RAVEN DESIGN DOCUMENT

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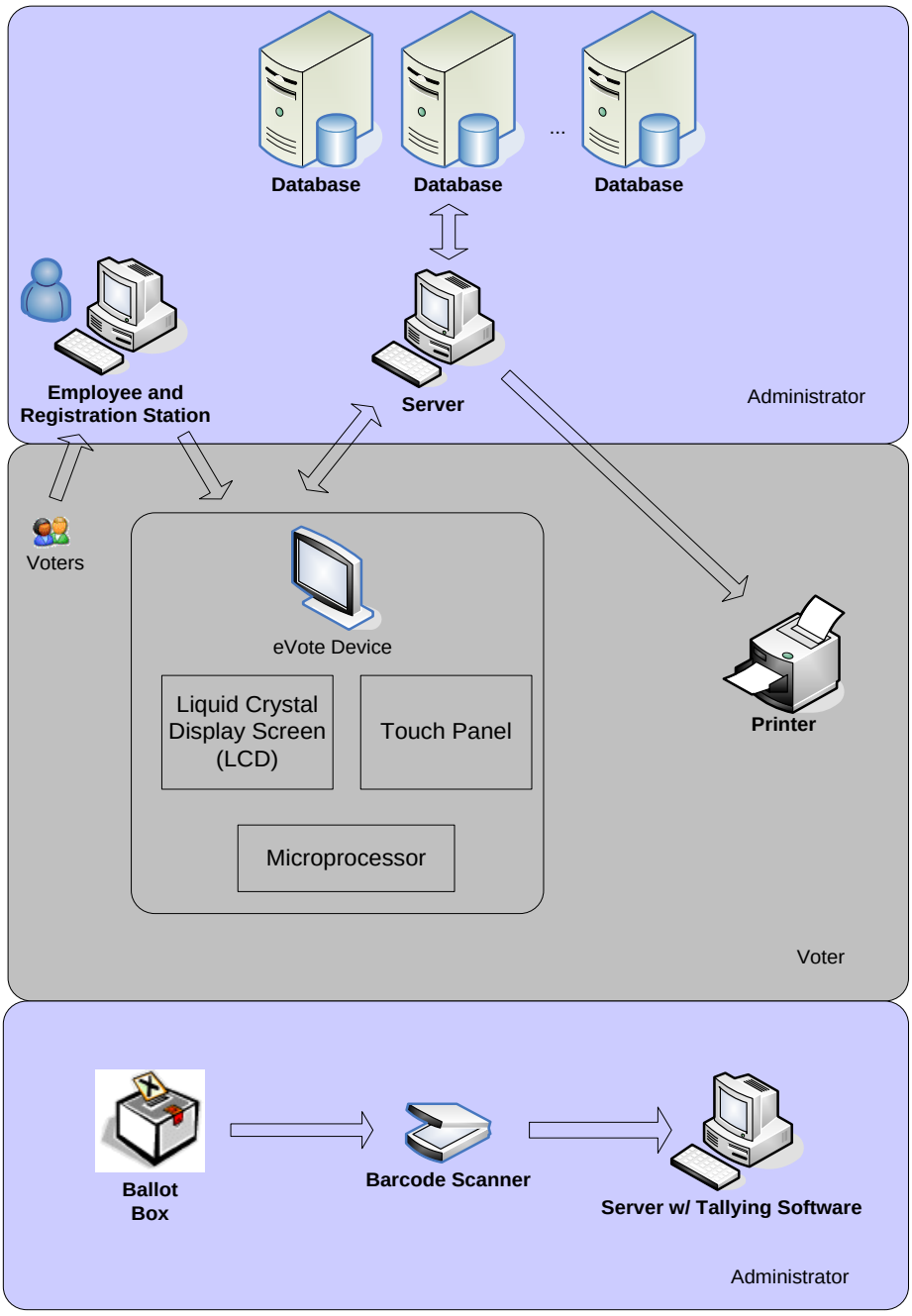
1. INTRODUCTION

Raven is the full implementation of eVote's sparrow design. This document describes how Raven will be designed and implemented. Unlike Sparrow, Raven uses software only and LCD touch-screen monitors to assist in the implementation. Also Raven includes a Tallying module using barcode scanning also discussed in detail within this document.

To learn more about the actual voting process, please refer to the Appendix 7.2, for details on the "**Elections Day Process**" which explains Election Day from start to end using eVote.

2. BLOCK DIAGRAMS

The following block diagram show the overall architecture of raven.



Raven System block diagram

Figure 1

The voters will register at the Registration Station once they arrive to place they are assigned for voting. An employee will direct the voter to a station where the voter will find an

eVote Device as well as a printer. The eVote device will be connected to a server that is connected to the data base for storing the voter selection. Once the voter is finished, he will receive a receipt ballot. The user will deposit the receipt in the ballot box. If there is a case that requires recounting of the votes, an authorized team will scan each of the barcodes on each of the ballots and the server with the Tallying Software will count and give the results of the votes once all the ballots are scanned.

3. BUDGET

The following section provides detail of the predicted budget for both the Raven and Sparrow versions of the eVote system. [18]

3.1. PERSONNEL

Table 1 – Personnel Budget For Raven [17]

Personnel	Annual Income	Salary plus benefits (Social Security and Pension Benefits)
3 Computer Engineers		
Laura Cruz	$40,000	$40,280.00
Angel Vega	$40,000	$40,280.00
Sylvia Rodriguez	$40,000	$40,280.00
1 Project Manager		
Javier Torres	$50,000	$54,100.00
	Personnel Total	$183,940.00
	Overhead Cost	190%
	Total	$479,326

3.2. HARDWARE

Materials	Total Cost
LCD Touch Screen Display	$299.99
Barcode Scanner	$119.00
Printer	$199.99
Materials Total	$617.99
Overhead Cost	190%
Total	1,792.17

Table 2 – Hardware Budget For Raven

3.3. BUDGET RESULTS

The total budget for the development of the Raven system is: $481,118.17. The highest inversion is found on the personnel. The salary of the engineers and the project manager were based on salaries assigned to the respective position on the area of Mayaguez, Puerto Rico. The benefits include a pension of 2.9% of the total salary as well as a 5.3% of the total salary for social security. The materials are tools needed to develop the hardware part of the project. The price includes one voting station, a printer and the software and scanner needed to recount the votes. The overhead cost is the cost to cover the cost for the utilities and software licensing.

4. FUNCTION POINTS

The following two tables represent the function point analysis of the Raven and Sparrow versions. With these metrics we are able to identify and measure the effort required for developing the different kinds of functionality provided by the software. [2]

Name	Type	DET	FTR/RET	Rating	Value	Multiplier	Total Value
Admin Application: Login	EI	3	0	L	3	1	3
Admin Application: eVote main screen	EQ	6	1	L	3	1	3
Admin Application: Authorization Processed Screen	EQ	1	1	L	3	1	3
Display Locked Screen	EQ	1	0	L	3	1	3
Display Welcome Screen	EQ	1	0	L	3	1	3
Display Language Selection	EI	2	1	L	3	1	3
Display Voting Method Choices	EI	2	1	L	3	1	3
Integral: Select Party	EI	4	1	L	3	1	3
Mixed/Candidature: Select Party	EI	5	1	L	3	1	3
Display Choices (State Ballot)	EQ	8	1	L	3	1	3
Display Choices (Legislative Ballot)	EQ	15	1	L	3	1	3
Display Choices (Municipal Ballot)	EQ	10	1	L	3	1	3
Select Candidates (All Ballots)	EI	1	1	L	3	3	9
Display Summary	EQ	1	1	L	3	1	3
Display Confirmation Screen	EQ	1	1	L	3	1	3
Confirm Vote	EI	2	1	L	3	1	3
Total Unadjusted Function Points							54
Value Adjustment Factor							0.95
Total Adjusted Function Points							51

Raven Function Points - Table 3

5. PROJECT DESIGN

5.1. OVERVIEW

The eVote system requires software that will allow the voter to cast their vote securely and anonymously. Software is also required in order for an administrator, like a political party representative, to verify the final vote count.

