Tribhuvan University

Institute of Science and Technology

ONLINE VOTING SYSTEM

A Project Report

Submitted to

Department of CSIT

Mahendra Multiple Campus

Nepalgunj, Banke

In partial fulfillment of the requirements for the Bachelor in Computer Science & Information Technology

Submitted by

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Under the Supervision of

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Tribhuvan University

Faculty of science and technology

Mahendra Multiple Campus

Supervisor's Recommendation

I hereby recommend that this project prepared under my supervision by Durga Devi Khanal (25285/076) and Shriya Acharya(25293/076) for their outstanding contribution to the "**ONLINE VOTING SYSTEM** " in partial fulfillment of the requirements for the degree of Bachelor of Computer Science and Information Technology is recommended for the final evaluation.

…….

Mr. Keshav Poudel

Project supervisor

Mahendra Multiple Campus

Nepalgunj , Banke

Letter of Approval

This is to certify that this project prepared by Durga Devi Khanal[25285],Shriya Acharya[25293] entitled "Online Voting System" in partial fulfillment of the requirement for the degree of Bachelor of Science in Computer Science and Information Technology (B.Sc. CSIT) has been well studied. In our opinion, it is satisfactory in the scope and quality for the required degree.

Signature of Supervisor **Signature of HOD**

…… …….

Mr.Keshav Poudel Mr.Madan Adhikari

Mahendra Multiple Campus Mahendra Multiple Campus

Signature of External Examiner

…….

Acknowledgement

It has been rightly remarked, “Develop success from failures. Discouragement and failure are two of the surest stepping stones to success.”

Before we get into things, we would like to share a few heartfelt words with the people who were part of this project in numerous ways, people who gave unending from the beginning.

The successful completion of the project is a combined effort of a number of people, and all of them have their own importance in the achievement of objective. We cannot miss this opportunity to thanks Mr. Keshav Poudel as a mentor for his timely support and valuable guidance throughout the project.

Also, we would like to thank Program Coordinator for CSIT, Mahendra Multiple Campus respected Mr. Keshav Poudel for his inputs during the course of this project. He also kept us up-to-date with relevant notices and deadlines, which helped us stay on the track to complete this project.

Last but not the least we would also like to thank our mates, teachers, and the entire campus as a whole for being a pillar of strength and support in times of stress & difficulty throughout the project duration.

Abstract

The project is mainly aimed at providing a secured and user friendly Online Voting System. Online voting is a more convenient way for voting process which use less resources with compare to manual voting process. Access online voting system through internet is more convenient way for the most of the voters with rapid development of the technology. This may be good solution for increasing the voter turnout at polls. The voting system is managed in a simpler way as all the users must cast the vote by click on his/her favorable candidates by entering their valid citizenship card number. Even so the security is the most challenging aspect when consider about online voting.

This study is about a software solution for voting through the internet. This system provides a way to record election data, process data and store them as digital information. Both casting a vote and counting votes provide through this only one voting system. Other than voting, this system also able to create and handle voter, political party and candidates details.

Keywords: Online Voting System (OVS), voters, voters registration, voting result, parties, parties registration.

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List of Abbreviations

OVS	Online Voting System
HTML	Hyper-Text Markup Language
CSS	Cascading Style Sheets
PHP	Hypertext Preprocessor

CHAPTER 1: INTRODUCTION

1.1 Introduction

An online voting system is a digital platform that enables eligible voters to cast their votes over the internet, eliminating the need for traditional paper-based ballots and physical polling locations.

Most of the countries use their governing system of democracy. Main activity in democracy is select the representative through electoral process. Most of the countries use paper ballots until now. But with the rapid development of technology most of the services provide through internet. So these voting procedures should also change accordingly. Money transactions and many more critical services handled using internet. Therefore voting via internet can be considered also. The internet voting may be next revolution in our life. This study is about a software solution for voting through the internet. This system provide a way to record election data, process data and store them as digital information. Both casting a vote and counting votes provides through this online voting system.

People who are outside their city do not wish to come to their city just for voting because of expenses and transportation problems. Some people who works in different cities may not be able attend the voting although they wish to attend. Some people who are on duty during the election they may not get the chance to attend for voting. Peoples with disabilities also may not attend for voting. Disable people cannot access to polling booths easily, but they can easily access online voting system through internet from anywhere. And also by using online voting system voters can vote their own free time within given time period without worrying polling centers. This system will lead to increase the participation to election voting with use of internet.

The main purpose of this study is to increase the voting percentage though out the country and to reduce expenditure for election. For every election government has to spend huge amount of money. During the election government has to hire lot of staff for election duties such as security, vote counting and so on. The government has to spend considerable amount of money for printing paper ballots. But the online voting system will able to reduce expenditure by reducing staff members. The printing cost of ballot sheets also eliminated though this online voting system. Voting via internet is also decrease the manual work load.

