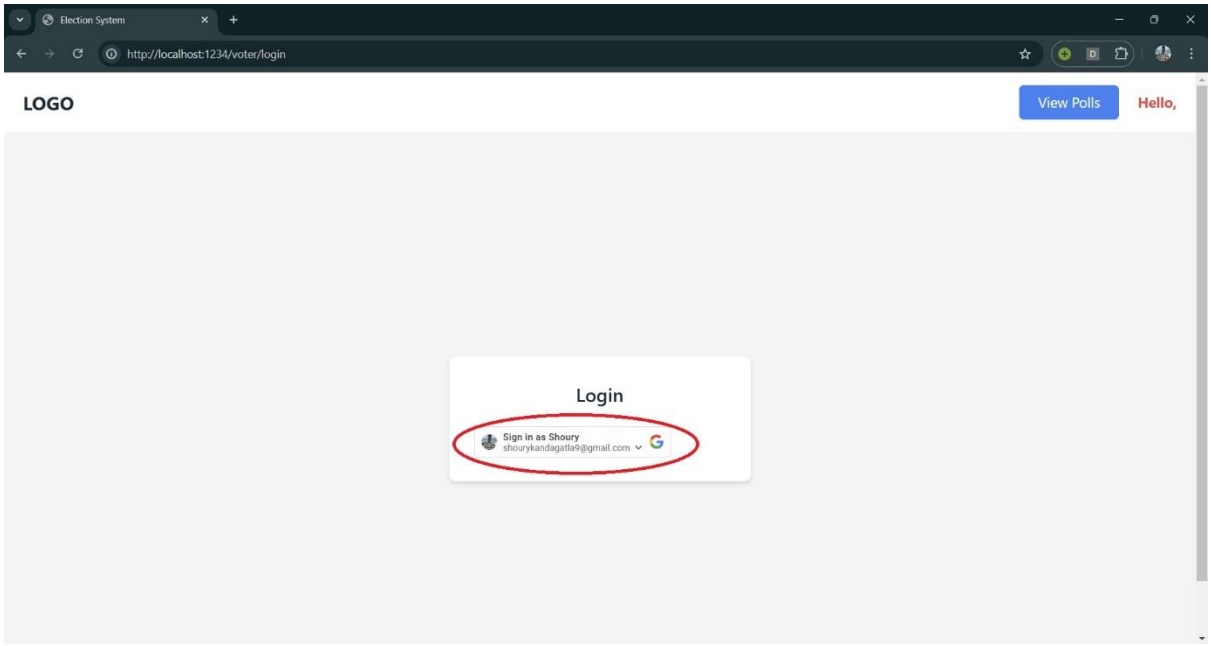
USER DOCUMENTATION:

Voter login:

To log in to your account, enter your email address in the provided field.

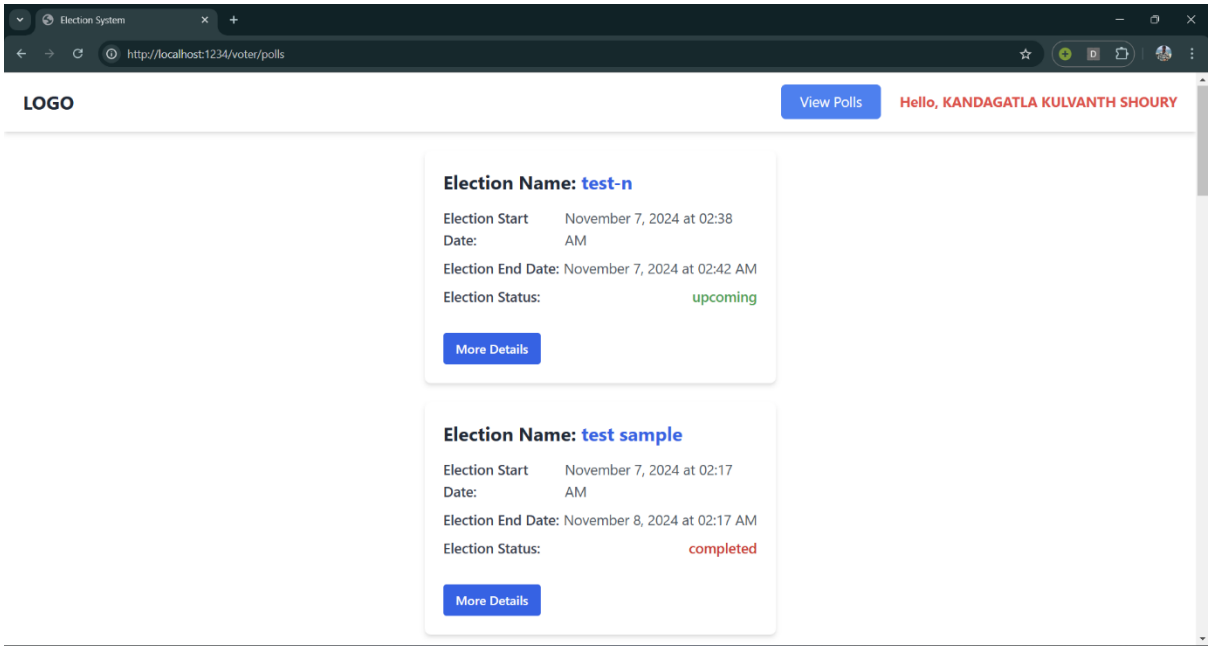
Click the "Sign In" button to proceed.

