Project Documentation: Online Voting Service

Problem Statement

In Singapore, the current voting process for elections is conducted exclusively through physical means, requiring citizens to physically visit designated polling stations to cast their votes. For Singaporean citizens living abroad, the process becomes more complex as they must navigate overseas polling stations or resort to postal voting, particularly if there's no accessible local facility available. Additionally, the manual counting of votes introduces the potential for recounts and human errors.

The current voting process in Singapore is cumbersome, logistically challenging with limited accessibility. As a result, there is a need for a more reliable, user-friendly and secure online voting solution. Such a solution would empower citizens to participate in elections from the convenience of their own homes, regardless of their global location, while upholding the principles of democratic participation.

Proposed Solution

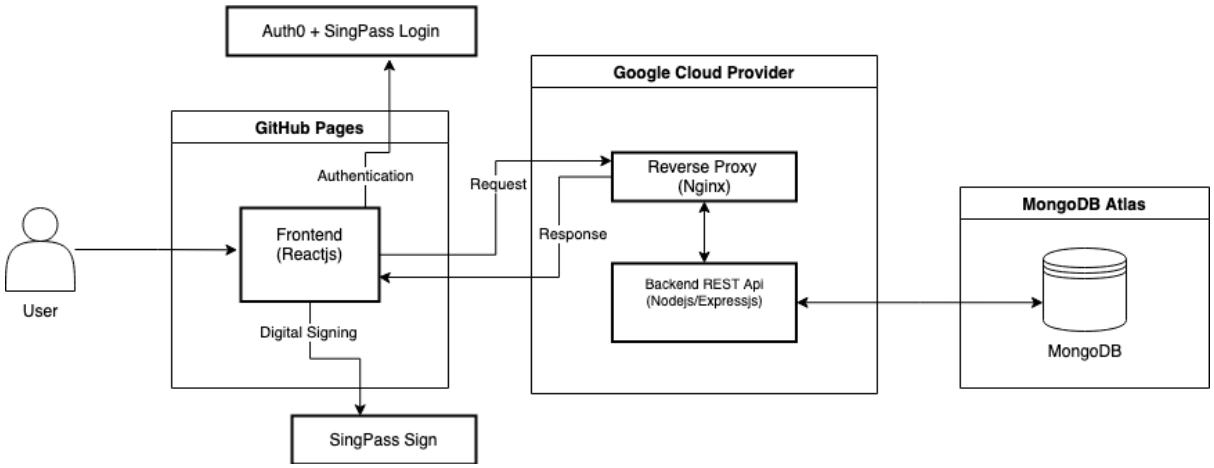
The proposed solution is to develop and Online Voting Service web app that offers a seamless yet secure voting experience for citizens. This web app will enable voters to cast their ballots remotely, ensuring accessibility and convenience, while incorporating security measures to safeguard the integrity and authenticity of the online voting process. Key features include:

1. **Authentication via Login**: Leveraging the SingPass authentication system ensures that only eligible voters in the certified register of electors for an electoral division can access and participate in the voting process.
2. **Digital Signing via Sign**: To enhance the security of the voting process, voters will need to digitally sign their votes before submission, guaranteeing the vote remains unaltered during transmission and storage.
3. **User-friendly Interface**: A user-friendly interface would ensure that even less tech-savvy citizens are still greeted with a simple yet recognizable interface to ensure a smooth voting process.

The solution will have the following Technology Stack:

- **Frontend**: React.js
- **Backend**: Node.js, Express.js
- **Database**: MongoDB
- **Authentication**: SingPass Login with Auth0 as the Relying Party
- **Digital Signing**: SingPass Sign

System Architecture
The diagram below shows the architecture of the Online Voting System:



The frontend ReactJS application will be hosted on GitHub Pages and the Backend REST API will be hosted on Google Cloud Provider's Compute Engine. MongoDB is used to store the user's votes as well as the candidate's information and the database is hosted on MongoDB Atlas. Authentication in the frontend will be handled using SingPass Login and Auth0 as the relying party and the Digital Signing service will be handled with SingPass Sign.

For this prototype, as the application still no access to the SingPass Login and Sign APIs, they have not been implemented fully and instead, only Auth0 is used for authentication and the Digital Signing service is simulated. Furthermore, to support this prototype, 2 MongoDB collections are used and their examples are illustrated below:

User Collection:
The voting status, name and Auth0 ID of the user is stored, and if the user has voted, their selection will also be stored.

```
_id: ObjectId('650ac4d1ac8d4f350eea63fb')
name: "John Doe"
auth0_id: "12345"
voted: false
```

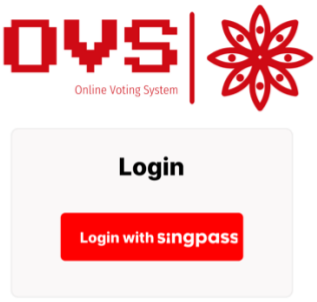
```
_id: ObjectId('650ac92871005c38c8f94249')
name: "Jane Doe"
auth0_id: "12346"
voted: true
selection: 2
```

Candidate Collection:
The name and the imageURL of the candidate is stored.