1.2 Problem Statement

The OVS can be used to solve the problems of manually counting paper ballots is time-consuming, especially in elections with a large number of voters, consumes large volume of paperwork,

Manual Counting Errors means the traditional voting systems often rely on manual counting of paper ballots, which can lead to human errors,

Geographical Constraints which means the voters who live in remote or distant locations may face challenges in reaching polling stations, potentially leading to lower voter turnout in certain areas,

Limited Flexibility is the traditional voting systems may lack flexibility in terms of voting hours and locations. etc. These drawbacks can overcome by Online Voting System.

This is a voting system by which any voter can use his/her voting rights from anywhere in the country. Voter can cast their votes from anywhere in the country without visiting to voting booths, in highly secured way. That makes voting a fearless of violence and that increases the percentage of voting.

Speed up the counting process and release result quickly is another main target of this study. Manual voting process is time consuming, and it takes more than 12 hours to release results. In Online voting, counting is done by system itself. When a voter cast his/her vote, system increments vote count automatically. Then the system can published final result as soon as election time period over.

Another purpose of this online voting system is reduction of cheating on elections. There are many people who registered more than one area to cast their votes multiple times. By using online voting system, it is possible to eliminate those kind of situations.

1.3 Objectives

- To create a module that provides admin to create user and facilitates online voting.
- To create an interface that provide a online platform to register a candidate and provide a instant voting results.
- To implement bubble sort algorithm to display voting result.

1.4 Scope and Limitations

1.4.1 Scope of the project

It was focused on studying the existing system of online voting and to make sure that the peoples vote is counts, fairness in the elective positions. This will also produce:

- Less effort and less labor intensive, as the primary cost and focus primary on creating, managing, and running a secure web voting portal.
- Increasing number of voters as individuals will find it easier and more convenient to vote, especially those abroad.

1.4.2 Limitations of the project

- OVS is that they're not as secure as traditional paper-based systems because there's always the potential for hackers to tamper with the results.
- Time factor was the greatest barriers to the successful completion of this exercise since it had to done within the semester.
- Financial constraints since all the activities involved were self-sponsored.

1.5 Development Methodology

The development methodology for an online voting system involves initiating the project, analyzing requirements, designing the system architecture, selecting suitable technologies, and adopting an iterative development approach. Emphasis is placed on security, usability, and performance through thorough testing, including security testing, usability testing, and performance testing. After deployment, training and documentation are provided, followed by ongoing maintenance with continuous improvement based on user feedback and emerging threats. Regular communication with stakeholders and compliance with legal and regulatory requirements are integral throughout the development process.

Developing an online voting system requires careful planning, security considerations, and adherence to best practices.

1.5.1 Agile Development

Agile development is effective in creating online voting systems through iterative sprints, feedback loops, and user-centric design. Cross-functional teams enhance collaboration, and continuous communication ensures a shared understanding. The methodology prioritizes adaptability over rigid plans, allowing for seamless response to changes in requirements or security considerations. User stories and usability testing focus on delivering a user-

friendly experience. Continuous integration, automated testing, and frequent releases maintain code integrity and allow rapid issue resolution. Security practices are integrated throughout the development lifecycle, with regular audits to identify and address vulnerabilities. Transparent progress, visible through tools like burn-down charts, fosters accountability. Incremental scaling addresses system scalability based on user demand. Early risk identification and collaborative risk mitigation are encouraged. Lightweight documentation ensures clarity without hindering development speed. Agile's principles provide a framework for teams to respond effectively to challenges, ensuring a secure and adaptable online voting system through continuous improvement.

