Elections Division
Office of the Secretary of State

Report of the Secretary of State on the Examination of Clear Ballot Group ClearVote 1.3 Voting System

December 2016
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Overview

Application

On November 21st Clear Ballot submitted an application for Washington State Certification of ClearVote 1.3. The Voting System includes ClearDesign, ClearAccess, and ClearCount. Copies of operating and maintenance manuals, training materials, technical and operational specifications were provided as part of the Technical Data Package.

New Voting System

This is a new voting system to the State of Washington. This system is a paper based digital scan voting system with a commercial off the shelf (COTS) scanners, printers, and computers.

This system has completed testing at an Election Assistance Commission (EAC) approved Voting System Test Lab (VSTL), Pro V&V, and is currently used in Oregon and Colorado.

National Certification

ClearVote 1.4 has just begun its EAC test campaign. It is anticipated to be EAC certified in mid 2017.

Software & Hardware

The following hardware and software of the system were tested by the VSTL:

Table 2.1: Software/Firmware

<table>
<thead>
<tr>
<th>Versions</th>
<th>Software /Firmware</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>ClearDesign Components, Version 1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ubuntu</td>
<td>14.04.3 server</td>
<td></td>
</tr>
<tr>
<td>MySQL Linux</td>
<td>5.5.32 The database engine</td>
<td></td>
</tr>
<tr>
<td>Apache2</td>
<td>2.22-6ubuntu5.1</td>
<td></td>
</tr>
<tr>
<td>libapache2-mod-fcgid</td>
<td>1:2.3.7-0.ubuntu2</td>
<td></td>
</tr>
<tr>
<td>PhantomJS</td>
<td>1.9.01-1</td>
<td></td>
</tr>
<tr>
<td>Python 2</td>
<td>2.7.6</td>
<td></td>
</tr>
<tr>
<td>Python web.py</td>
<td>1:0.37+20120626-1</td>
<td></td>
</tr>
<tr>
<td>Python MySQL dB library</td>
<td>1.2.3-2ubuntu1</td>
<td></td>
</tr>
<tr>
<td>Python SQLAlchemy</td>
<td>0.8.4-1build1</td>
<td></td>
</tr>
<tr>
<td>Python Pillow library</td>
<td>2.3.0-1ubuntu3</td>
<td></td>
</tr>
<tr>
<td>Python dbutils library</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Python xlrd library</td>
<td>0.9.4</td>
<td></td>
</tr>
<tr>
<td>Python rtf library</td>
<td>0.2.1</td>
<td></td>
</tr>
<tr>
<td>Python FontTools library</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
Python PyCrypto library 2.6.1
JavaScript jQuery 1.10.2
JavaScript DataTables 1.10.5
JavaScript Bootstrap 3.0.0
JavaScript jQuery-Impromptu 5.2.3
JavaScript jQuery-qrcode 1.0
JavaScript jQuery-splitter 0.14.0
JavaScript jQuery-ui 1.10.4
JavaScript jscolor 1.4.2
JavaScript tinymce 4.1.9
JavaScript fastclick 1.0.4
JavaScript libmp3lame na
JavaScript jszip na
JavaScript papaparse 4.1.2

ClearAccess Components, Version 1.3
Windows 8.1 or 10
Python 2.7.10
Python web.py 0.38
Python pywin32 library 2.2.0
Python pyCrypto library 2.6.1
JavaScript DataTables 1.10.5
JavaScript jQuery 1.10.2

ClearCount Components, Version 1.3
webCBG.fcgi na
sql\cbgweb.sql na
Debconf 1.5.49ubuntu1
python 2.7.4
python-mysqlpdb 1.2.3-1ubuntu1
PIL-python-imaging 1.7+2.0.-1ubuntu0.1
PyInstaller 2.0
python-webpy 1:0.37+20120626-1
Ubuntu Server 13.04-serveramd64
mysqlserver 5.5.32
apache2 2.22.22-6ubuntu5.1
libapache2-mod-fcgid 1:2.3.7-0.ubuntu2
samba 2:3.6.9-1ubuntu1.1
JavaScript Bootstrap library 2.3.2
JavaScript Chosen library 1.0.0
JavaScript jQuery library 1.10.2
JavaScript jQuery-migrate library 1.2.1
JavaScript DataTables library 1.9.4
JavaScript FixedHeader library 2.0.6
JavaScript hotkeys library no version, dated May 25, 2013
JavaScript pep library no version, dated Oct 4, 2013
JavaScript tooltip library 1.3
JavaScript LESS library 1.3.3
JavaScript TableTools library 2.1.5
ZeroClipboard.js na
Table 2.2: Hardware Components ClearVote 1.3

