

Proposal for an e-voting system for the Regent House

Bob Dowling

This paper contains a proposal for the development of a voting system for the Regent House with the option to move to online voting using the BOB¹ system for any regent who chooses to. Specific development work is identified where required.

All the technical development is small scale and the proposal only requires an additional machine to be maintained. The costs of the facility are the staff time required for each ballot.

Proposed time line of a ballot

1. Ballot duration, text & list of choices is agreed.
2. Returning Officer (RO) takes snapshot of who is opted in and out at a specific time.
3. System Administrator (SA) inserts a virgin USB stick into the voting server and then reinstalls the system and updates all software to current versions & patch levels.
4. System audit if desired.
5. SA passes control of system to RO. RO now has knowledge of system password.
6. Returning Officer uploads:
 1. the list of opted-in regents,
 2. the ballot text,
 3. the choice lists, and
 4. the start and end dates for the online ballots into BOB's database.(n.b. more than one ballot may be run simultaneously)
7. RO's office posts paperwork to offliners including ballot papers.
8. RO's office posts paperwork to onliners including a reminder of the voting website URL.
9. BOB runs the online ballot.
10. BOB generates the anonymous lists of votes cast.
11. RO shuts down BOB server.
12. RO removes USB stick and places it with the paper ballots in storage.
13. RO publishes anonymous list for onliners to check.
14. RO merges online and offline votes and counts them all.
15. RO publishes result.
16. At a later date the RO securely destroys the ballot papers and USB stick.

The computer

This paper proposes a physical server. This will lead to a machine sitting powered off and idle for the majority of the time. An alternative implementation using virtual machine technology is possible but the description and implementation of its security model are more complex. With an eye on the perception of the security of the system the author is sticking with physical machines.

The server is a Linux system with the minimal software for:

- the LAMP stack²,
- the BOB software on top of the LAMP stack,
- the SSH server to allow secure login by the RO,

1 BOB: Basic Online Ballots, [www.c1.cam.ac.uk/~dme26/proj/BOB/]

2 LAMP: Linux, Apache, MySQL, PHP.

- the Raven authentication module for Apache, together with its certificates,
- software for the RO to easily add the data specific to each ballot,
- the OpenSTV software for vote counting.³

The configuration and software packages for the server are maintained by the installation system that the UCS already uses.

The server's file system is configured so that the /var file system⁴ is mounted on an external USB device. A 1GB USB stick is plenty for this purpose. This is the file system that will accumulate all the data during the ballot.

The current online ballot system run for CUSU has two halves: the BOB system proper (running the ballot and counting the votes) and the web system used for setting up the ballots. The latter is a large, complex, locally-grown system with a carefully controlled route through to the ballot system proper, designed to support untrusted people setting up ballots. We don't need this as our ballots are far less frequent and we have trusted staff. Given that all the ballot set up does is add data to three database tables we can do without the extra complexity. Instead, a simple tool is proposed for uploading a ballot.

Proposed key points of the ballot tool:

1. Takes a spreadsheet export format (CSV) defining the ballot data (dates, text, number of slots to fill and options) in set cells.
2. Tool shows dates, text and options to user for three distinct confirmations.
3. Tool uploads data for ballot.

A dummy spreadsheet of the sort the author anticipates is attached to this paper.

Development needed:

1. Packaging the BOB software for automatic deployment.
2. Configuring the installation system.
3. Design and creation of the tool for the RO to upload data. Training in how to use it.

Roll of the Regent House

This currently exists as an Excel spreadsheet which includes the CRS IDs of all regents. It is maintained by the Registry's office which also supplies the RO. This paper proposes that this also contain the record of whether a regent has opted in to online voting.

Questions:

1. Should the request to opt in to electronic voting be part of the paper ballot process (and therefore only be available at the time of ballots) or continually available throughout the year?
2. Should the opt-in be in writing or online?

Development needed:

4. Adding the column to the spreadsheet and establishment of procedures and/or online systems to maintain it.

Ballot processes

Three procedures will need to exist for this scheme to work:

1. sending out ballot papers & flysheets to those regents not signed up for online voting.

3 The current version is commercial. BOB uses an earlier version licensed under the GPL.
[<http://www.openstv.org/>]

4 Technical note: /var is where all the log files and database files on a system go. Strictly speaking it is where system data files of **variable** size go.

2. sending out online reminder notes & fliers to those regents signed up for online voting.
3. combining paper votes and online votes.

The first two procedures are pretty much implemented already. The roll of the Regent House will simply need splitting prior to the mailshot. See above for comments on the maintenance of the split list.

It is the third process, the combination of paper and online ballots, that will involve most effort.

While paper dominates web we can simply print out the votes received online (with their anonymous tokens in place of ballot paper numbers) on slips of paper and include these in the paper counting process.

Once web dominates paper we can enter the few paper votes into a spreadsheet and incorporate them into an electronic vote count. There is a risk of errors being introduced in any transcription. Transcription can be done twice independently and the results compared, but that doubles the effort required

In between, however, we have additional effort either way.

Questions:

3. A formal decision will be needed on the relative timing of online and paper ballots. Should the online ballot start when the paper ballots are sent out or when they are expected to start arriving in people's pigeon holes? The exact time of the closing of ballots seems more clearly defined.
4. What notification should be sent to onliners? Are we content to send them only online notification?
5. How shall we mix our paper and online ballots?

Conclusion

The big issues are procedure/policy ones, not technical.