This software needs to be scalable, robust and most of all secure. In order to create this software in an organized and timely manner an evaluation of available software development models was made. The project requires a model that allows quick progress, simultaneous work in different tasks and produces documentation.

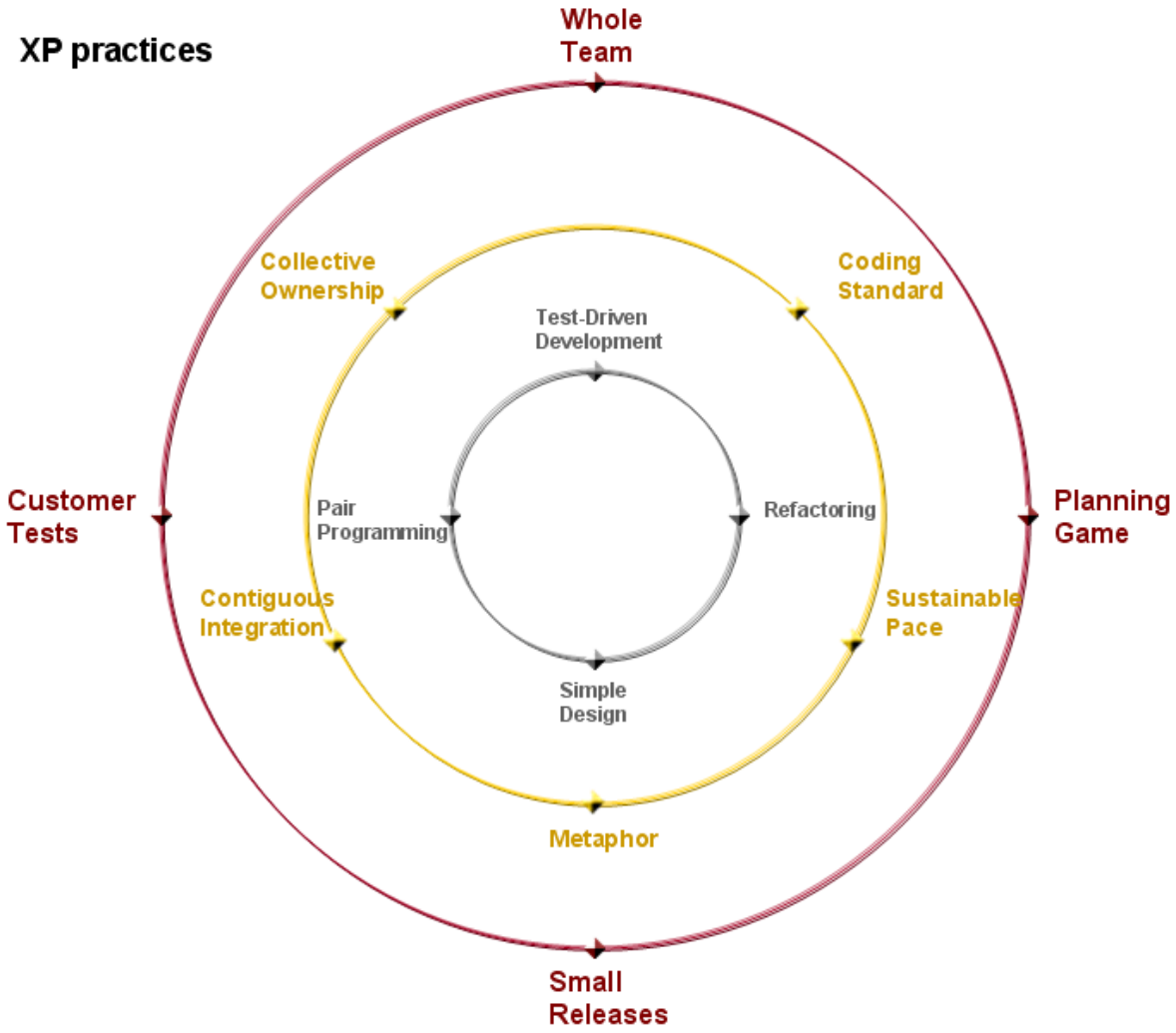
5.2. CHOSEN SOFTWARE DESIGN MODEL

The software design pattern selected for this project is a behavioral pattern. Behavioral patterns take in consideration the communication between objects identifying common patterns and realizing these patterns. Inside behavioral patterns there are several existing categories. The category selected for this project is the Chain-of –Responsibility pattern. Chain-of-responsibility pattern is based on a chain of command objects that will pass off the processing objects between them until one of the command objects can handle it. In our project, the first two command objects will be the English and Spanish Languages, the processing object will be the selected language by the voter. Another example of command objects will be the "integer" vote and mixed/candidate vote, the processing object will be the selected option picked by the voter. [20], [21], [22], [23]

5.3. CHOSEN PROGRAMMING DESIGN MODEL

The eVote project requires constant and quick progress with regards to making software. The project also requires that a considerable amount of progress be achieved in a short amount of time. For these and several other reasons the Extreme Programming agile method was selected for our project. However, one of the drawbacks of agile methods is the lack of documentation. For the capstone course the team is required to document all activities. In this way the team will

stray from the conventional agile methods in order to satisfy our course requirements. The team will follow the XP methods in most other aspects like, every contributor is an integral part of the whole team, creating software in small releases, testing code against all applicable specifications and standards , pair programming and keeping a sustainable pace. [19]



Extreme Programming (XP) Practices

Figure 2

5.4. MODEL DESIGN DECISIONS

Other common development process models were considered for this project, but were rejected because they did not meet different needs. The Prototype model was considered since it requires a semi-functional product at the end of every cycle. However, this model requires that

you finish one cycle in other to plan for the next. Due to the unyielding schedule we have, we cannot leave planning for a later stage of the schedule, so this model was rejected. We also considered using the Cascade model, but our project requires that multiple tasks be done simultaneously. The cascade model, would not allow us to begin a process without finishing a previous process, and this could delay progress. Finally, we considered a Concurrent (Issue-Based) model since it allowed for analysis, design and coding to be done at once. This seemed attractive to us since we have four team members that need to stay productive at all times. However, this model was also removed from our options since planning for concurrent processes and planning the effort required is extremely complicated and time consuming.

5.5. VOTING MODULE

5.5.1. OVERVIEW

The Raven design refers to the full scale design of the eVote system. The voting module consists of the actual voting process. Any registered voter that has been authenticated and cleared to participate in the elections, will be allowed to vote using the eVote system. The system will discard the paper ballot format and provide an interactive touch screen experience that will contain graphics. The graphics will represent each candidate's affiliation as well as their running position in full color. The voter will also be able to provide their write in choices by selecting an option to display an onscreen keyboard which will require touch interactions and once the voter has typed in the name of their nomination, the voter can then move on to the next category of the ballot. The interface will provide the option to vote for mixed party candidates or all members running particular to a specific party. The voter will then be able to submit their vote and receive a print out with a summary of their votes with the corresponding barcodes for their choices. The barcodes will be used as a backup counting method in case the electronic results are found to be invalid. The voter's choices will then be sent to a software application that then relays this information to a database where detailed information of the votes will be stored.

5.5.2. HARDWARE REQUIREMENTS ANALYSIS

The software needs to be able to interact with the voting device and acquire the voting selections made. In order to make the device compatible with the software, a driver will be developed. A physical device that can enable voters to cast their choices, and communicate this choice to a database is required. The interactions with the Raven version will be completely through touch screen interactions so the physical device requires a touch panel.

Additional hardware requirements include the systems that will act as servers for Raven. This is necessary so that the system can have a dedicated machine to the management of data used for the Raven voting process.

5.5.3. USER REQUIREMENTS

The voting process will be a simple procedure so that any demographic can adjust to the newly developed voting system. The interface used on the device needs to abide by usability and accessibility standards and provide an efficient user experience. To this end, the images will be developed to meet the user's needs. The system will be in full color to help identify the political parties with their corresponding colors. Also images will be at an acceptable size for users that have impaired vision. Font considerations and text size are also taken into consideration for the eVote interactive interface. Blind and other impaired voters will require additional assistance as they have in the past paper format elections. The development for accessible voting will be considered as future work.