<table>
<thead>
<tr>
<th>Voting System Component</th>
<th>Serial Number(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ClearDesign Components</strong></td>
<td></td>
</tr>
<tr>
<td>Dell Precision M2800</td>
<td>13Q0362</td>
</tr>
<tr>
<td>Dell Laptop Latitude E5570</td>
<td>927QQC2</td>
</tr>
<tr>
<td>TRENDnet Switch TEG-S80g</td>
<td>CA11238032857</td>
</tr>
<tr>
<td><strong>ClearAccess Components</strong></td>
<td></td>
</tr>
<tr>
<td>Dell OptiPlex 3240 All In One</td>
<td>F0B6B02</td>
</tr>
<tr>
<td>Dell Inspiron 15 5000 Series 2 in 1 (Windows 10)</td>
<td>29XF1C2</td>
</tr>
<tr>
<td>Oki Data Laser Printer Model: B432dn</td>
<td>SAK5B007647A0</td>
</tr>
<tr>
<td>Brother Laser Printer Model: HL-L2340DW</td>
<td>U63879M4N628612, U63879M4N628617, &amp; U63879M4N628535</td>
</tr>
<tr>
<td>HP OfficeJet 100 Mobile printer</td>
<td>MY648F10JG</td>
</tr>
<tr>
<td>HP Inkjet Printer Model: HP7612</td>
<td>CN6343R0D6</td>
</tr>
<tr>
<td>APC Smart-UPS 1500 (for All In One PC) Model: SMT1500</td>
<td>3S1525X07491</td>
</tr>
<tr>
<td>APC Smart-UPS 2200 (for the Laser Printers) Model: SMT2200</td>
<td>AS1603160039</td>
</tr>
<tr>
<td>Origin Instruments Sip/Puff Breeze with Headset Model: BZ2</td>
<td>AC-0313-H2</td>
</tr>
<tr>
<td>Storm EZ Access Keypad Model: BZ2</td>
<td>1500005</td>
</tr>
<tr>
<td>Hamilton Buhl Over-Ear Stereo Headphones Model: HA-7</td>
<td>CLR-002-20-HP</td>
</tr>
<tr>
<td>ElectionSource Table Top Voting Booth (Privacy Screen) Model: VB-60B</td>
<td>CLR-002-21-VB</td>
</tr>
<tr>
<td>Hosa Technology Male 3.5 mini to Female ¼” Adapter Model: GMP112</td>
<td></td>
</tr>
<tr>
<td>Hamilton Buhl Sanitary Headphone Covers Model: HYGENX45</td>
<td></td>
</tr>
<tr>
<td>Security Seals Model: MRS2-12030</td>
<td>CLR-002-22-Seal</td>
</tr>
<tr>
<td><strong>ClearCount Components</strong></td>
<td></td>
</tr>
<tr>
<td>Fujitsu fi-6800 Scanner</td>
<td>A9HCA00737</td>
</tr>
<tr>
<td>Fujitsu fi-6670 Scanner</td>
<td>AAADC00936</td>
</tr>
<tr>
<td>Fujitsu fi-7180 Scanner</td>
<td>A20D000798</td>
</tr>
<tr>
<td>IBML ImageTrac Lite Scanner 6000 series</td>
<td>A-108126000019</td>
</tr>
<tr>
<td>IBML ImageTrac DS series Scanner 1210</td>
<td>763SHT416568M100050029</td>
</tr>
<tr>
<td>Toshiba Laptop Model: S55-A5167</td>
<td>1E098351S, 1E123732S, &amp; 1E068199U</td>
</tr>
<tr>
<td>Lenovo Laptop Model: Y50-70 20378 59441402</td>
<td>CB34965397 &amp; CB34673854</td>
</tr>
<tr>
<td>Dell Laptop Latitude E5570</td>
<td>5537MC2, J2ZQQC2, &amp; FXDQQC2</td>
</tr>
<tr>
<td>HP ProBook Laptop Model: 4540s</td>
<td>CLR-002-23-Laptop</td>
</tr>
<tr>
<td>Lenovo Server Tower Model: TS140</td>
<td>MJ03T42D</td>
</tr>
</tbody>
</table>
The ScanServer™ computer hosts the primary database and the ClearCount server and client software that recognizes and analyzes ballots. It can be a desktop or laptop computer. Minimum requirements include:

- 4-core, 8-thread processor
- At least 8 GB of RAM
- At least 500–750 GB of disk space
- Gigabit LAN connection
- USB 3.0 ports for backing up databases on external hard drives

When a jurisdiction installs or updates a ClearCount product, the installer program replaces the ScanServer computer’s operating system with Linux. Therefore, the operating system originally installed on the ScanServer computer is unimportant.

