# The Election Manager System

(Rev. 20250521 – Roy Minet)

## What Is Election Manager?

Election Manager is a publicly available, integrated software system that can be utilized to automate all phases of any election in a transparent, secure and auditable manner. It may be used free of charge for any non-profit application (e.g., public elections). It is a "Swiss Army knife" for elections that can be used to:

- Flexibly define the various jurisdictions for elections anywhere on Earth
- Flexibly define elections with their political parties, races, candidates and aliases
- Export election setups to be used to load/set up precincts for election day
- Supervise and control user-friendly touch-screen voting in polling places and in voting booths
- Print voter-verifiable paper ballots which form the legal record of voters' intents and provide an audit trail
- Export a secure XML list of all ballots and choices for each polling place when polls close
- Electronically tally the results of an entire election so that accurate final results can be available within minutes after the polls close (including all write-in votes)

## Why Is Election Manager Important and Needed?

Electing the classmate most likely to succeed probably won't affect the course of world events, but electing those who will wield government power over citizens is of critical importance. The entire election process begs for automation utilizing modern technologies. However, earlier attempts to utilize modern technology have not been comprehensive system designs and have often compromised election integrity; think hanging chads in 2000 and the Direct Recoding Electronic (DRE) voting machines that produced no audit trail. It makes absolutely no sense to put the fundamental democratic process of voting at risk just for the sake of some time-saving automation.

Election Manager comprehends the entire election process and achieves the desired high efficiency while actually *improving* transparency, security and auditability over hand-marked paper ballots. The opportunity for fraud is reduced.

Both the discredited plurality voting method and AADV (Approve/Approve/Disapprove Voting) are completely supported by Election Manager. This should facilitate the phasing out of the known-to-be-awful and pernicious plurality method that prevents proper functioning of elections.

## How Does Election Manager Work?

After setting up whatever jurisdictions may be required, an election (or multiple elections) may be flexibly defined. An entire election setup can be exported as an XML file (with security fingerprint) that can be loaded from a CD or flash memory to automatically set up each precinct.

On election day, voters check in as usual. For each authorized voter, a voting booth is enabled and the voter is directed to it. The voter taps a "Begin Vote" button and the races for which s/he is entitled to vote appear on the display. The voter may quickly select candidates for each race

from a pop-up list or write in any name. When the voter has made choices in any or all races and reviewed them, s/he taps the "Cast Ballot" button which displays the voter's ballot exactly as it would print. Following a "Really sure" and a "Really, really sure" verification from the voter, the ballot is electronically cast and the voter-verifiable paper ballot is printed.

The printed ballot looks just like the one still displayed on the screen and has nothing printed on it that the voter can't read and understand. After verifying that the ballot has printed correctly, the screen clears and that voter's session ends. The voter drops the ballot into a traditional ballot box on the way out of the voting booth area.

If for whatever reason, the ballot has not printed correctly, the voter taps a "Help" button that summons the Judge of Elections and a watcher. The JoE resolves the problem on the spot or, in the worst case, allows the voter to manually complete a "Provisional Ballot."

When the polls close, a text file of the randomly ordered ballots is produced (using standard XML). The Judge of Elections and poll observers certify the results file as well as its security fingerprints. The results file can be printed and posted at the polling place, and should immediately be posted publicly on the Internet. Election Manager will tally the votes cast at the polling place, which are also posted.

The ballot files from all polling places are tallied by a copy of Election Manager anywhere which then reports results for the entire election. Anyone anywhere can verify the election totals using Election Manager, some other software, or even a hand count.

## What Approach Was Used for the Software?

All of Election Manager's source code is written in Java so that it is highly portable. Either the EM server or the EM client software will run identically on substantially any combination of hardware and operating system. Inexpensive, standard, reliable PC hardware can be used to keep everything non-proprietary, open and low-cost. A simple and user-friendly GUI (graphical user interface) with touch-screen voting is employed.

## Does Election Manager Support "Internet Voting"?

No. No system that allows voting over the Internet can guarantee acceptable security and the door is opened to other problems as well. Voting booth clients within each polling place should always be connected to the server via hard-wired Ethernet cables (no RF). However, clients can connect over the Internet to a central server while setting up jurisdictions and elections. During voting, there should be no connection to any other network, and certainly not to the Internet. However, note that these precautions are taken to avoid disruptions. Because each ballot is verified by the voter, and because the output ballot file can be verified against the ballots in the ballot box, any error(s) *will* be detected and can be corrected, whether accidental or the result of attempted fraud.

## What Election Options Are Supported?

For each election, the following can be independently selected:

- Election date and times that the polling places open and close
- Primary election (requires parties) or general election

- Races can be a referendum or elect 1, 2, 3, etc. candidate(s)
- The voting method for each race can be set either as standard Plurality or AADV (Approve/Approve/Disapprove Voting). AADV is strongly recommended.
- Pop-up candidate list can be either specific to each race or consolidated
- Voter-verifiable ballot printing can be either 8.5" x 11" or 8.5" x 14" ballots
- Either a reference number (strongly recommended) or the ballot number can be printed.
- Any number of approved aliases can be set up for each candidate (aliases are automatically comprehended, properly handled and reported in the tally process)

## How Does Election Manager Achieve Greater Transparency and Security?

Everything about voting should be completely transparent and public, except, of course, that the secrecy of each voter's ballot must be fiercely guarded. The public needs to both understand the entire process and have the visibility into it to have confidence that all procedures are followed. Only then will it be possible to trust elections implicitly.

Election Manager is written entirely in Java, perhaps the most widely used, secure and most portable programming language to-date. Both the source code and executable jar files are made publicly available. Election Manager can run on a wide selection of readily available, well understood, standard, inexpensive, reliable hardware and operating systems. Anyone can independently run and test the system. Ballots as cast are instantaneously and always maintained and reported in a random order.

The text file of results from each polling place is standard, well-understood XML in a format matching published schema. XML editors and readers (including most browsers) are widely available. The files are also human readable. The secure and redundant output file contains all ballot choices in three different sort orders with quadruple security fingerprints.

No one can guarantee that any machine at least as complicated as a paper stapler is working correctly all the time. For that reason, every output must be verifiable *and actually be verified as a part of standard procedure*. Voters verify their printed ballots. The XML output can be easily verified in two ways to the printed ballots in the ballot box. The totals for the XML file can be matched to the totals for the ballots in the ballot box OR the ballots and their choices can me matched up one-to-one with those listed in the file. Any "glitches" whether intentional or accidental **will** be caught and can be corrected. Anyone anywhere can independently verify election totals and results using the publicly-available output files and Election Manager (or any other method) to tally the ballots. Airtight integrity is assured.