5.5.4. RESTRICTIONS

The software used for the system can only be used by an elections official due to the fact that the software allows voters to check in and have a voting kiosk assigned to them. The voter will need to be checked in by the elections official before being able to vote, because the voting devices will be locked until activated through the voter check in software.

5.5.5. DATABASE REQUIREMENTS

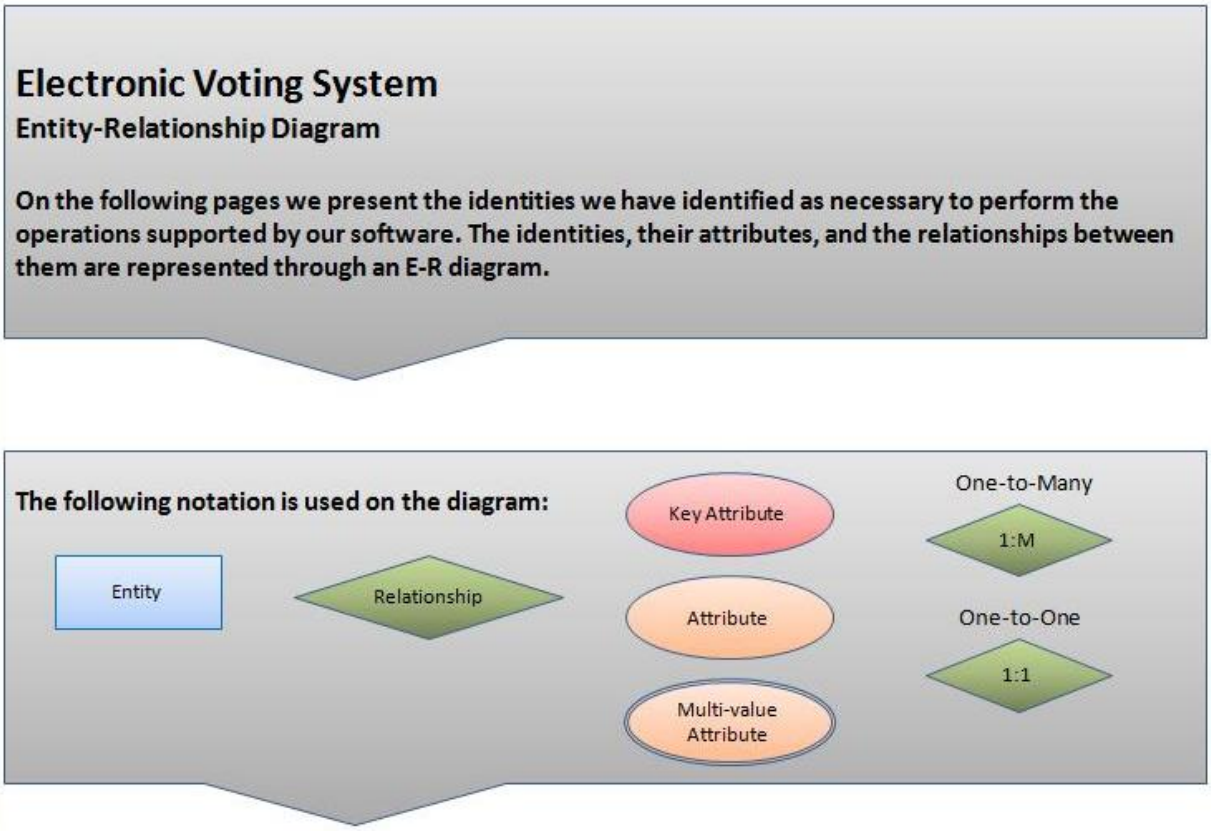
The eVote system requires two essential database designs: voting system database design and the Voter/Kiosk database design.

The voting system database design contains information pertaining to all candidates participating in the current elections. The database contains tables for Candidates, Positions, Districts, and Cities. With the information provided in this database design all necessary ballots can be created and displayed for a voter in different places. This is also the database design used for tracking the number of votes given to a specific candidate.

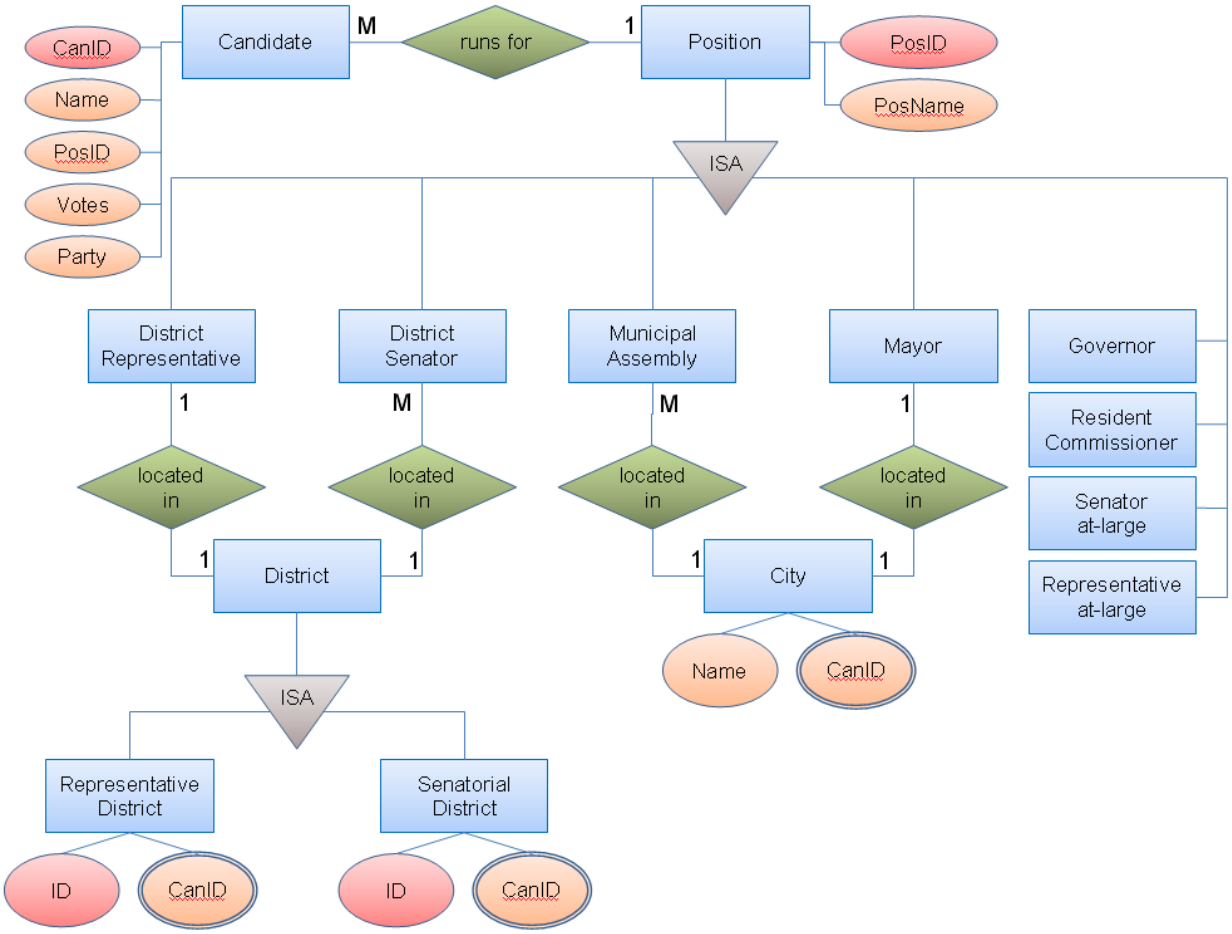
The voter/kiosk database design was made in order to provide a means for administrators to verify if a voter has already participated in the current elections. The database design contains two main entities: voters and kiosk. With these entities and their corresponding attributes an administrator can determine if a user has already participated in the election and the administrator can also associate a kiosk to a voter. This relationship is helpful when assigning a kiosk to a voter and also as a way to track who has used which kiosk. This can aid in protecting kiosks and determining who is responsible for any kiosk damage.