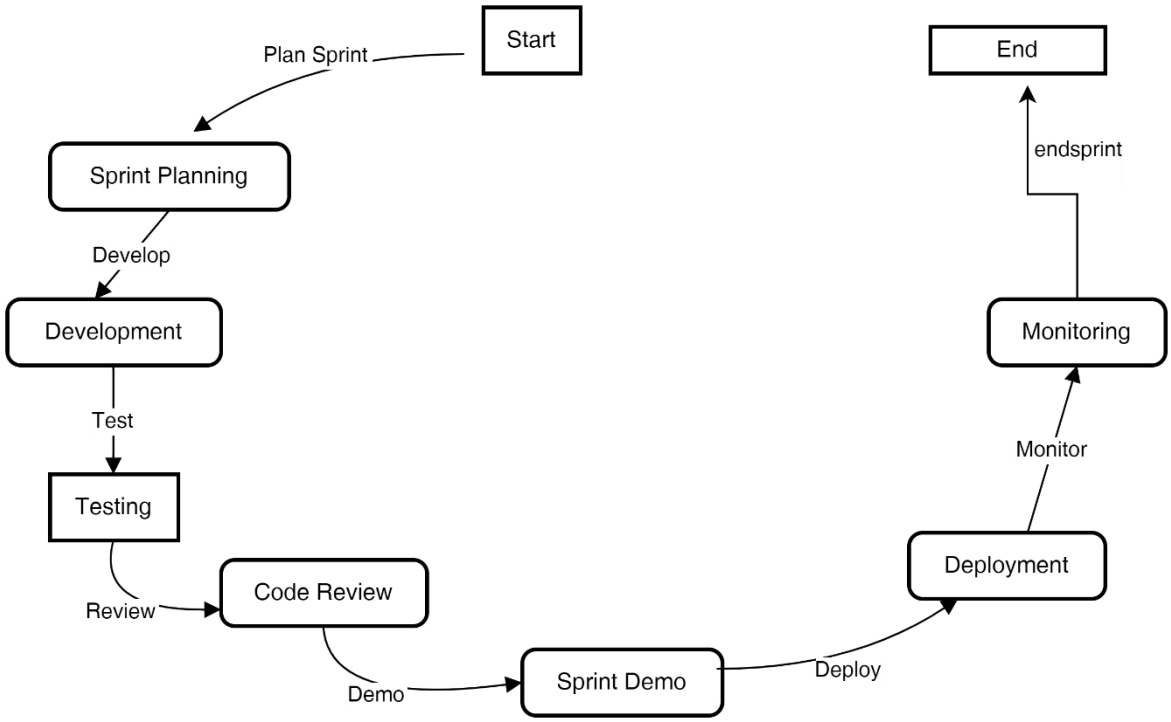

Figure 1.5.1 Agile Development

1.6 Report Organization

This report is separated into different chapters which are as follows:

Chapter 1: This chapter includes about short introduction of the project, objectives, problem statement, purpose and needs of project, methodology used, project scope and limitations.

Chapter2: The second chapter includes about background study and literature review

Chapter3: The third chapter includes requirement analysis, its functional and non-functional requirements,

Chapter 4: It includes system design, various pictorial diagrams

Chapter 5: It includes implementation and testing

Chapter 6: This chapter includes the conclusion of the whole project and future recommendation.

CHAPTER 2: BACKGROUND STUDY AND LITERATURE REVIEW

2.1 Background Study

OVS is also known as e-voting is a term encompassing several different types of voting embracing both electronic means of counting votes. Electronic voting technology can include punched cards, optical scan voting systems and specialized voting kiosks(including self contained direct-recording electronic voting system or DRE).It can also involve transmission of ballots and votes via telephones, private computer networks , or the internet.

Online voting is an electronic way of choosing leaders via a web driven application. The advantage of online voting over the common “queue method” is that the voters have the choice of voting at their own free time and there is reduced congestion. It also minimizes on errors of vote counting. The individual voters are submitted in a database which can queried to find out who of the aspirants for a given post has the highest number of votes.

This system is geared towards increasing the voting percentage in kenya since it has been noted that with the old voting method {the queue system}, the voter turnout has been a wanting case. With system in place also, if high security is applied ,cases of false voters shall be reduced.

With the OVS, a voter can use his/her voting right online without any difficulty . He\She has to register as a voter first before being authorized to vote . The registration should be done prior to the voting date to enable update in the database.

However, not just anybody can vote. For one to participate in the elections, he/she must have the requirements. For instance, he/she must be registered citizen i.e. must be 18 and above years old. As already stated ‘Online Voting’ provides means for fast and convenient voting and access to this system is limited only to registered voters.

Internet voting systems are appealing for several reasons which include; people are getting more used to work with computers to do all sorts of things, namely sensitive operations such as shopping and home banking and they allow people to vote far from where they usually live helping to reduce absenteeism rate.

2.2 Literature Review

Early Voting in Ancient Greece. Since approximately 508 B.C., Ancient Greece seems to have implemented the earliest form of democracy.[1]

In the 20th century, technological advancements led to the introduction of electronic voting machines, initially using punch cards and later evolving to more sophisticated systems. The historical background of electronic voting systems dates back to the mid-20th century, with the initial efforts aimed at streamlining the traditional, manual voting process. The first notable electronic voting machine, known as the "lever machine," was introduced in the United States in the 1960s. These machines allowed voters to cast their ballots by pulling a lever associated with their chosen candidate.[2]

As technology advanced, the 1970s and 1980s saw the introduction of computerized voting systems, incorporating punch cards and optical scanning technologies. The aim was to enhance accuracy and efficiency in tabulating votes. However, these systems were not without flaws, as highlighted by the controversial 2000 U.S. presidential election.[3]

The late 20th and early 21st centuries saw the emergence of online voting experiments in certain jurisdictions, aiming to make the voting process more accessible. [4] Estonia became a pioneer in 2005 by implementing a nationwide online voting system. Despite the potential benefits of electronic voting, concerns about security, privacy, and the potential for manipulation persist. The evolution of electronic voting reflects ongoing efforts to balance technological innovation with the fundamental principles of transparency and integrity in democratic processes.[5]

In 2008, during the constituent assembly polls, Nepal successfully observed the pilot test of electronic voting machines in Kathmandu. 14 years later, Nepal traditionally conducted its local elections using complicated ballot papers and counting done within wire fences. Is this a setback for the digital transformation of Nepal?

