Software Requirements Specification

for

E-Voting using Blockchain

Version 1.0 approved.

Prepared by

Aditya Aggarwal (2000290120013) CS-6A
Ashish Kumar Gupta (2000290120043) CS-6A
Saurabh Pundir (2000290110149) CS-6A

KIET Group of Institutions

1. Introduction

1.1 Purpose

The purpose of this document is to provide a detailed software requirements specification for an electronic voting system using blockchain technology. The system will enable voters to cast their votes securely and transparently in a way that prevents tampering, fraud, and other malicious activities. This document will adhere to the standards set by the IEEE for software requirements specification.

1.2 Document Conventions

This document follows the IEEE standard for software requirements specification conventions.

1.3 Intended Audience and Reading Suggestions

This document is intended to provide suggestions to developers, project managers etc. but it is readable for every person.

1.4 Product Scope

The e-voting system using blockchain technology will be a web-based platform that allows eligible voters to cast their votes electronically. The system will use blockchain technology to ensure that each vote is recorded securely, anonymously, and immutably. The system will be designed to meet the requirements of various electoral systems, including single or multiple candidate elections, approval voting, and preferential voting.

1.5 References

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2. Overall Description

2.1 Product Perspective

The e-voting system using blockchain technology is a standalone software product that allows voters to cast their votes electronically in a secure and transparent manner. The system will be built using blockchain technology, which provides a decentralized, immutable, and tamper-proof record of the voting process.

2.2 Product Functions

The e-voting system will provide the following functions:
Registration of eligible voters.
Authentication of voters.
Ballot creation and distribution,
Vote casting and recording.
Vote counting and tallying.
Result declaration.

2.3 User Classes and Characteristics

The e-voting system will be used by the following user classes:

Voters: eligible individuals who will use the system to cast their votes.
Administrators: system administrators who will manage and oversee the system's operation and maintenance.
Election officials: officials who will use the system to create and, monitor the voting process, and declare the results.

2.4 Operating Environment

The e-voting system will be a web-based application accessible via a standard web browser. The system will require a stable internet connection, and it will be hosted on a secure server.

2.5 Design and Implementation Constraint

The e-voting system will be built using blockchain technology, which requires specialized programming knowledge and expertise. The system will also need to comply with local and national regulations and guidelines regarding the conduct of online voting.

2.6 Assumption and Dependencies

The e-voting system assumes that users have access to a stable internet connection, and that they are familiar with basic computer skills such as using a web browser and entering data into online forms.

3. External Interface Requirements

3.1 User Interfaces

The e-voting system will provide a user-friendly interface that is easy to navigate and understand. The interface will be accessible via a standard web browser and will be designed to be compatible with a wide range of devices and platforms.

3.2 Hardware Interfaces

The e-voting system will require a stable internet connection and access to a secure server for hosting the application.

3.3 Software Interfaces

The e-voting system will be built using blockchain technology and will require specialized programming knowledge and expertise. The system will also need to integrate with other software and technologies as needed.

3.4 Usability

The system should be user-friendly and easy to use. The system should provide clear instructions and guidance to the users during the voting process. The system should also be accessible to users with disabilities.

4. System Features

4.1 System Feature 1: User Registration

The e-voting system will allow eligible voters to register for the system by providing their personal details, including their name, address, and identification documents. The system will verify the eligibility of the user and assign them a unique digital identity that will be used to authenticate the user during the voting process.

4.2 System Feature 2: Ballot Creation and Distribution

The e-voting system will allow election officials to create and distribute ballots for the election. The system will provide a user-friendly interface that will allow officials to customize the ballot based on the specific election and the candidates or issues being voted on. The system will also provide a mechanism for distributing the ballot to eligible voters securely.

4.3 System Feature 3: Vote Casting and Recording

The e-voting system will allow eligible voters to cast their votes electronically using their unique digital identity. The system will record each vote securely in the blockchain ledger, ensuring that the vote is anonymous and tamper-proof.

4.4 System Feature 4: Vote Counting and Tallying

The e-voting system will use blockchain technology to count and tally the votes cast during the election. The system will provide an accurate and transparent tally of the votes, and officials will be able to monitor the process in real-time.

4.5 System Feature 5: Result Declaration

The e-voting system will automatically declare the election results based on the votes cast and the tally calculated using the blockchain ledger. The system will provide an accurate and transparent record of the election results, ensuring the integrity of the process.