It is important to point out that these two database designs are in no way connected and there will be no method in which the design will allow anyone to decipher who a voter cast a vote for.

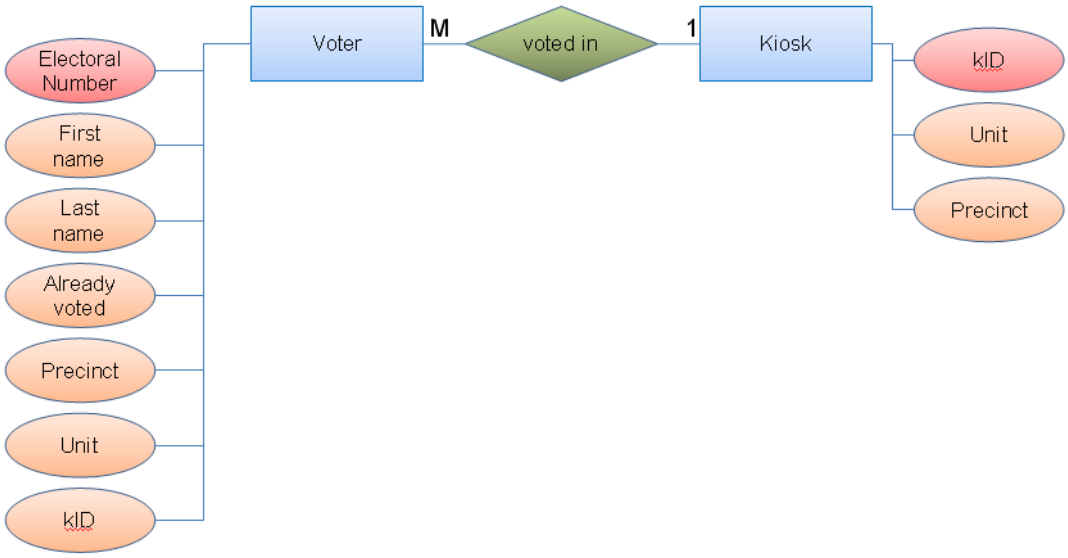
The information stored in these two designs needs to be backed up and protected in order to protect two valuable sets of information: the voting count and the voter personal information. Database replication can help secure this information with a master/slave relationship between the original database and copies. If the master database becomes unavailable or compromised, the slave databases will take over any functions of the master database and will provide any necessary information. Synchronous replication would guarantee that no loss of information occurs as storing any information would happen in master and slave simultaneously.



Entity Relationship Diagram Legend - Figure 3



Raven Voting System ER Diagram - Figure 4



Raven and Sparrow Voter Kiosk ER Diagram - Figure 5

5.5.6. SECURITY REQUIREMENTS

To prevent the results of the election from being viewed and understood by anyone else other than selected officials, the information sent to the database will be encrypted. Only special software used to acquire this information will be able to decrypt it.

5.5.7. SOFTWARE TRUST ISSUES

Since elections is a public event, it is important to establish a specific level of trust to the programming behind the votes made with the eVote system. After completion of the voting software has been completed, it will be made open source to prove that JSAL's work is neutral and unbiased.

The topic of corruption affecting the electronic voting systems was covered extensively in the HBO Documentary called "Hacking Democracy". The film "exposes the vulnerability of computers - which count approximately 80% of America's votes in county, state and federal elections - suggesting that if our votes aren't safe, then our democracy isn't safe either."[Hacking Democracy ref #] For this reason it is important that the eVote system, in its Sparrow and Raven versions, maintains the utmost transparency both in code and in information management. Our system seeks to stand out with the transparency with which it is developed and the effort spent in securing information and maintaining voter anonymity.

5.5.8. BALLOT DESIGN

A similar design to the physical ballot will be used to allow a familiar interface that any user with voting experience is accustomed to. EVote will provide small tutorials for users who have no experience so that they are not confused when the moment comes to vote.

Governor Voting Ballot – Original Taken from the Elections in Puerto Rico website [25]

Figure 6

Figure 10 shows an example of the governor ballot which was used to design the interface allowing for a more familiar look. Figure 11 depicts the legislative ballot and Figure 12 shows the municipal ballot. While the legislative and municipal ballots are extensive, Raven will support a scrolling feature allowing the voter to view all possible options.

Legislative Ballot – Taken from Elections in Puerto Rico website [25]

Figure 7

Municipal Ballot – Taken from the Elections in Puerto Rico website [25]

Figure 8

The design of the electronic ballots will take the current format of each ballot and implement them in a similar fashion which should in essence lower the learning curve. This design will allow the voter to have mixed votes or simply vote for all party members in one column if the insignia is selected.

5.5.9. DESIGN DECISIONS

5.5.9.1. DECISION BACKGROUND

The goal is to design an interface in which a user can pick up the device and interact with it easily during the time of the elections. The user interface will hopefully improve the user experience from past elections and provide a more modern feel while voting.

There are many trade-offs involved with the development of the voting of EVote. In order to maintain the budget, economic hardware components will be purchased to assure that the prototype can be built within a reasonable spending limit.

Raven will require a LCD screen with touch screen capabilities that can communicate with computer software. After comparing market prices, the panels using resistive screen technology are the most economic and easy to use on the user end. Due to our budget, the resistive technology is preferred. Due to the need of a write in feature where the user can enter a name into the eVote device, an on screen keyboard will be implemented to take full advantage of the capabilities that the touch screen provides.

Since Raven is to be completely implemented using software, no additional hardware components is needed in the design.

5.5.9.2. LCD SCREEN DESIGN DECISIONS

Monitor	Display Size	Price	Comments
Megavision MV155UB 15" Touchscreen LCD Monitor - 500:1, 12ms, 1024x768 (XGA), Black	15 “	$299.99	Compatible also with IBM and Apple
Synaps S15TSM/T5AV 15-inch Touch Screen Monitor	15 “	$429.00	For use in retails and point of sales, educational, industrial, scientific or manufacturing, office automation, self service kiosk, inter-active marketing and advertising. Easy to operate and accurate with a stylus, gloved hand, pen, or direct contact
Synaps S17TSM/T7AV 17-inch Touch Screen Monitor	17”	$529.00	For use in retails and point of sales, educational, industrial, scientific or manufacturing, office automation, self service kiosk, inter-active marketing and advertising. Easy to operate and accurate with a stylus, gloved hand, pen, or direct contact
Gvision P15BX-AB-459G 15-Inch LCD Touch Screen Monitor with Built In Speakers (Black)	15”	$399.99	Support for plug & play
10.4 Desktop TFT LCD Monitor w Touch Screen + VGA	10.4”	$199.99	Too small.

LCD Screen Comparison Table [1] - Table 4

The most efficient monitor would be the mega vision monitor, which has a high resolution as well as an efficient display size. Coincidentally, touch screens are easier to find for the size of the monitor.

5.5.9.3. PRINTER DECISIONS

Printer	Price	Resolution	Paper Storage	Speed	Duty Cycle
HP LaserJet P1006 Printer	$179.99	600 x 600 dpi	150	17 Pages per Minute	5000 pages
HP LaserJet P1005 Printer	$129.99	400 x 600 dpi	150	15 Pages per Minute	5000 pages
HP LaserJet P1505 Printer	$199.99	600 x 600	250	24 Pages per Minute	8000 pages
Samsung ML-1630 Monochrome Laser Printer	$ 199.95	1200 x 1200	100	17 Pages per Minute	5000 pages