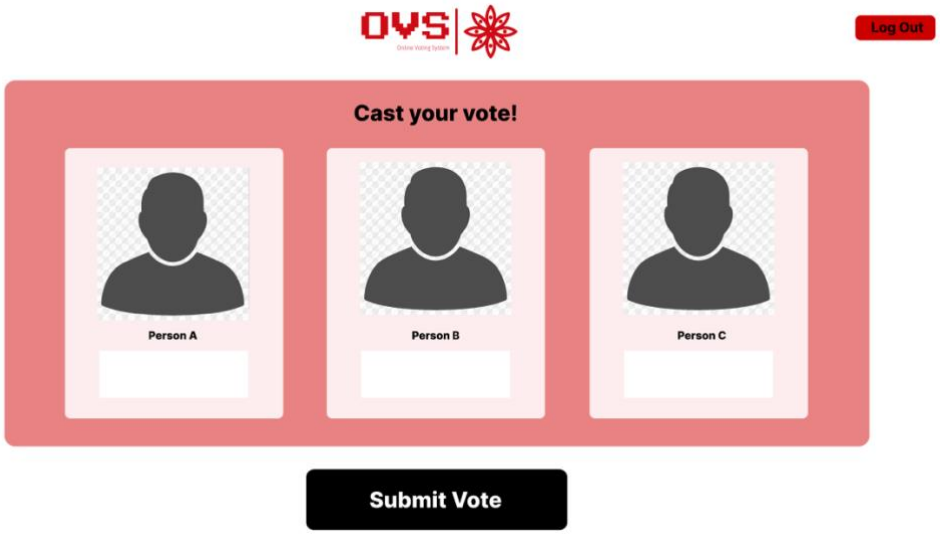
```
_id: ObjectId('650c02b8aeab6c1f590448a5')
name: "Candidate 1"
imageURL: "https://campussafetyconference.com/wp-content/uploads/2020/08/iStock-4…"
```

Wireframes

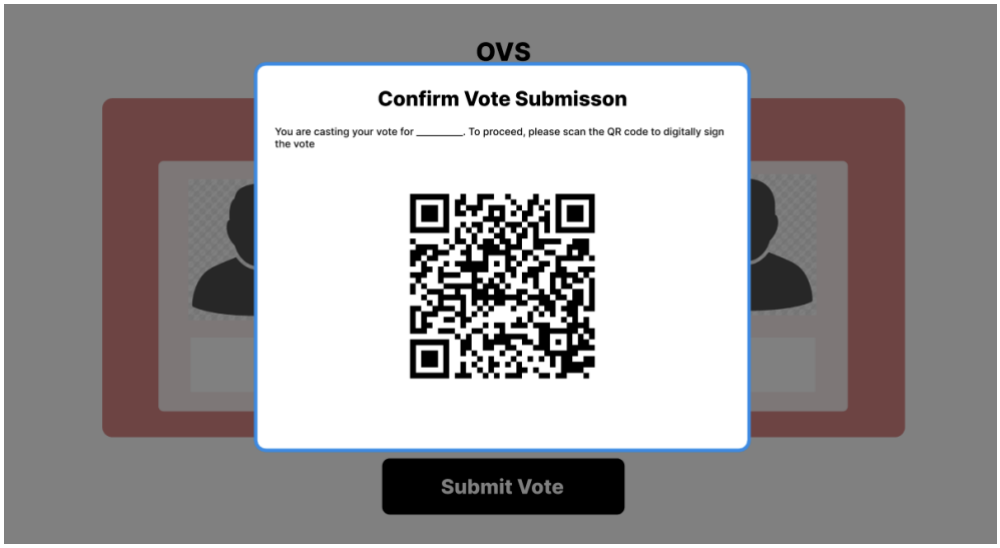
Login Page



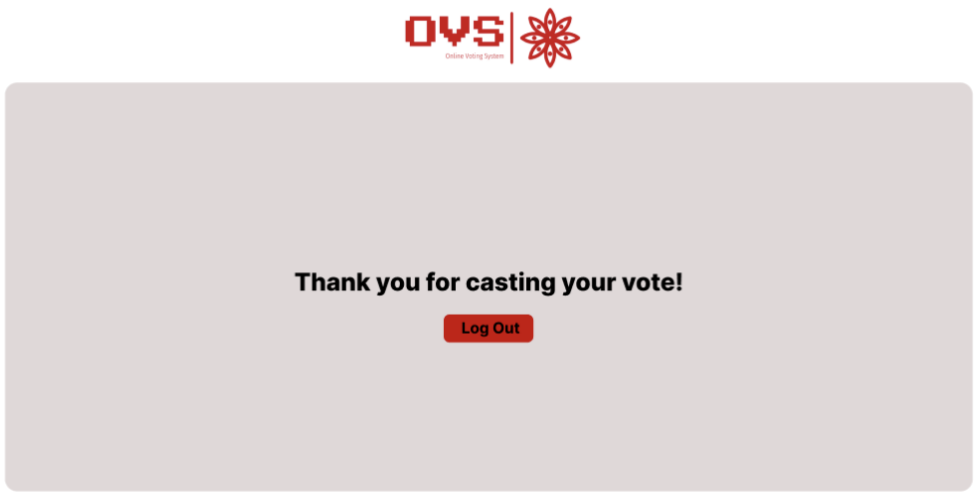
Unselected Voting Page



Confirm Submission



Vote Completed



Error Page