Software Requirements Specification

for

Elections Management Software (EMS)

Version 1.0

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1. Introduction

1.1 Purpose

The purpose of this document is to outline the development and implementation of a simple and secure Elections Management Software (EMS) that aims to simplify the validation and other background processes, as well as to secure the voting process and ensure confidence in election outcomes produced by the Guyana Elections Commission (GECOM). This document will go over the software's functions and users, as well as detail the constraints that may stymie the project during the design or implementation stages. Most essentially, the document will define the system's features as well as its requirements, regulations, and attributes. In other words, it specifies what the system is going to do.

1.2 Intended Audience and Reading Suggestions

This document is intended for all individuals directly involved in the development of the Elections Management Software. These include software developers, project managers, testers, and marketing personnel, but it is understandable to the broader public, which includes possible users. It is not necessary to read this document in chronological order; in fact, readers are urged to skip to any section that interests them. Having said that, developers should read parts one, two, and three in their entirety. Each section of the document is summarized below.

- Part 1 (Introduction)

  This section provides an overview of the Elections Management Software project, including its goals and general purpose.

- Part 2 (Overall Description)

  This section goes into more detail about the individual functions, and its users, as well as highlights the design and implementation constraints of the EMS. Additionally, it includes the assumptions and dependencies which are especially directed at the developers of this program.

- Part 3 (System Features)

  This section describes the EMS's features as well as the functional requirements associated with these features. It also includes response sequences that stimulate the operation of each feature, as well as the use case diagram for these features.

- Part 4 (Other Nonfunctional Requirements)

  This section describes the non-functional requirements, which include the requirements for performance, safety, and security. You can also find a breakdown of the software quality attributes and business regulations that may impact the overall system quality.

2. Overall Description

2.1 Product Perspective

Our program is a new product developed to replace the use of handwritten records at the GECOM Election. It allows the recording and analyzing of the results produced from the election.

2.2 Product Functions

- The system must allow users (legal voters) to vote for their preferred candidate.
- The system must identify voters before allowing them to vote.
- The system will keep a database of legal voters and their identifying information.
- The system must keep an activity log of all voters using it.
- The system must allow authorized personnel to view activity logs
- The system must allow authorized personnel to update the candidate list.

2.3 User Classes and Characteristics

- **User 1:** Voter

  The system is created to cater to this user's needs and preferences. The voter uses the system once: entering all required identifying information, and selecting and confirming their preferred candidate.

- **User 2:** IT Administrator

  This user is employed by GECOM and will be interacting with the system for the entirety of the voting period. Their purpose is to add and/or remove candidates, monitor the system for network disruptions and make sure all system synchronization attempts are successful.

- **User 3:** IT Specialists/ EngineersTechnician

  This person is provided by the developers, and will be interacting with the system for the entirety of the voting period. Their purpose is to fix any system malfunctions and guide the IT administrators.

2.4 Design and Implementation Constraints

- One of the developers becomes ill during the development process.
- The required development software becomes outdated and therefore unusable.
- The laws of Guyana may change, barring the developers from accessing the voters' personal information.

2.5 Assumptions and Dependencies

- All developers have working devices to contribute. These devices must also have an appropriate amount of available memory.
- All developers have access to the necessary hardware and software requirements.
- All developers have a thorough knowledge of the system being created.
- All commercial software being used in development remain available for the duration of the development.
- All developers have a consistent internet connection.
- The laws of Guyana do not change in a manner that would impact the development.
- The developers and application in general would have access to a database containing the personal and identifying information of voters.
- The voter information provided is valid.

3. System Features

System feature is a broad description of functionality.