If you have a Google account, you can also log in using your Google credentials.



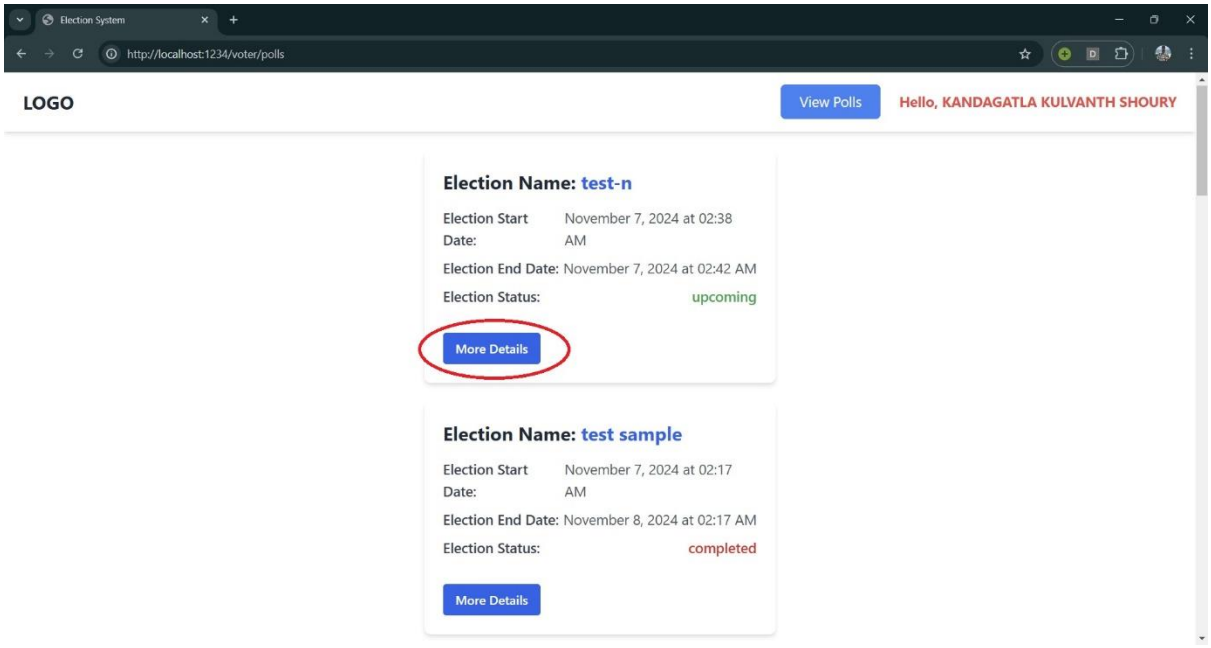
All Polls:

Once you've successfully logged in, you'll be automatically taken to the 'All Polls' page where you can view all available elections.