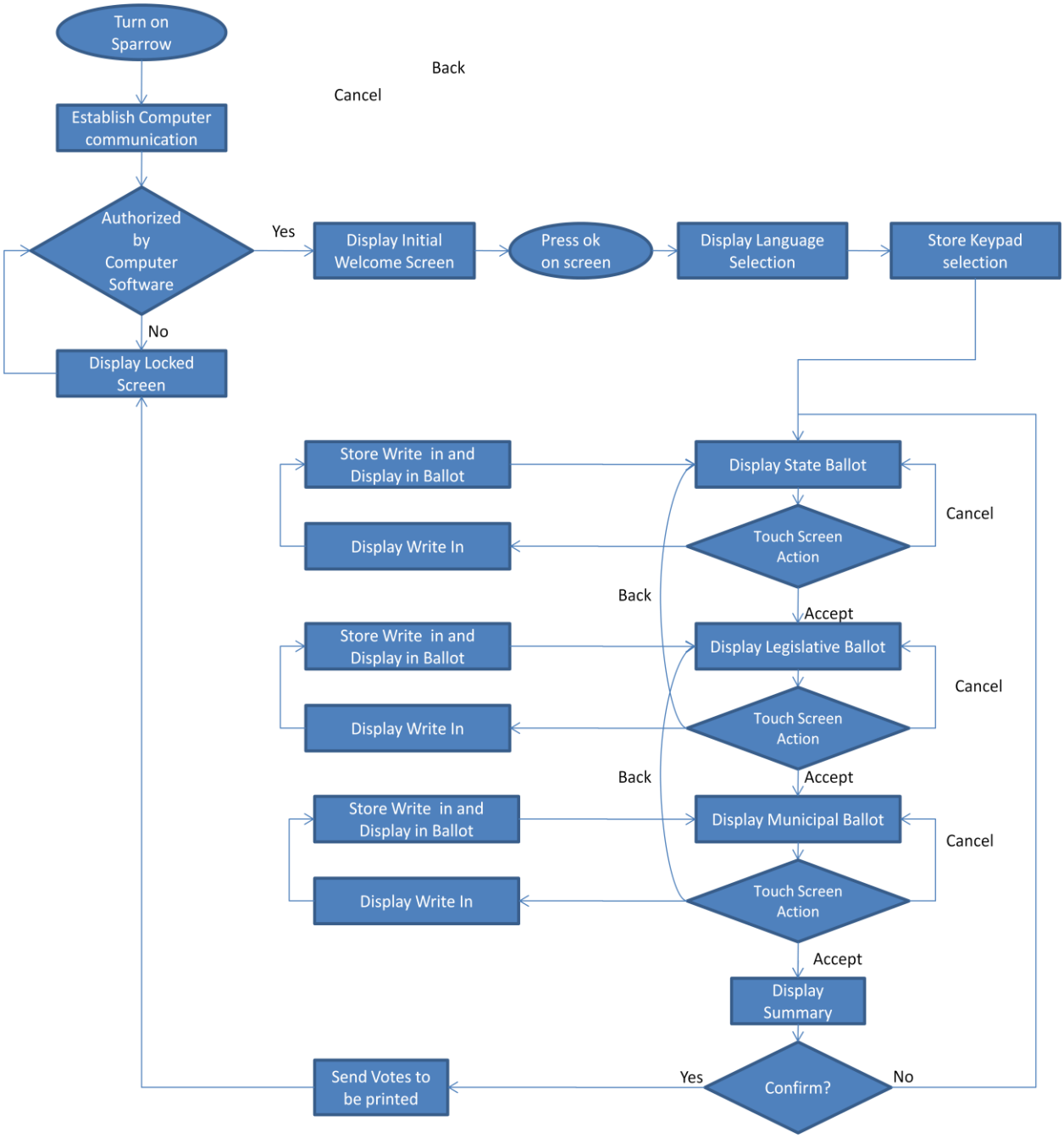
Printer comparison Table

Table 5

The recommended printer is the HP LaserJet P1505. The reason for recommending this printer is basically the high paper storage and the high speed for printing. Also, it has a great duty cycle.

5.6. RAVEN FLOWCHART

The flowchart represents the flow of execution of the Raven system. When the device is turned on, it will establish communication with a computer through its software. This is important so that the voting summaries can be sent into the database for tallying purposes.



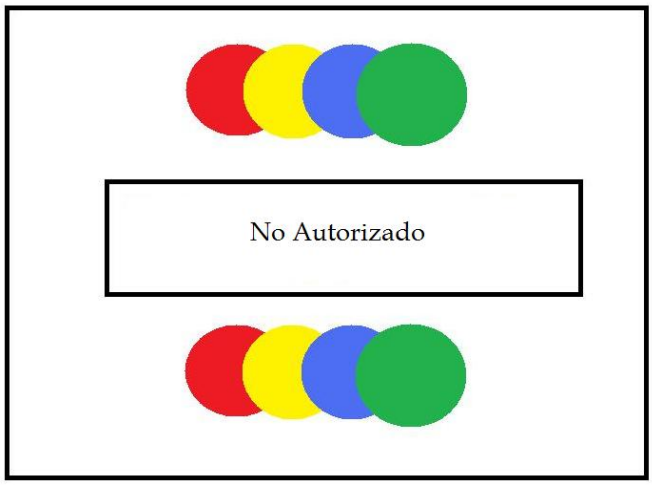
Raven Device Flowchart - Figure 13

5.7. RAVEN INTERFACE DESIGN

The eVote system will implement the three ballots used in today's elections. When the user arrives at the voting booth, they will encounter an initial screen upon being authenticated by an elections official shown in Figure 14.

Initial Screen of eVote - Figure 14

Once touching the screen, the voter is rapidly directed to the first ballot. However, if not authenticated first by an elections official the screen will display what is shown in Figure 15.

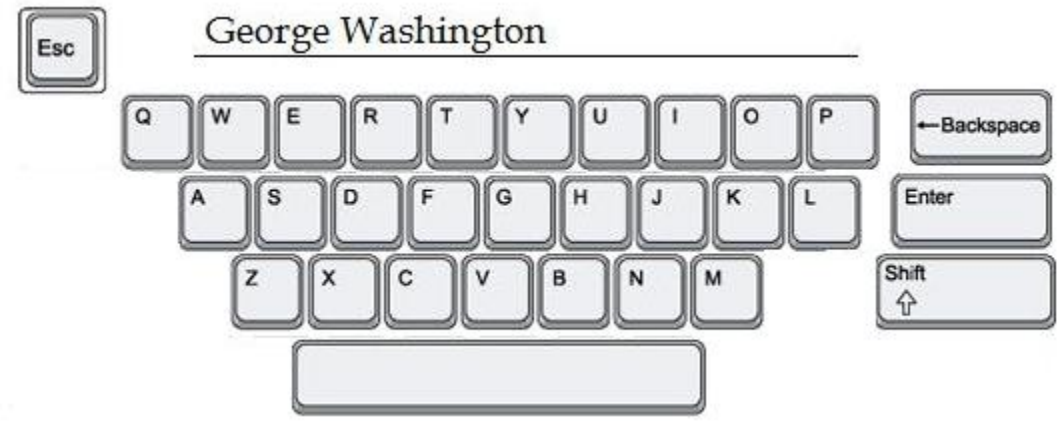


Locked Screen of eVote - Figure 15

They will have the option to select one candidate of their choice for each position in the ballot shown in Figure 16. To perform a write-in the voter can simply touch the right most columns where gray circles are located. After touching this area, a write-in touch interface will appear in the form of a keyboard.

Governor Screen of Raven - Figure 16

Write in will have an onscreen keyboard appear allowing you to type in your choices.



Touch screen keyboard screen on eVote –Original image taken from Seo consultants web page [24][2]

Figure 97

Once the voter has typed in their write-in, they can simply press enter and the write in choice will appear in the corresponding row and column as seen in Figure 18.