3.1 System Features and Stimulus Sequence

3.1.1 Priority Levels

High - critical feature that allows the system to perform its fundamental operation
Medium - supporting feature that will enhance the system's operation
Low - feature than improves overall quality but is not necessary

Create profile
Description and Priority:
This feature shall allow users to create a profile which grants them access to the website's homepage.
Priority: Medium
Stimulus and Responses:

1. The user clicks the "create button"
2. The system prompts the user to create a new profile
3. Upon successful completion of this action the user is welcome with a home page

Login
Description and Priority:

This feature shall allow users with an account to login to the homepage.
Priority: Medium
Stimulus and Responses:

1. If user already has an account;
2. The user clicks the “login’ button
3. The systems allows the user to login into their profile if they have successfully passed the two-step verification
4. Users are now greeted with a home page that asks them to register as either a voter, admin or political party

Register for admin’s ID
Description and Priority:
This feature shall allow authorized admins to enter information which will be used to validate them to enter the admin page.
Priority: High
Stimulus and Responses:

1. If user selects “register as admin”;
2. The systems asks for clear identity pictures and the appropriate proof/documents
3. An automated AI systems will scan the documents for verification and compare the information with the official admin list provided by the government to avoid any fraud or impersonation
4. If the admin meets the criteria the systems allows the into the admin home page that has a list of parties, the option to total display votes, the option to edit features on all dashboards and is alerted if there is any obstruction of web traffic or technical problems users might face
5. Admin should be able to modify, add and delete voters, parties information
6. Admin should be able to grant authorities appropriate privileges
7. Admin should be able to modify circumscriptions

Register for Voter’s ID
Description and Priority:
This feature shall allow prospective voters to enter information that will be used to validate them as eligible voters.
Priority: High
Stimulus and Responses:

1. If user selects “register as voter”;
2. The system asks for clear identity pictures and the appropriate proof/documents
3. If the verification is successful the user is prompted to cast votes else the user is denied access because of an error e.g they have already voted or they are not on the voters' list or their verification document was invalid

Validate Voters

Description and Priority:

This feature shall allow admins to validate the registration of prospective voters so that only voters with approved registrations will be allowed to cast a vote.

Priority: High

Stimulus and Responses:

1. User clicks the “verify me” button;
2. An automated AI system will scan the documents for verification and compare the information with the official voters list provided by the government to avoid any fraud/ invalid votes
3. If the voter meets the criteria the system allows them into the voting homepage that has a list of parties and the option to total display votes

Cast Votes

Description and Priority:

This feature shall allow eligible voters to select the political party of their choice.

Priority: High

Stimulus and Responses:

1. After voters have successfully verified their identity and met the voting criteria
2. User clicks the “cast vote button”;
3. The system prompts a voting list of parties to choose from
4. After the user has chosen a party, the system asks for a final confirmation
5. If the user is sure about the vote they can click the “submit” button to confirm or the “cancel” button to change vote
6. If sure clicks “submit” button the system returns a successful message confirming that the vote has been cast
7. If there were any technical errors e.g obstruction of internet and the vote was not cast the system returns an error message that prompts the user to repeat the casting process

Register for “Election authority ID”

Description and Priority:

This feature shall allow users to enter information which will be used to validate them to have authorized access to the system.

Priority: Medium

Stimulus and Responses:

1. If user clicks “register for election authority ID”;
2. The system prompts the user to provide verification/identification documents
3. The system then sends a notification to the admin for approval/denial of access
4. If the user is approved they will have the privilege to view results, generate reports, and publish results else the user is denied access.

Publish results

Description and Priority:

This feature shall allow election authorities to generate and publish the results of the elections once the voting period is over.

Priority: High

Stimulus and Responses:

1. Election authority clicks “publish results” button;
2. The systems prompts the election authority to use generated results and publish elections results e.g; the winner and each parties number of votes and the location of voters(region), along with the filtered amount of voters from each region

Display results

Description and Priority

This feature shall allow users to view the statistics of the election once the voting period is over.