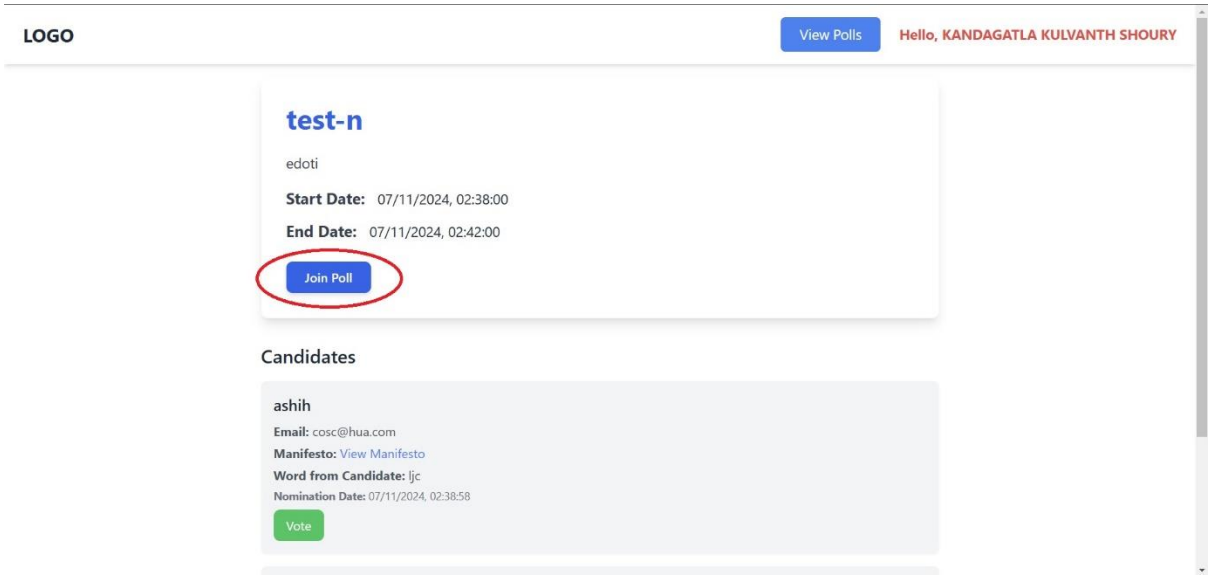
Click on more details:

Clicking 'More Details' will provide you with full information about the election, including how to join and vote.



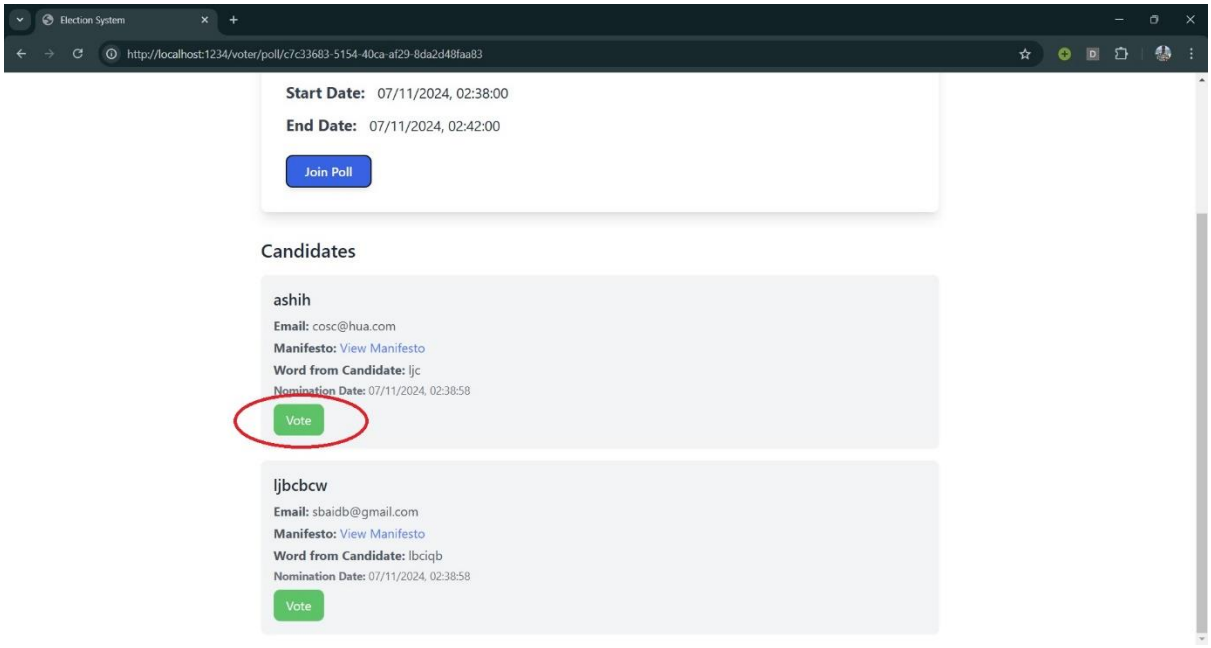
Click on join poll:

In order to participate in this election, you must first join the poll. Once you've joined, you'll be able to view the candidates and cast your vote.