On May 13, 2022, Nepal has held its second local level elections since federalization. Voting was completed in 752 local levels on May 13, with polling in one municipality being postponed to May 17. The local elections allowed Nepalis to cast their vote to fill 35,221 local legislative and executive seats from around 145,010 candidates.[6]

CHAPTER 3: SYSTEM ANALYSIS

3.1 System Analysis

System analysis is the process of gathering and interpreting facts, diagnosing problems and using the information to recommend improvements on the system. System analysis is a problem-solving activity that requires intensive communication between the system users and system developers. System analysis or study is an important phase of any system development process. The system is viewed as a whole, the inputs are identified and the system is subjected to close study to identify the problem areas. The solutions are given as a proposal. The proposal is reviewed on user request and suitable changes are made. This loop ends as soon as the user is satisfied with the proposal.

3.1.1 Requirement Analysis

Requirement analysis is the process of identify expectation from new software being built. Requirement analysis critical to the success or failure of the system. Identifying functional and nonfunctional requirements are necessary to produce successful system.

i. Functional Requirement

Identifying functional requirements and design and develop the system to achieve these requirements are very important. Some of the functional requirements need to achieve through the system shows below.

- An administrative dashboard (Admin Login) - Admin can login to the system and provide different user levels. Admin can monitor voting process through the dashboard.
- Register voters – By using this feature new voter can register to the system.
- Registered voter login – Registered users can view details and registered users can update basic information like phone number. Changing other critical details done by election department. Registers voters can request for make changes.
- Update/Delete Voters – Update and delete information done by election department or GS according to user requests.
- Register Candidate- Candidate can register with the system by providing required details.
- Check Results - Admin can view result through result display interface.
- Generate Reports – Generate different types of reports (vote count district vise and provincial vise, Vote count of each candidate)

The actions are performed by the different users can view through the use case diagram. Following use case diagram represent the functionalities of the online voting system. System mainly deal with four actors' names voter, admin, and candidate and system user. Each actor interacted with one or more use cases.

Voter can perform four action through system which are view registered details, request for update details, vote for candidate and view election results. To perform each action voter must to log in to the system.

Candidate is another important actor of the system. Candidate need to register with the system to perform other actions like view registered details and request for update details.

System user is another actor who deals with the system. System user need to log in to the system to perform any action. Voter registration, update/delete voter details, approve candidate registration and update/delete candidate are actions perform by the system user.

Admin is an actor who can perform all the system user actions. Other than those actions manage voting process, provide user levels and manage full application is up to admin user.

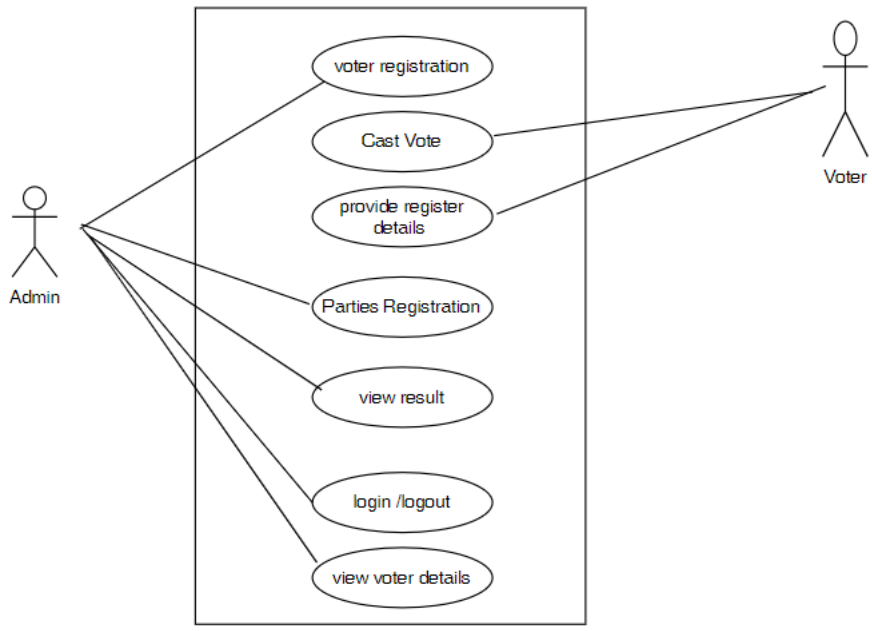

Figure 3.1.1. 1: Use Case Diagram for Online Voting Process

Hardware Requirement

- Microsoft Windows XP Professional /Windows 7 Professional /Windows 10:
- Processor: 800MHz Intel Pentium III or equivalent