Priority: Medium

Stimulus and Responses:

1. User clicks “view election results”;
2. The system displays the votes of the election and the appropriate parties vote counts
3. If user clicks “exit results” the system returns user to the homepage

3.2 Functional Requirements

1. The system should allow the user to create a new account if they don't already have one
2. The system should authenticate user login using the two-step encryption login mechanism
3. The system should allow the user to choose the account type appropriate to them
4. The system should allow the admin to view statistical report of election and monitor election
5. The system should allow the admin to make changes that would fix any unexpected events
6. The system should alert the admin of any suspicious activities
7. The system should allow admin to grant privileges to election authorities
8. The system should allow the election authorities to generate results
9. The system should allow the election authorities to publish results
10. The system should allow the user to upload ID documents
11. The system should compare the ID information with the information given by GECOM and the government to ensure there is no fraud
12. The system should deny access to anyone who doesn't meet the voting criteria e.g under 18, has voted already, is not on the voters' list, or insufficient ID proof

13. The system should allow the user to access the home page and dashboard upon successful verification of ID
14. The system should save user information
15. The system should save user choice
16. The system should allow the user to cast votes and display election results upon entering the dashboard
17. The system should allow the user to choose their preferred party
18. The system should add a point to each party that receives a vote and total the results automatically
19. The system should send the user a confirmation message if the vote has been cast successfully
20. The system should send the user an error message if the was any technical difficulties during the casting of votes e.g obstruction of the internet, or web traffic
21. The system should allow the user to return to the home page after the vote has been cast
22. The system should allow the user to view election results

3.3 Use Case specification and description

3.3.1 Use case specifications

Use Case UC1	Create Profile/login
Summary	Create a user profile if the user has not yet been registered
Actor	Voter and election authority
Precondition	Sytem should be ready to verify account
Description	Basic path Created the account successfully and pending user identification documents Alternative path User already have an account and is asked to login instead

Use Case UC2	Register

Summary	Registration for online election
Actor	Voter, admin, election authority
Precondition	System should be able to grant access upon successful registration
Description	Basic path Identification confirmed and user is greeted with the software's dashboard to cast votes or view results Alternative path Access denied because of invalid identification or user has already registered

Use Case UC3	Registration for admins ID
Summary	Confirming admin ID to be granted privileges
Actor	Admin
Precondition	System should have a list of admins who can access the system
Description	Basic path Admin is verified and gets privileges Alternative path User denied and prompt to change registration type

Use Case UC4	Registration for Voter's ID
Summary	Register for voters ID and confirmation of voters eligibility
Actor	Voter
Precondition	System should be connected to the voters' list database system and ready to make verifications
Description	Basic path Voter is verified and greeted with the voter's home page

	Alternative path User is denied access because of invalid ID or has already registered

Use Case UC5	Registration for election authority ID
Summary	Registration of election authority and prompts admin to verify user
Actor	Election authority
Precondition	System must have a list of personnel who will be given privileges to make changes and publish results.
Description	Basic path User is granted access and is allowed to perform tasks Alternative path User is denied access because of invalid identification

Use Case UC6	Cast votes
Summary	System records successful votes and point is given to voters specified party
Actor	Voter
Precondition	System must collect voters choice, save choice and add points to chosen party
Description	Basic path User has successfully cast votes and is given a confirmation message Alternative path Votes has not been sent because of technical issues e.g obstruction of internet

Use Case UC7	Publish votes
Summary	After results have been generated the election authority has the privilege of publishing results
Actor	Election authority
Precondition	System should have already granted privileges to election authority to user the publish results function
Description	Basic path Results has been successfully published Alternative path Results has not been published because of technical issues which the admin should resolve

Use Case UC8	Display results
Summary	Voters are allowed to view election results after the elections authority has published the results
Actor	Voter
Precondition	Voters must have successfully registered and cast votes
Description	Basic path Results is displayed Alternative path Results are not displayed because of internet obstruction or web traffic