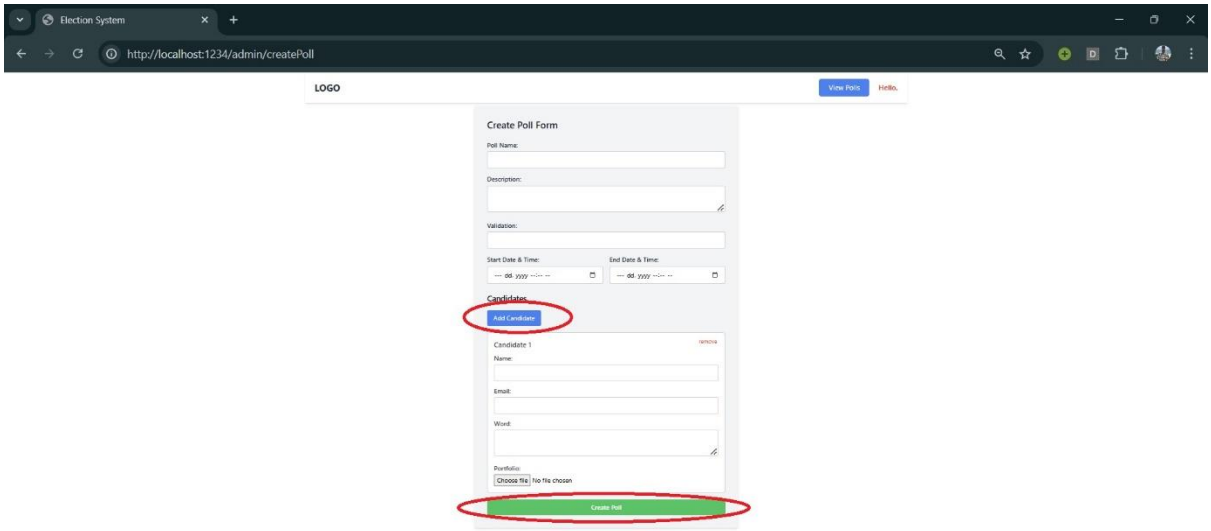
Casting vote:

Click on the 'Vote' button next to a candidate's name to cast your vote for that candidate.



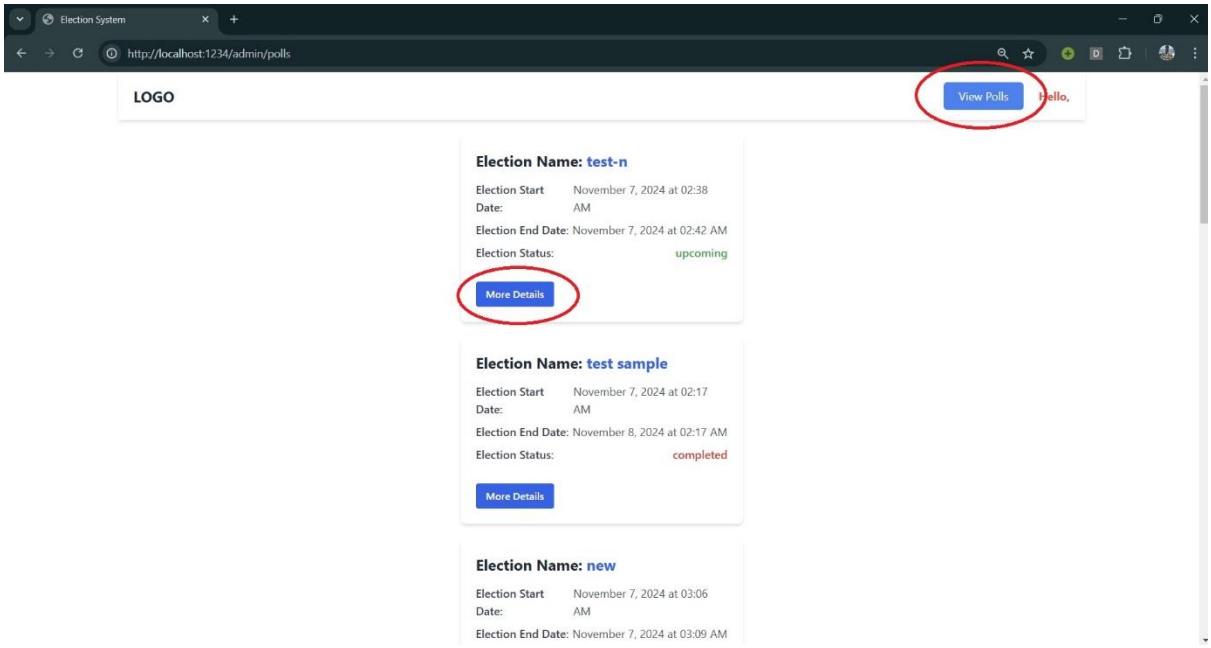
Admin creating poll:

To create a poll, fill in all required fields in the form and click on the 'Add Candidate' button. Then, enter the details for each candidate to complete the poll setup.



All details about the poll:

Click on 'More Details' to view additional information about the poll.



Upon clicking 'More Details,' the admin will now be able to see all the information about the poll.