Governor Ballot – Write in

Figure 10

Item Selected – Governor Ballot

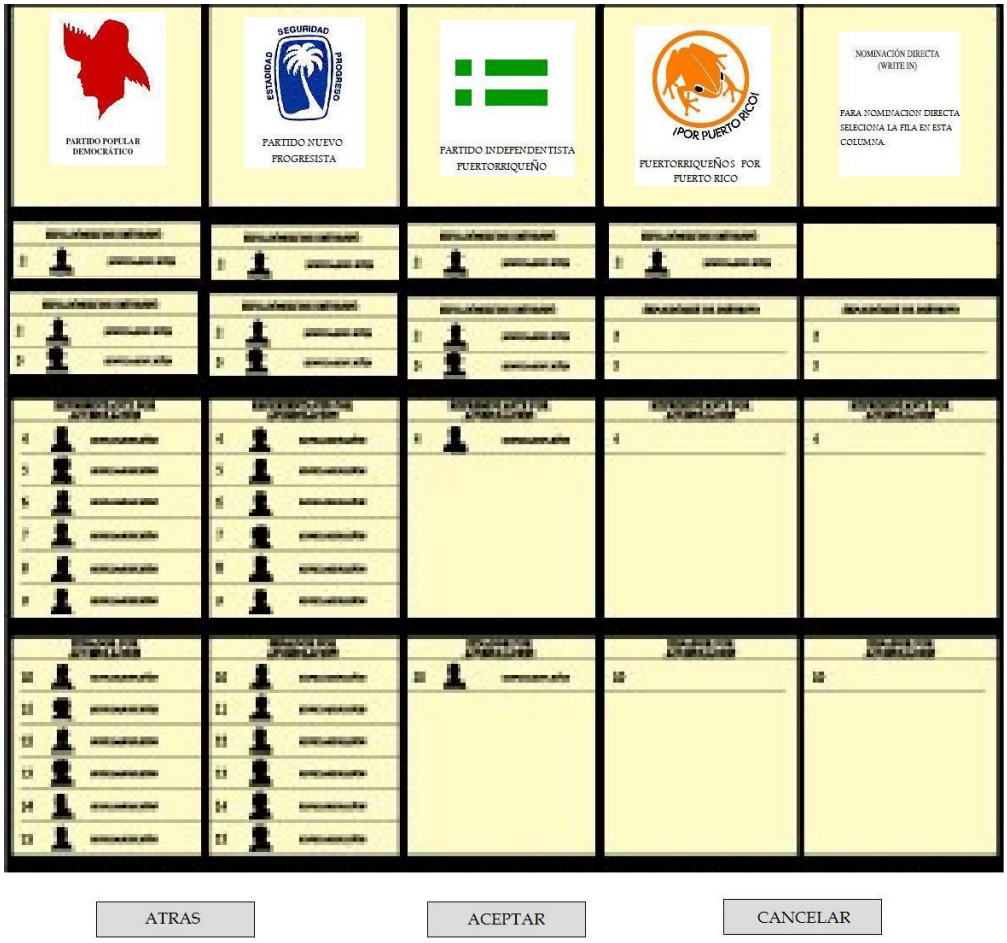
Figure 191112

Once you select a candidate the write in will be removed and your selection will be highlighted as seem in Figure 19. After making the corresponding selections, the voter must press the accept button to continue to the next ballot. Pressing cancel would nullify the selection made and return the screen to its original state.

Municipal Ballot Screen

Figure 20

The next ballot shown in Figure 20 is the municipal ballot. Voting on this ballot will behave in the same manner as the first ballot. Selecting a mayor will highlight your selection and if you select a row in the write in column, a key board will be displayed allowing you to continue typing in your choice for that particular voting position.



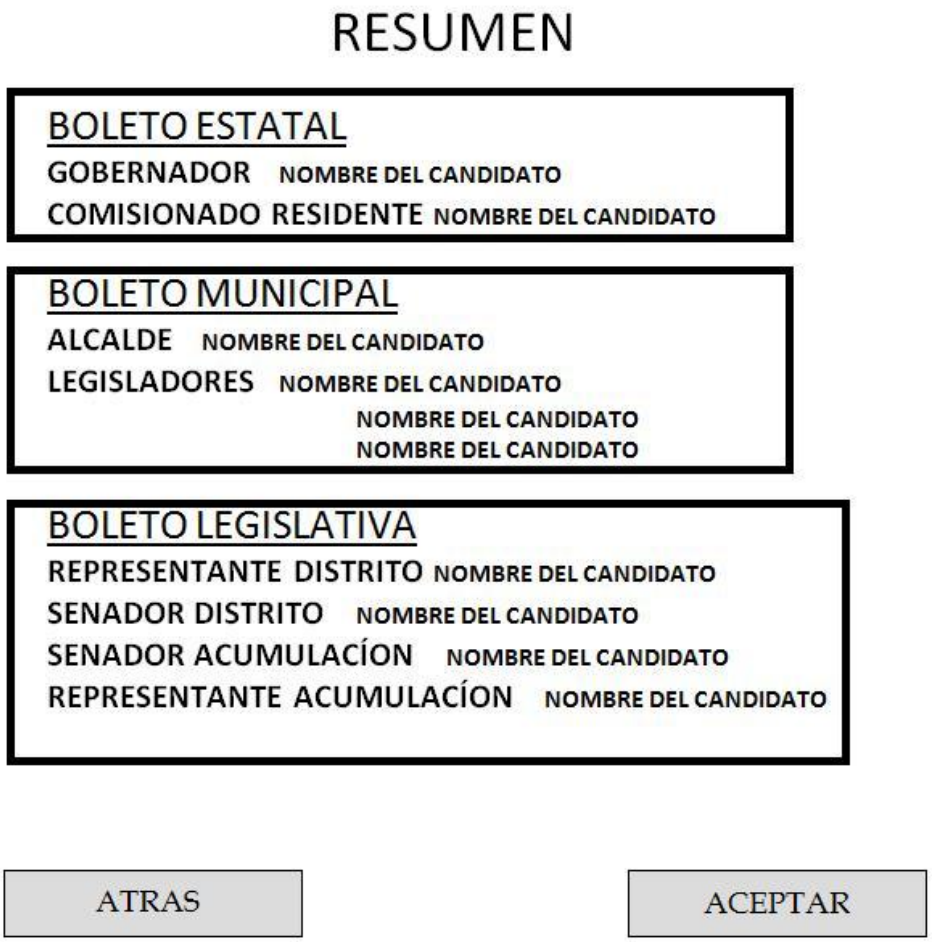
Legislative Ballot Screen

Figure 13

Figure 21 shows the third and final ballot to be implemented which is the legislative ballot. Interactions on this ballot are of the same method as the previous ballots.

After the first ballot if the user decides to return to a previous screen, they can simply click the back button labeled "ATRAS" in the ballot Figures 20 to 21. Once the voter has selected the accept button on this ballot they will be directed to a summary screen seen in Figure 22, where they will be briefed on their voting choices. Here they can decide if everything is in order, if not, they can simply click back until they reach the ballot they wish to modify.

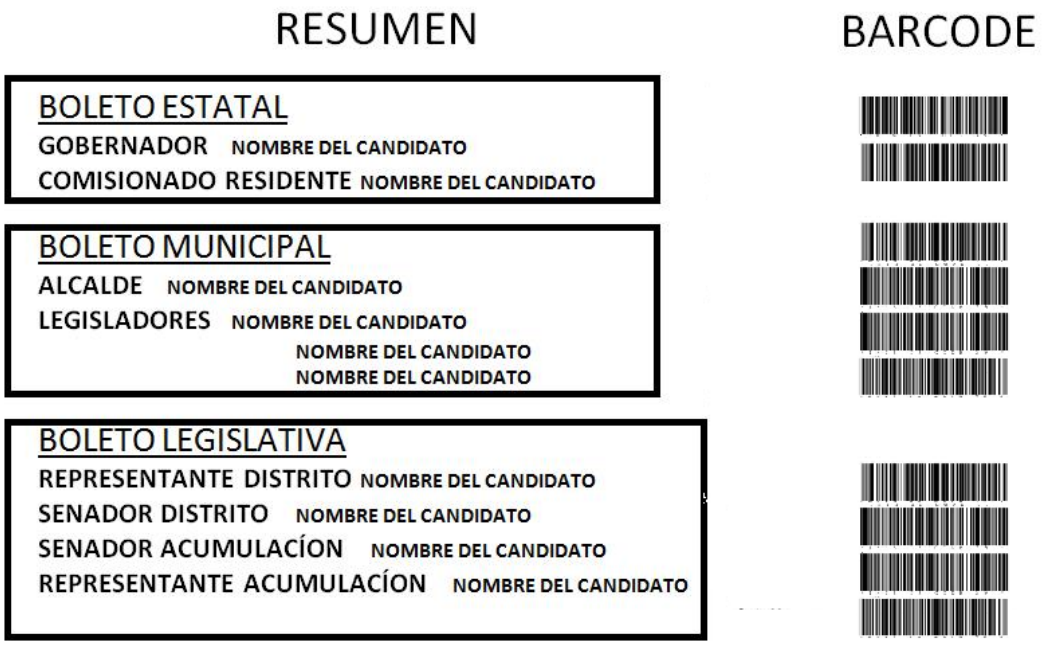
Each ballot will still remember the selections made to them so by pressing the back button, the voter will not have to "re-vote".