A desktop or laptop computer enabled with a USB 2.0 or later port that can successfully run the listed software is required for use in a ScanStation. One computer is needed for each scanner in concurrent use.

The minimum requirements for a ScanStation computer are:

- 4 core, 8-thread processor
- At least 4 GB of RAM (at least 8 GB recommended)
- At least 500 GB of disk space
- Gigabit LAN connection

Software requirements for each ScanStation computer include:

- Operating system: Windows 8.1 Pro
- For Fujitsu scanners:
  - Fujitsu ScandAll PRO™ 2.0.12
  - Fujitsu TWAIN driver for the connected scanner, one of:
    - fi-7180 PaperStream IP 1.4.0
    - fi-6800 10.10.710
For ibml scanners:
- SoftTrac® Capture Suite 4.0 (for ImageTrac 6000 series)
- SoftTrac ScanDS 4.4.0 (for ImageTracDS 1155 and 1210)
- ibml TWAIN driver for the connected scanner, one of:
  - 03-02-01 (for ImageTracDS 1155 and 1210)
  - TWAIN Manager 6.4.0 or later (for ImageTrac 6000 series)

**Testing & Inspection**

Testing and evaluation of ClearVote 1.3 was conducted by Secretary of State staff at the Thurston County Elections Ballot Processing Center in Olympia, WA on December 6, 2016. Examining the system for the Office of the Secretary of State was Stuart Holmes, Voting Information Systems (VIS) Manager and several members of the King County Elections Department and Pierce County Elections Department. Thurston County Elections Department was also present.

Due to ClearVote 1.3 receiving a successfully test at an VTSL prior to state certification testing, a two phase testing program was developed and approved by Secretary of State VIS Manager for state certification testing.

- **Delivery acceptance testing** of the equipment and software to determine if the correct model and versions of the equipment and software are delivered and that the equipment, software and system operate as documented by the vendor.

- **Election Results Testing** to ensure that the equipment, software and system perform each of the functions required by federal, state and local law in order to administer an election from the beginning to the end.

Ballots were manually voted using the accessible voting unit, ClearAccess, and incorporated into the results to ensure proper tabulation.

**Executive Summary of Findings be Secretary of State Staff**

**Voting System Accuracy**

ClearVote 1.3 successfully and accurately tabulated all ballots including additional hand marked and manually voted ballots from the accessible voting units. Results were manually audited and reviewed by a team of two.
**Results Reporting**

ClearVote 1.3 was able to produce the state required reports for election results by precinct and cumulative. It was noted that results were produced with contests in alphabetical order which could cause some change in proofing procedure for most counties. Clear Ballot representatives present noted that this issue is currently being addressed for a future version. The ordering of contests in the report would not affect the county’s ability to import results into the Washington Election Information system (WEI) for election night reporting.

Copies of the CSV extracts were received so that they could be provided to the SOS IT staff to incorporate that format into our WEI election results import process.

**Presidential Primary**

ClearVote 1.3 can perform all the functions necessary to comply with current state requirements for the Presidential Primary. It can detect cross-party voting in a Presidential Primary without manual intervention.

**System Limits**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Tested Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precincts in an election</td>
<td>5,000</td>
</tr>
<tr>
<td>Splits per precinct</td>
<td>50</td>
</tr>
<tr>
<td>District categories</td>
<td>5,000</td>
</tr>
<tr>
<td>Districts per single category</td>
<td>5,000</td>
</tr>
<tr>
<td>Districts</td>
<td>5,000</td>
</tr>
<tr>
<td>Contests in an election</td>
<td>5,000</td>
</tr>
<tr>
<td>Candidates/Counters in an election</td>
<td>5,000</td>
</tr>
<tr>
<td>Ballot styles in an election</td>
<td>5,000</td>
</tr>
<tr>
<td>Contests in a ballot style</td>
<td>125</td>
</tr>
<tr>
<td>Candidates in a contest</td>
<td>200</td>
</tr>
<tr>
<td>Ballot styles in a precinct</td>
<td>50</td>
</tr>
<tr>
<td>Number of political parties</td>
<td>50</td>
</tr>
<tr>
<td>“Vote for” descriptors in a contest</td>
<td>50</td>
</tr>
<tr>
<td>Supported languages in an election</td>
<td>15</td>
</tr>
<tr>
<td>Number of write-ins per contest</td>
<td>30</td>
</tr>
</tbody>
</table>
Ballot Scanning