- Memory: 512 MB
- Disk space: 750 MB of free disk space

Software Requirement

- Operating System: Windows, Linux, MacOS, Android
- Programming Language: Php, Javascript
- Testing: XAMPSERVER
- Web browsers: Mozilla Firefox, Google Chrome, Opera and Internet Explorer

ii. Non Functional Requirement

These are basic requirements any online voting system must satisfy.

- Scalability – The system must able to expand for future requirements.
- Flexibility – The system should cope with other technologies without any hesitation.
- Mobility – Ability of the system to provide a way to cast their votes without any restriction of the location.
- Democracy – Any voter cannot vote more than one time.
- Security – Votes should not be manipulated during the voting process.

3.1.2. Feasibility Analysis

A feasibility study is a detailed analysis that considers all of the critical aspects of a proposed project in order to determine the likelihood of it succeeding. "FEASIBILITY STUDY" is a test of system proposal according to its workability, impact of the organization, ability to meet needs and effective use of the resource. A feasibility study is an assessment of the practicality of a proposed plan or project. A feasibility study analyzes the viability of a project to determine whether the project or venture is likely to succeed. The study is also designed to identify potential issues and problems that could arise while pursuing the project.

i. **Technical**

It is the measure of practicality of a specific technical solution and availability of a specific technical solution and availability of technical resources and expertise. It addresses the hardware and software considerations.

- No new hardware is needed and all the software that will be used are open-source free software.
- Php will be used as programming language.

ii. Operational

It is mainly related to human organizations and political aspects. The system is operationally feasible as it very easy for the End users to operate it. It only needs basic information about Windows platform.

iii. Economic

When designing web application, it is needed to consider web hosting cost. Since the system should access the voters in given period of time, the system required high bandwidth for the operations of the application. This system is critical system so the cost for the security and maintenance will be high. At the initial stage the system build only for presidential election and the system further developed for other elections.

Besides associated cost there will be many benefits for all citizens of our country. Because using this system, election cost can be reduced greatly. So it is clear that this OVS is financially feasible.

iv. Schedule

The evaluation of the project deadline and the feasibility of achieving it. Time evaluation is the most important consideration in the development of project. The time schedule required for the developed of this project is very important since more development time effect machine time, cost and cause delay in the development of other systems. A reliable Online voting system can be developed in the considerable amount of time.

Weeks / Activities	Start 2080 mangsir1st	2nd	3rd	4th	2080 Poush 1st	2nd	3rd	4th	2080 Magh 1st	2nd	3rd	4th	2080 Falgun 1st	2nd	3rd	End 2080 falgun 4th
Study &analysis	5 weeks															
Data Collection				3 weeks												
Design and Implementation						9 weeks										
Testing												4 weeks				
Documentation														3 weeks		
Review															2 weeks	
Presentation															2 weeks	

Figure 3.1.2. 1: Gantt Chart

CHAPTER 4: SYSTEM DESIGN

4.1 System Design

The online voting system is basically design for voting over internet using electronic ballots. Online voting system includes preparations before the poll, the actual voting process, counting of votes and provide results after closed the poll.

The object-oriented approach is a popular programming paradigm that structures software design around objects, which are instances of classes that encapsulate data and behavior. Applying an object-oriented approach to an online examination system can improve modularity, reusability, and maintainability.

4.1.1 State Diagram

An Activity Diagram can represent the flow of activities in the system, such as the voter registration process, the election process, and result generation.