Voting Summary Confirmation

Figure 22

The summary will contain the votes in blocks that correspond to each ballot to keep an organized look.



Summary Printout Receipt

Figure 23

Once the user has accepted the voting summary, which effectively submits their votes, a print out with barcodes that correspond to the voting selections will be made available by a printer within the current voting booth. The barcodes will have specific information that refers to the position, political party and name of the candidate.

5.7.1. PROGRAM DESIGN

The voting check-in software for Raven and Sparrow are the same since both versions require the voter to check in with an elections official and have a voting booth assigned to them electronically, which is the purpose of the software.

5.7.2. SOFTWARE DESIGN CONSIDERATIONS

One of the most important aspects of the software is the protection of the sensitive voting data. This can be done by creating a key that encrypts the information in the database and no one without knowledge of this key will be able to decipher the encryption.

5.8. TALLYING MODULE

5.8.1. OVERVIEW

The Raven system will provide an application for counting the votes for the case of re-counting for a revision of the results. The counting application will provide an interface so that a person can scan the barcodes printed on a ballot using the barcode scanner. The process of re-counting the votes will be the same process that is being followed today for counting the votes in which there is an authorized representative of each party, the only change will be found in the counting of the votes. Instead of counting the votes manually, the votes will be scanned and the application will count the votes. When all the ballots are counted the application will provide an option to print a document with all the results and a signature space to validate and sign the results. By scanning the votes, instead of counting them manually, there will be a reduction in time of processing the votes as well as precise results.

5.8.2. INTERFACE REQUIREMENTS

A user interface is required in order to manage the scanned results. The user interface will count the votes and will provide a print copy of the results. As a hardware requirement, the interface must be able to interact with barcode scanner.

5.8.3. INPUT AND OUTPUT REQUIREMENTS

An input for the module will be the barcode code. This input will be produced by the barcode scanner in text format. The output of the module will be the result report in which the user will act as the consumer. The output will be text formatted.

5.8.4. FUNCTIONALITY REQUIREMENTS

The module must have the following two functionality requirements: Capture barcode code from the barcode scanner and Produce results and present then to the user. The Capture of the code from the barcode scanner is required to count the votes. The production of results and

presentation of them to the user is required to produce the results report that will be printed once the ballots are scanned.

5.8.5. RESTRICTIONS

The tallying vote application will be accessed only by authorized personnel to count the votes.

5.8.6. DESIGN DECISIONS

Why use barcode? What type of code should be used? What type of scanner? Barcodes are representation of data in an optical format that can be interpreted by an optical machine (barcode scanner). Barcodes are used to implement Auto ID Data Capture (AIDC) systems. This type of system improves the speed and accuracy of computer data entry. Therefore, if there is the need to re-count the votes, the use of the barcode will improve the speed as well as the accuracy of results.

There exist several types of barcode codes as well as several types of barcode scanners. For selecting a barcode code, the type of image and the character set are the primary characteristics to take in consideration. For this product the type of image selected was linear instead of 2-D image. 2-D images are used when complex data representation is need. Since the barcode will be used only to represent a candidate, the linear barcode comply the need. Also, linear barcode scanner is not as expensive as 2-D barcode scanners. After taking in consideration that linear image is to be used, the character set is to be compared. The barcode code 39 is the one selected for the project. The reason for selecting this particular code is based on the fact that between the codes that provided characters as well as numbers, Code 39 fonts can be downloaded free from the internet.

The type of barcode scanner will depend on the type of barcode code selected. Since the code 39 is a linear code, either a Laser Scanner or a CCD (Charged Coupled Devices) Scanner (also called linear imagers) will work for the application. Since laser scanner can also read 2-D codes, this type of scanner is more expensive than a CCD Scanner. Therefore, a CCD (linear) scanner will be used for the application. When selecting a scanner there are several

characteristics to take in consideration. For example, the Operating System supported. Since the whole eVote system will be developed to support Windows XP, the scanner selected needs to support this operating system. Scanners power consumption and reading distance will have effect on the prices of scanner. Since the project will be supported by students' finances the cheaper scanner was selected to be used on the application. [7],[8],[9], [13],[14],[15],[16]

Barcode	Character Set	Applications / Comments
Code 128	All ASCII characters and control codes	Widely used: excellent for any applications
Code 39	Uppercase Letters A-Z; Numbers 0-9; Space - . $ / + %	In very wide use for many types of applications
Extended Code 39	All ASCII Codes and control variables	Uses pairs of characters to encode non-standard symbols; wasteful of space
Code 93	Uppercase letter A-Z; Number 0-9; Space -. . $ / + %	A more compact cousin of Code 39, not as widely in use

Barcode Comparison Table [3],[4],[5],[6],[10]

Table 6

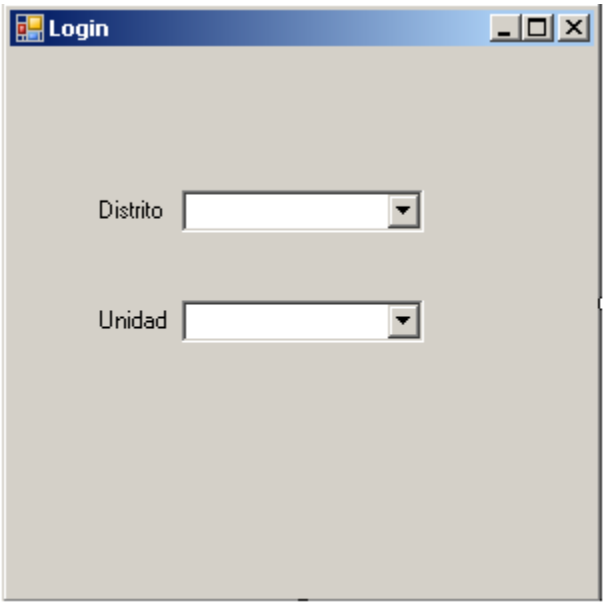
Barcode Scanner	Type	Operating System	Power	Reading Distance	Price
IDAutomation USB Barcode Scanner with DataBar and PDF417	Linear CCD	All versions of Windows (Vista Included)	5 VDC +-5% 120mA current consumption	Up to 8"	$119
EZ One Shot® USB CCD Barcode Scanner By IDTech	Linear CCD	Windows (Vista not supported)	+5 VDC ± 5% 85 mA ± 10 mA current consumption	1/2” to 1"	$69
ID Tech EconoScan	Linear CCD	Windows (Vista not supported)	+5 VDC ± 5%. 65 mA ± 10 mA current consumption	0” to 4.72”	**$89.20**
Xi3000 Barcode Scanner	Linear CCD	Windows Vista, XP, or 2003	+5V +/- 10% 75 mA current consumption	0.59” up to 10”	*$189.00*

Barcode Scanner Comparison Table [11], [12]