ClearVote 1.3 uses Fujitsu or IBML high-speed scanners capable of scanning up to 16,000 ballots per hour using the ImageTrac Lite. Scanning speeds of each of the four available scanners are:

- Small scanner: Fi-7180 – 700 per hour
- Medium scanner: fi-6800 – 3,000 per hour
- Medium/Large scanner: DS 1210 - 6,000 per hour
- Large scanner: ImageTrac Lite – 16,000 per hour

Ballot Processing

Different from other digital scan systems, most adjudication occurs after Election Day. Prior to Election Day, only unreadable ballots are adjudicated. After results have been enabled, adjudication can begin on all overvotes, undervotes, and write-ins.

ClearCount is currently only tested on laptop workstations. The small screen is a drawback, however the county could use the external monitor port to use a large screen monitor. However, dual monitors would not be an option. Some benefits of using laptop computers is the built in battery backup and the ability for counties to store them compactly and reuse the election space when not in ‘election mode’ (especially in smaller counties who could benefit from repurposing their office space when not conducting an election).

System Security

ClearDesign and ClearCount require a server that stores the election data. That connection to the server is via a HTTPS connection through a VPN router capable of IP/MAC/Domain name filtering and other high security features. This is ideal for completely locking down the internal network in large counties.

All laptops and computers will be hardened to restrict only ‘approved’ applications to be opened on each workstation along with securing and protecting other important areas of that workstation.

The ClearAccess devices will come with a bezel that will cover and protect the exposed ports and only expose those require for accessibility and power. Those ports can be protected via a tamper evident seal when not in use.

All software and media has an easy to view hash value that will ensure that the device’s software has not changed since its last install. Additional system and election event logs can be accessed to view any activity on that device. Furthermore, users can be given roles or credentials that limit their ability to perform any action on the system.
**Physical Security**

Clear Ballot’s security recommendations are:

When the components of the ClearCount system are not in use, they must be stored in a locked area under the custody and control of the jurisdiction. Access to this area must be controlled by the jurisdiction so the system cannot be accessed by unauthorized individuals and so that any breaches in security can be recognized through the auditing functions of the system.

When in storage or in use, the ClearCount system must be kept within a controlled area where only individuals authorized by the jurisdiction to handle and process ballots or maintain the voting system can come into direct contact with the ballots or components of the system. Each jurisdiction must also follow all jurisdictional and state rules for the handling and processing of ballots in addition to this Clear Ballot procedure. This means that at least one security method is employed to provide deterrence and physical security:

- Receptionists or guards with a gate or other barrier to the scanning area.
- Security cameras.
- Electronic door locking mechanisms such as ID cards or key fobs that record the identity of the device used or person to unlock the door.
- A locking computer rack or other cabinet to contain components of the ClearCount system.

**Write-Ins**

ClearVote 1.3 allows for entering write-in candidates after results have been enabled. Write-in candidates do not have to be on a qualified or declared list prior to ballot processing. Clear Ballot representatives recommended that counties review marks in the write-in box prior to adjudicating write-in votes for any marks that are not write-ins (marked the write-in oval, however did not write-in a name).

**Accessible Voting**

ClearAccess has an accessible voting unit that is touchscreen, can be used with the provided accessible switches or the voter’s sip-n-puff or other USB assistive device. Once the voter has completed voting, their ballot is printed onto regular ballot paper. Depending on the county’s procedures and in compliance with all other state elections law, the voter could then put their ballot into a return envelope and put into a ballot drop box and processed with all other ballots returned by mail or in drop boxes. The vote is not captured electronically so this device is not a direct recording electronic (DRE) voting unit so this device does not need to be audited separately. The votes on ClearAccess will be a part of the post-election audit as the ballots can be mixed in with all other ballots.
Conclusion

After an evaluation of the system, Stuart Holmes, Voting Information Systems Manager, believes the system and its components meet current Washington State requirements for Presidential Primary, Special, Primary, and General Elections as well as security, accuracy, and transparency.

Router:
Medium size scanner (left) small size scanner (right)

ScanServer
Medium size scanner with workstation
Large size scanner (picture left) with scan station (right – on floor)
Mobile ballot printer for accessible voting mobile unit

Ballot printer for voting centers
ClearVote server