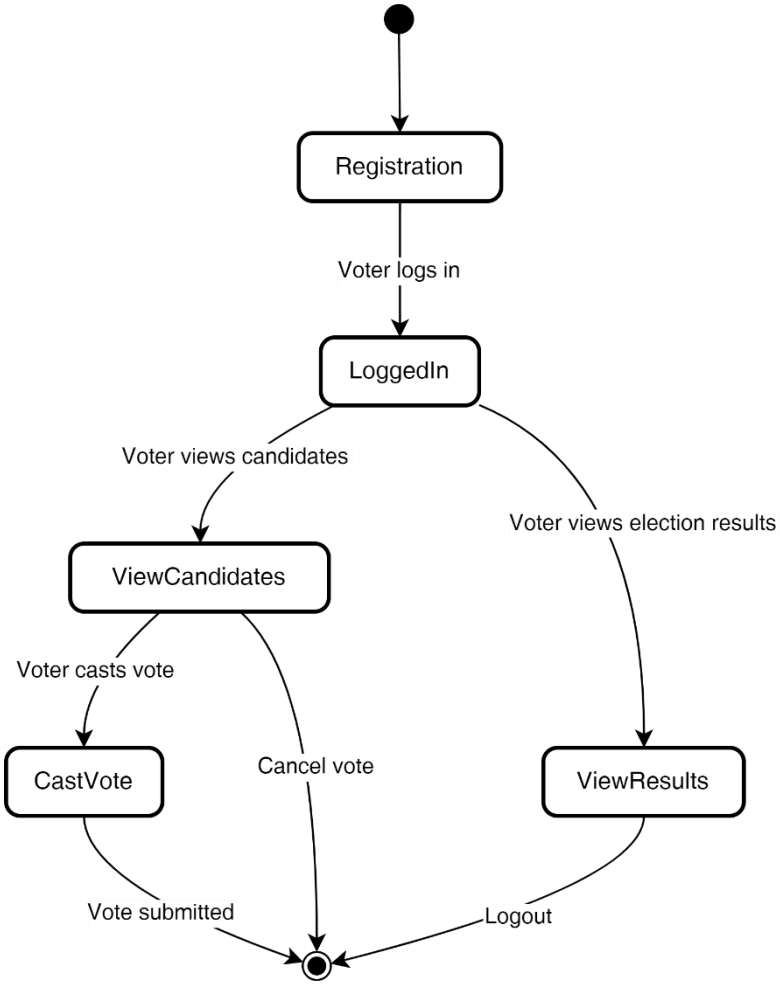

Figure 4.1.1.1. 1: State Diagram

4.1.2 Sequence Diagram

A Sequence Diagram can illustrate the interactions between different objects over time, providing a more dynamic view of the system, such as the voter login and vote casting sequence.