3.3.2 Use Case Diagram

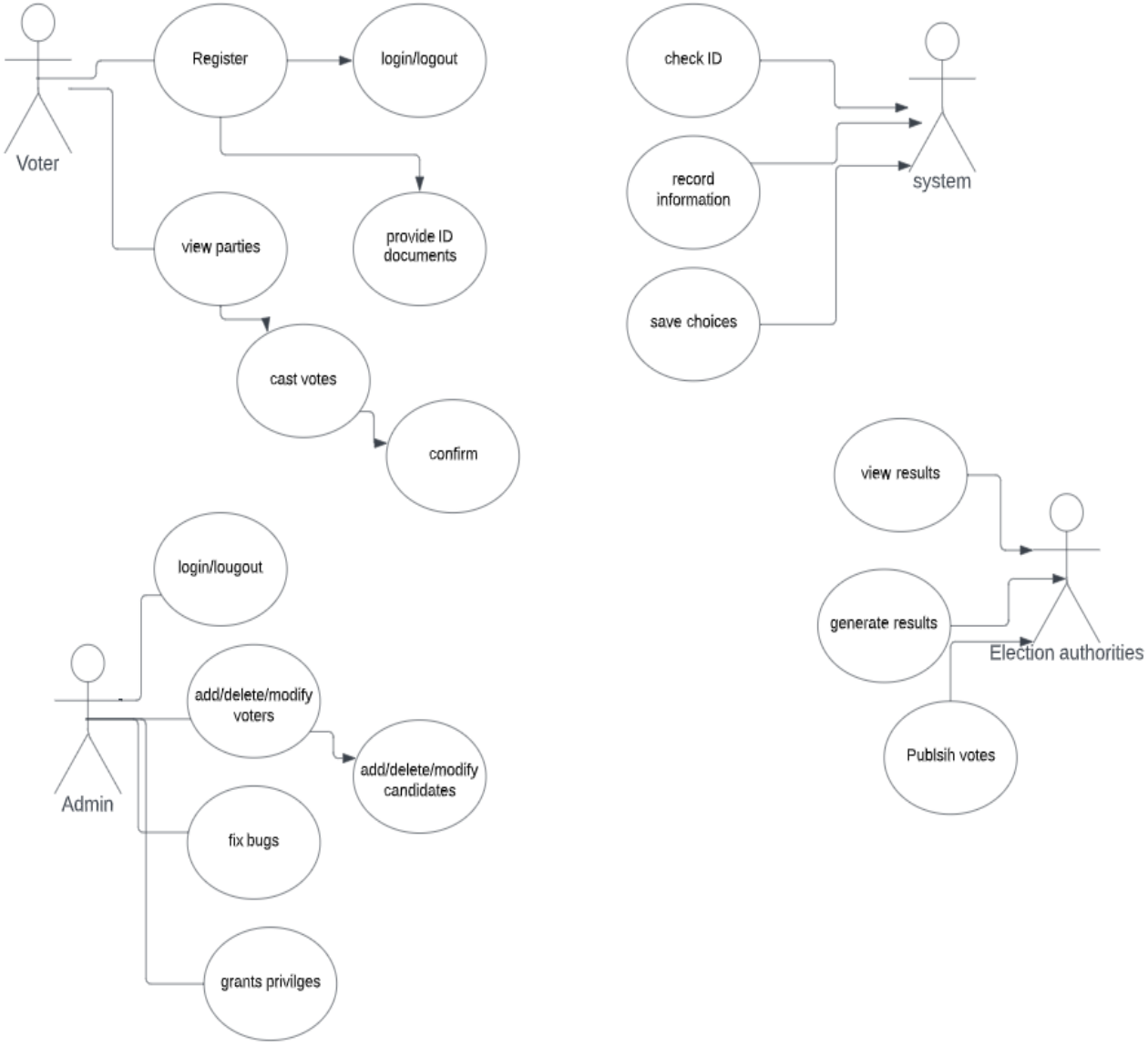

Figure 1. Diagram showing use case

4. Other Nonfunctional Requirements

Non-functional requirements of the voting system that are not explicit functions of the system, however, do play an integral role in optimizing the system's overall performance.