5. Other Non-Functional Requirements

5.1 Performance Requirements

The e-voting system must be able to handle a large volume of traffic during the election period, and the system must be able to process votes quickly and accurately. The system must also be able to withstand cyber-attacks and other security threats.

5.2 Safety Requirements

The e-voting system must be designed to prevent voter fraud and other forms of election manipulation. The system must also be designed to ensure the privacy and confidentiality of the voter's identity and the votes cast.

5.3 Security Requirements

The e-voting system must be designed with strong security features to prevent unauthorized access and tampering. The system must also provide a secure mechanism for user authentication and data encryption.

5.4 Software Quality Attributes

The e-voting system must be reliable, maintainable, and scalable. The system must be designed with a modular architecture that allows for easy updates and modifications as needed.

6. Other Requirements

The e-voting system must be tested thoroughly before deployment to ensure that it meets all of the functional and non-functional requirements. The system must also be monitored regularly to ensure that it continues to operate effectively and efficiently.

Appendix A: Glossary

E-voting System: A system that enables voting through electronic means instead of traditional paper ballots.

Authentication: The process of verifying the identity of a voter before granting access to the voting system.

Ballot: The list of candidates or options that a voter can choose from during an election.

Blockchain: A digital ledger that records transactions in a secure and transparent manner.

Encryption: The process of converting data into a coded format to protect it from unauthorized access.

Digital Signature: A cryptographic technique used to verify the authenticity of digital messages or documents.

Electronic Poll Book: A digital version of the traditional poll book that contains voter registration information.

Hardware Security Module (HSM): A device that provides secure storage and management of cryptographic keys.

Internet Voting: A form of e-voting that allows voters to cast their ballots using the internet.

Paper Trail: A physical record of each vote cast that can be used to audit the results of an election.

Remote Voting: A form of e-voting that enables voters to cast their ballots from a remote location.

Software Security: The measures taken to ensure the security of the e-voting system's software components.

Voter Verified Paper Audit Trail (VVPAT): A paper record of each vote cast that is produced by the e-voting machine and verified by the voter.

Appendix B: Analysis Models

"PEST Analysis: Understanding the External Environment" by MindTools. This model can be used to analyze the political, economic, social, and technological factors that can impact the implementation and adoption of e-voting systems. For example, political factors may include government regulations and policies around voting, while technological factors may include the availability of secure and reliable hardware and software.

"SWOT Analysis: Discover New Opportunities, Manage and Eliminate Threats" by MindTools. This model can be used to identify the strengths, weaknesses, opportunities, and threats facing e-voting systems. For example, strengths may include the potential for increased voter turnout and accessibility, while weaknesses may include concerns around security and privacy.

"Porter's Five Forces: Analyzing the Competition" by Harvard Business Review. This model can be used to evaluate the competitive forces that can impact the e-voting industry, including the bargaining power of suppliers (such as technology providers), the threat of substitutes (such as traditional paper ballots), and the intensity of competitive rivalry between e-voting providers.

"Value Chain Analysis: Identify Activities That Create Value" by MindTools. This model can be used to identify the key activities involved in the implementation and operation of e-voting systems, from the design and development of the software and hardware components to the training of election officials and the maintenance of the system. It can help identify areas where value can be added, or costs can be reduced.

Appendix C: To Be Determined List

Security Measures:

The type of encryption to be used for the blockchain.
The level of encryption for voter data and their votes.
The security measures for voter identification and verification.
The protocol for handling errors, malfunctions, or attacks.

Governance and Administration:

The governance structure for the e-voting system.
The roles and responsibilities of the parties involved, including the election commission, blockchain administrators, and third-party auditors.
The process for selecting blockchain administrators and auditors.
The process for resolving disputes or challenges to the election results.

Transparency and Accountability:

The level of transparency for the blockchain, including the visibility of the voting process and results.
The auditing and reporting procedures for the e-voting system.
The process for verifying the authenticity of votes and ensuring the accuracy of the results.
The availability of the data for public access and analysis.

Accessibility and Inclusivity:

The accessibility of the e-voting system for voters with disabilities or limited internet access.
The language options available for the e-voting system.
The usability of the system for non-technical users, including the elderly or those with limited computer skills.
The measures in place to ensure equal access and opportunity for all voters.

Sustainability:

The environmental impact of the e-voting system, including energy consumption and carbon footprint.

The cost-effectiveness of the system and its scalability for large-scale elections.
The ability to upgrade or maintain the system over time.
The potential for integrating the e-voting system with other government services and systems.