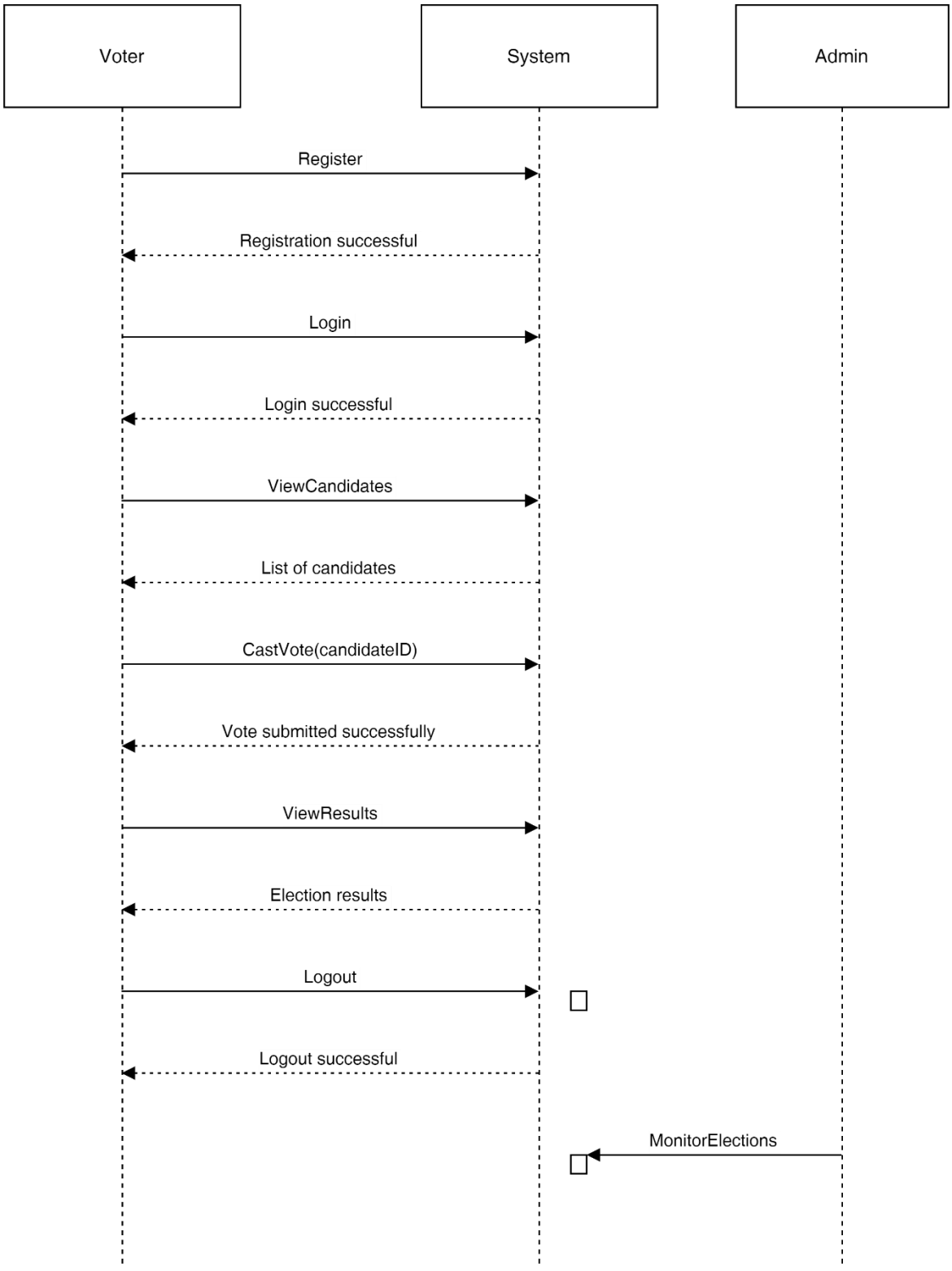

Figure 4.1.1.1. 2: Sequence Diagram

4.1.3 Program Flowchart

The voters whose age is 18 or above years can log in into the election portal by providing their details. Authenticated user whose details are added successfully and also their vote casting successfully. Flowchart for voting process is shown below:

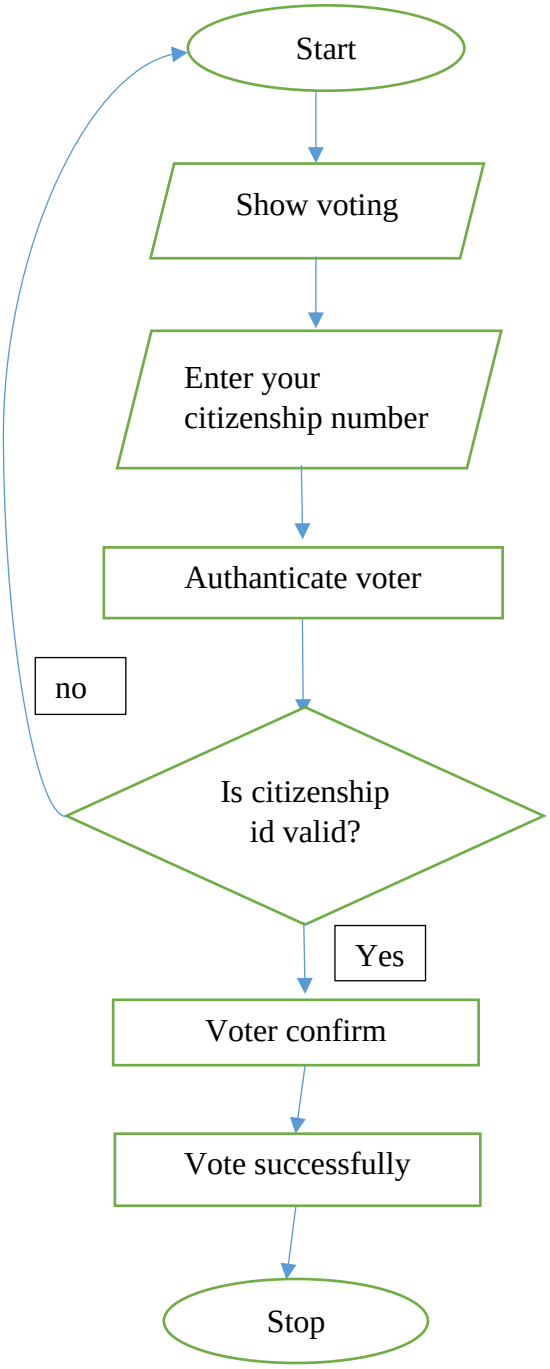

Figure 4.1.2. 1:Flowchart for voting process

4.2 Algorithm Details

Filesort algorithm

In the context of MySQL and other relational database systems, the term "filesort" is often associated with the way the database engine executes queries that involve sorting of data. Specifically, it is related to the process of sorting data when there is no index available to

satisfy the sorting order requested in a query, or when the optimizer determines that using an index would not be efficient.