4.1 Performance Requirements

4.1.1 Workload and Response Time

The system should be able to manage 200,000 users at once for the provision of a speedy voting process where users will not need to worry about things like a system crash or a drastic deceleration in the response time of the system. This would be achieved by equipping the machines used to capture data with enough disk space, memory and processing power to handle the amount of data that will be inputted into the databases.

4.1.2 Platform and Scalability

As the users will be entering different sets of information on the web, it is best to have a dynamic web application. The web application will be linked to a database which will be normalized so as to prevent data redundancy. The mentioned strategies will be continuously analyzed over time and adjustments will be made based on the requirements of the system. Constructing an application which will be easily understood by voters will coherently be easier to manage.

4.2 Safety Requirements

With regards to possible harm that can be caused when a voter is using the software via their electronic devices, the majority of possibilities will be faults that are beyond our control. On the other hand, the equipment that will be used to house and make our product accessible—hardware requirements (computers, routers, backup systems, etc.)—will be kept under optimal safety practices. This would include: keeping the equipment in a cool environment; proper cable storage; optimizing electricity usage (using the right voltage, shutting off the power when items are not in use); keeping fire safety equipment at hand. In addition, periodic checks will be conducted on the equipment to check for faults and to maintain them.

4.3 Security Requirements

4.3.1 Confidentiality

As the eligible citizens of Guyana will be required to input their personal data into the system, it is prerogative that the system provides all users with extreme confidentiality in how their data will be collected, handled, processed and stored.

This would include:

1. Ensuring that users go through a two-step authentication process whenever they log in to their voting portal. These would include entering both their username and passwords where they would be notified and asked to verify their identity by a third party (such as their mobile device through SMS).

2. Ensuring that the users' passwords are hashed

3. Encrypting their data in such a way that it is decrypted only when authorized personnel access the database.

4.3.2 Integrity

In conjunction with the voting system's confidentiality, there would also be measures put in place such as privacy policies to assure the users that the system is safe to use and that everything said about the system is true.

Such privacy policies would include:

1. All personal data about you will be used only to verify your identity.

2. Most of your personal data will be kept if and only if your account is open

3. Your password will only be saved to our database if you make the decision to save it to our system.

4.4 Software Quality Attributes

4.4.1 Maintainability

The Elections Voting System will be built in such a way that there will be an ease to continuously enhance the system over time. Proper documentation will be put in place in case other developers

will have to develop the system and will need to understand both the frontend and backend of how it is built and how it works to ensure that effective enhancements will be done.

4.4.2 Usability

Since this application will be used by the adult population (18+), it will cater to those that are not familiar with modern technology usage. The user interface will make interaction as simple as possible.

4.4.3 Speed

The application will be utilized by the masses, so speed is a crucial requirement. The system will be built by optimizing computing resources however the developers see fit.

4.4.4 Portability

The operating systems of users' devices may vary depending on personal preference, financial standing, etc. The developers will therefore also construct in a language that is universally compatible with operating systems across the board.

4.4.5 Robustness

In the case that there are issues with regard to hardware, software, or user-induced faults, the developers will seek to cater for anticipated errors.

- User related- eg. Wrong input from the voter. The system will display instructions on how to eradicate the problem and lead the user back to safety.
- Hardware- there will be backup systems in place to replace damaged instruments.
- Software- to detect errors so that the probability of them occurring upon implementation, extensive testing (run-time as well as compile-time checking) and validation will be done on the software.

4.5 Business Rules

GECOM, like most voting authorities, has a series of rules in place to make sure the election process runs smoothly. These rules will be integrated into the election management software.

1. Only Guyanese citizens who are 18 years old or above can vote in elections.
2. Users must be verified before voting so as to prevent them from voting multiple times or voting ineligibly.

3. Only authorised users can register potential voters, and access, view and monitor voting and election statistics.
4. Only authorised users can access reports generated by the software after the voting period has ended.

If users do not meet the criteria or have not been granted access to the system or functions within the system, the system will restrict them and display error messages.