

8 July 2020 (revised 1)

Online Voting Platform for General Election



1. Introduction

This paper describes an online voting platform for a general election.

This platform is developed to achieve the following goals

- Ensure that the voting is secure and free from hacking and fraud
- Makes it convenient for the voter to submit their vote for electing their representatives for one or more offices
- Able to cater to voters who are not able to handle technology

2. Approach

a) Online voting

Each voter is assigned a unique ballot code comprising of 6 to 12 digits. This code is sent to the voter by SMS. The voter clicks on a link in the SMS to enter the voting platform and enters a PIN. The PIN is the postal code of the voter.

As the unique code is sent by SMS, it will be received on the mobile phone of the voter. As most adults have a mobile phone, they are able to vote using a mobile phone.

The majority of the voters are likely to use this approach. It can also be used by voters who are out of the country.

b) Polling station

A voter who is not able to vote using a mobile phone can turn up at the polling station. The polling officer will verify the identity of the voter and pass a tablet to the voting to voter to submit the vote.

The voting process is similar to the voting on the mobile phone.

3. Voter Database

The Election Department will upload the database of eligible voters into the platform.

The data for each voter are

- Name of voter
- Identification of voter, e.g. NRIC
- Residential district or postal code
- Mobile number
- PIN

The Election Department will allow the voter to update the mobile number and PIN (as they are not available) and also to change the residential district.

The update has to be done at the office of the Election Department. The voter has to provide an ID card to authenticate the changes.

In the case of Singapore, the voter can log into the Sing Pass database with the ID and password and update the mobile number and PIN.

4. Polling Day

A SMS is sent to the voter 24 hours before the start of the voting. This is to notify the voter about the election. It will indicate the time that the actual voting SMS will be sent out on polling day.

The polling SMS will be sent out to the voters in batches every 15 minutes on polling day. It contains a link to the Voting platform and embeds a unique ballot number to identify the voter.

If the PIN number is not set by the voter, the default PIN is the postal code of the voter.

The voter clicks on the link to access the voting platform. The voter is required to provide the PIN. The platform checks the unique ballot number and PIN against the database and returns the following error conditions, if applicable:

- Voting has not started
- Voting has closed
- Invalid ballot number
- Invalid PIN
- You have voted already

If there are not error conditions, the voter can proceed to vote.

The voter is presented with the voting slips for the various offices that need to be voted.

For a small country like Singapore, the voting is for one office, i.e. the Member of Parliament for the constituency.

For a country like Malaysia, the voting is for two offices, i.e. the member of the state assembly and for the national parliament

A large country may require the voter to vote for more than two offices.

For each office, the list of candidates is presented to the voter. In most cases, the voter has to make a single choice.

But the platform allows the voter to submit several choices for an office, e.g. to vote for several candidates, up to a prescribed maximum, from a list of candidates.

5. Verify with Sing Pass

I have considered the use of Sing Pass to verify the voter. This option has its merits and disadvantages.

One disadvantage is the reliance on another platform. If this platform hangs due to a large volume of logins, it can affect the voting process. Another disadvantage is that some voters are not familiar with using Sing Pass.

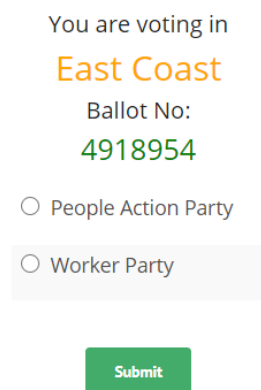
On balance, I prefer to avoid using Sing Pass for verification. I find that the voting platform already has sufficient security against fraudulent voting, without the need to rely on Sing Pass.

By not using Sing Pass, the platform can be used in other countries. It is not restricted to Singapore.

6. Ballot Number

The votes of the voter for each office is recorded against the ballot number, and is not identified to the voter (except through a separate lookup process that is available for audit purpose only).

This is to enforce the concept that “voting is secret”.



You are voting in

East Coast

Ballot No:

4918954

☐ People Action Party

☐ Worker Party

Submit

7. Databases

The votes are stored in three databases – the Election Department, the Independent Auditor and the Supreme Court.

The three databases are kept separate and under the control of three separate sets of officials.

This is to prevent fraudulent alteration of the voting records by any person who has control to the database or by an external hacker.

As the databases are under the control of three separate groups of officials, it is extremely difficult for the data to be tampered with identical changes.

8. Certification of Results

The results are computed separately using the database of the Election Department and the Independent Auditor.

If the results are identical, the Returning Officer can certify the results. If the results are different, the results controlled by the Supreme Court can be used to determine the final results.

The comparison of the results can be automated and the differences are thrown out for human audit.

The process of counting the votes can be completed within an hour after the close of the voting session.

9. Advantages of online platform

There are significant advantages of this online platform, compared to the manual platform:

No need for voter to visit and queue at the voting station

- Counting of the votes can be done at computer speed
- Automatic check that each voter can only vote once
- Voting can be done at remote locations, including outside the country
- The platform also supports voting at polling stations – for voters who are not able to vote online.

10 Prototype system

I have developed a prototype system to show the operation of this platform.

11 Conclusion

It is possible to carry out the voting of a general election using an online voting platform that is convenient to the voters and is secure against internal fraud and hacking by external parties.



Tan Kin Lian