Table 7

5.8.7. PROGRAM DESIGN

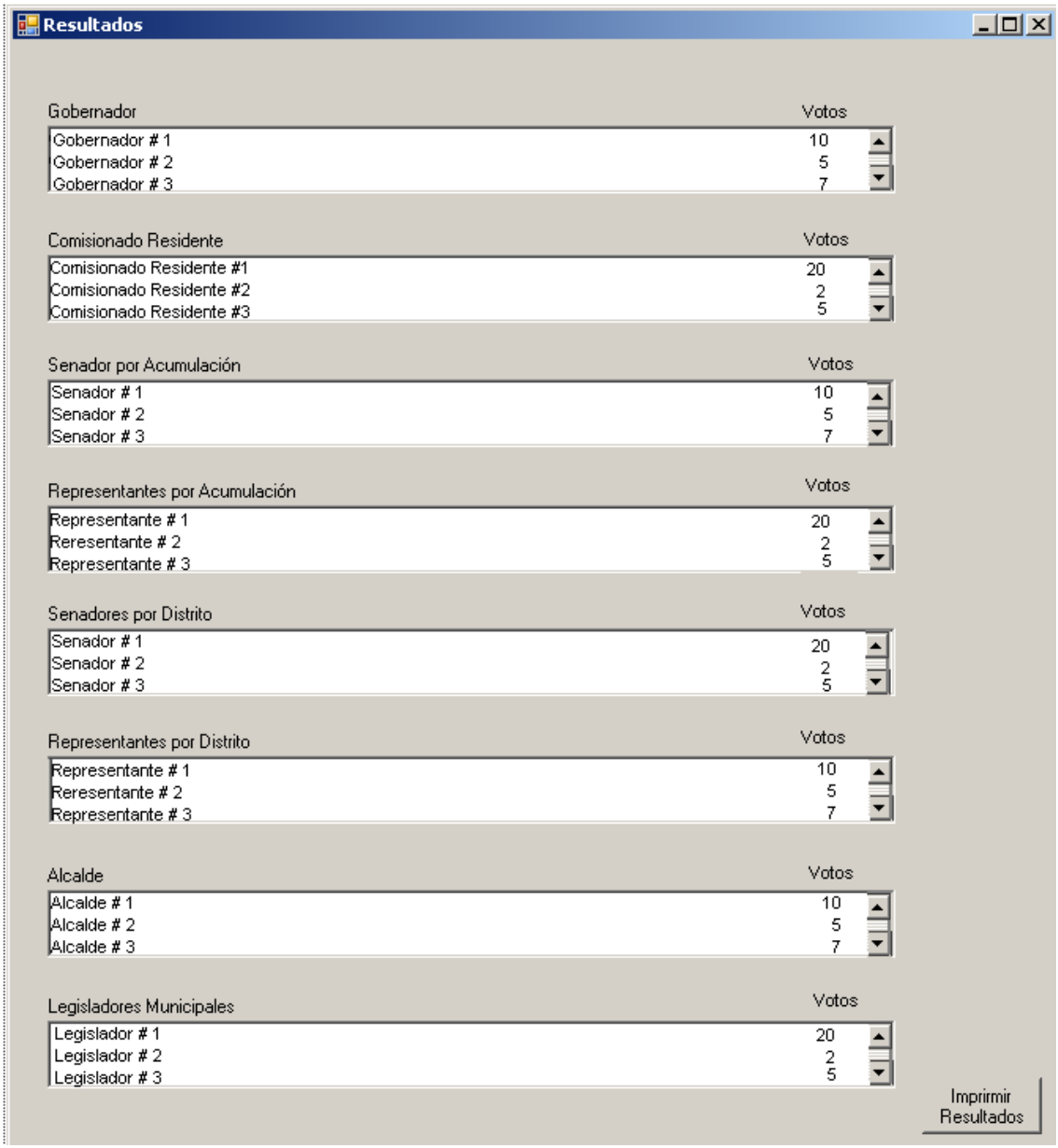
5.8.7.1. PROGRAM SCREENS



Required Login Parameters

Figure 14

The Login Screen will appear when an authorized user opens the tallying application. The user will enter the district and unit for which he will scan for tallying the votes.



Tally results Screen

Figure 26

As the user scans the ballots, the results will be displayed. Once all the ballots are scanned the user will click on the print results button to print out a report.

Gobernador

Partido	Candidato	Votos
PNP		
PPD		
PIP		
PPR		
	Otros	
	Total	

Comisionado Residente:

Partido	Candidato	Votos
PNP		
PPD		
PIP		
PPR		
	Otros	
	Total	

Representante por Distrito

Partido	Candidato	Votos
PNP		
PPD		
PIP		
PPR		
	Otros	
	Total	

Senadores por Distrito

Partido	Candidato	Votos
PNP		
PNP		
PPD		
PPD		
PIP		
PIP		
PPR		
PPR		
	Otros	
	Total	

Representantes por Acumulación

Partido	Candidato	Votos
PNP		
PNP		
PNP		
PNP		
PNP		
PNP		
PPD		
PPD		
PPD		
PPD		
PPD		
PPD		
PIP		
PIP		
PIP		
PIP		
PIP		
PIP		
PPR		
PPR		
PPR		
PPR		
PPR		
PPR		
	Otros	
	Total	

Senadores por Acumulación

Partido	Candidato	Votos
PNP		
PNP		
PNP		
PNP		
PNP		
PNP		
PPD		
PPD		
PPD		
PPD		
PPD		
PPD		
PIP		
PIP		

PIP		
PIP		
PIP		
PIP		
PPR		
PPR		
PPR		
PPR		
PPR		
PPR		
	Otros	
	Total	

Alcalde

Partido	Candidato	Votos
PNP		
PPD		
PIP		
PPR		
	Otros	
	Total	

Legisladores Municipales

Partido	Candidato	Votos
PNP		
PNP		
PNP		
PNP		
PNP		
PNP		
PNP		
PNP		
PNP		
PNP		
PPD		
PPD		
PPD		
PPD		
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PPD		
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PPD		
PPD		

PIP		
PIP		
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PIP		
PIP		
PIP		
PIP		
PIP		
PIP		
PPR		
PPR		
PPR		
PPR		
PPR		
PPR		
PPR		
PPR		
PPR		
PPR		
PPR		
	Otros	
	Total	

Certificacion de resultados:

Representante PPD

Representante PNP

Representante PIP

Representante PPR

Distrito: _____

Unidad: _____

Figure 27 – Tally Results Printout

The printing report will be signed by a representative of each party to approve the results.

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7. APPENDIX

7.1. RAVEN DATABASE DESIGN

This document is an external Document Found in the Appendix of the JSAL Final Report (section 13.4.)

7.2. ELECTIONS DAY PROCESS

1. INTRODUCTION

The following section consists of a summary of the events that will occur on the day before the elections and on the Election Day. The summary is a modified version of the traditional process in Puerto Rico, if the eVote were to be integrated in the voting process and the analog system were to be replaced. Until the analog systems are completely replaced, then the original voting procedure will run parallel to the eVote system in separate classrooms. JSAL stresses the fact, that this is only a summary it does not represent a full nor complete agenda of what will actually occur in this time period. Unnecessary details and protocols have been intentionally left out to focus more on the integration of the eVote system. Please refer to our source, the State Election Commission, for more details [1].

2. PRE-ELECTION DAY

On the day before the elections, each Electoral Unit Committee will meet up with the Inscription Committees of that precinct in the morning to pick up required equipment and will depart to their respective voting centers in order to prepare each classroom. On that same day, once all preparations (i.e. booths, urns, tables, etc.) are completed they should inform their Local Commission of that precinct as soon as possible.

3. ELECTION DAY

Before opening the voting centers, the Electoral Unit Committees will meet up at the Local Commission Headquarters, to receive their election material, including the eVote system, which will be transported back to their unit. Once they arrived, they will meet up with each

Classroom Committee to distribute the election material accordingly. The Classroom Committee will double check with a provided inventory list to make sure every item is accounted for.

When the voting centers open at 8:00 a.m. through 3:00 p.m., voters will be attended by the Classroom Committees who will guide them through the traditional process in order to cast their vote. During this period, the Electoral Unit Committee will be in charge of supervising, maintaining order, and resolve any disturbances throughout the day.

After voting centers are closed at 3:00pm, the Electoral Unit Committee will proceed to vote in their corresponding precinct. When the last voter has casted his/her vote, the Unit Committee will view the voting results and tally up the votes using a tallying application. This tallying application should also include fields for entering the voting results in the paper ballots, if any. The voting results will also be sent electronically to the Precinct Inscription Committees. Finally the Electoral Unit Committee will send the results by to the Local Commission by fax and deliver an official hard copy to the President of the Local Commission.

Once the tallying process has finished the Electoral Unit Committee will deliver the election material, including the eVote system back to the Inscription Committee. The Inscription Committee should verify that none of the components of the eVote system have been tampered with. If any of the components of the eVote system shows signs of tampering, a process for reporting tampering should begin.

The remainder of the voting equipment, like booths, urns, and tables can be left at the school for pickup by State Election Commission members in the following day.

4. REFERENCE

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