Here's a more detailed explanation of the filesort algorithm:

i. Sorting Without an Index:

When you execute a query with an `ORDER BY` clause, the database engine attempts to satisfy the sorting requirement. If there is an index that can be used for sorting, it is generally more efficient. However, if there is no suitable index, or if using an index would be less efficient than other methods, the database engine resorts to using the filesort algorithm.

ii. Filesort Process:

- Memory Allocation: The filesort algorithm often involves the creation of a temporary file on disk to store intermediate results. Additionally, it allocates memory for sorting. The specific amount of memory allocated depends on the database system's configuration and the available system resources.
- Two-Phase Sorting: Filesort usually employs a two-phase sorting process.
- In the first phase, the database engine sorts smaller chunks of data in memory. If the dataset is small enough to fit entirely in memory, the entire sorting process may occur in memory without the need for a temporary file.
- If the dataset is too large for in-memory sorting, the sorted chunks are written to temporary files on disk.
- In the second phase, the sorted chunks are merged into a final sorted result set. This merging process ensures that the entire dataset is correctly ordered.

iii. Performance Considerations:

- Memory Usage: The efficiency of filesort can be influenced by the available memory. If the dataset is small enough to fit entirely into memory, the sorting process can be quicker as it avoids the need for disk I/O operations.
- Disk I/O: If the dataset is large, and filesort needs to use temporary files on disk, the efficiency can be affected by the speed of the disk and the I/O operations involved in reading and writing to the temporary files.

iv. Avoiding Filesort:

- In general, if you want to optimize queries and avoid filesort, it's advisable to create indexes on the columns you frequently use for sorting.
- Properly structuring your queries and database schema can also help the optimizer make better decisions about whether to use an index or resort to filesort.

Understanding the filesort algorithm and its implications is important for database performance optimization. While it's a necessary mechanism when sorting large datasets without suitable indexes, its impact can be minimized through proper indexing strategies and query optimization.

CHAPTER 5: IMPLEMENTATION AND TESTING

5.1 Implementation

The system design convert into the working product is the main goal of system implementation. This online voting system is implemented using , PHP, MySQL database, HTML, CSS, Bootstrap and JavaScript. Bootstrap is toolkit for UI design. FPDF report generating tool use to report generating in this study.

The Language used in coding is PHP. PHP is an open source language which is mostly used for web application development. PHP also support for html, JavaScript. Most of the web servers support for PHP installation. It is available open source language pack which means any user can use this without making any payment.

MySQL is database management system which is widely use all over the world. MySQL databases are typically use these type of web applications and accessed using PHP.

5.2 Testing

System testing is used to find the weakness of the integrated system. Main purpose is testing is capture the errors and checking the system is working well according to the parameters established for it. System testing usually begins at the earlier stage of system development life cycle. Testing plan starts immediately after requirement analysis which lead to identify weaknesses before the design phase begun. During design phase, it is possible to come up with different testing approaches like unit testing, integration testing and system testing. Doing different testing approaches at the earlier stage gives the ability to explore some of weakness and mistakes such as poor naming convention of variables, data connectivity issues, inconsistencies in fixing the requirements and so on.

i. Test plan

A test plan like any other plan is defined as a series of tests activities that will be conducted during test. It also serves as a checklist which is used to determine which testing step is to be done first and which is to be done last and with which tool and methodology is to be implemented. It is important to understand that a test plan is nothing but a piece or collection of document which is organized in a well-structured form by following a specific defined standard. In this project, the following criteria were set as part of the plan for conducting a successful testing on the system.

Black-box testing should be implemented on each and every module. This is to ensure that all modules have meet their specification requirements. Hence, the type of testing to be conducted here is unit testing.

White-Box testing should be implemented on the program source codes to ensure that no logical errors are found. Therefore, all Graphic user interfaces should be checked carefully by checking how responsive they are to mouse and keyboard events. This will enable the tester to know whether the interfaces are communicating with one another efficiently or not.

Requirement testing should also be carried out towards the end of the project before implementing. This will ensure that the requirements and specifications were dully followed during development.

ii. Test case

Creating a test case table for an online voting system involves identifying various scenarios to ensure the system functions correctly. Below is a simplified example of a test case table for an online voting system.

Table :5.2. 1 Test case for voter page

Test case ID	**Test Scenario**	**Test Steps**	**Expected results**
TC_01	User login	1.Navigate to the voting page	Voting page is displayed.
TC_02		1.Choose the party and enter valid citizenship number	Voting is done successfully.
		2.Enter invalid citizenship number	Error message is shown
TC_03	Duplicate vote Prevention	1. Attempt to vote for the same party twice.	System prevents duplicate votes.

Table :5.2. 2 Test cases for admin page

Test case ID	**Test Scenario**	**Test Steps**	**Expected results**
TC_01	View Voting result	1.Navigate to the admin page	Admin page is displayed
		2.Enter valid username and password	Voting result are displayed.
TC_02	System security	1.Enter invalid username and password	Unauthorized access is denied

Table :5.2. 3 Test cases for System testing

Test case ID	**Test Scenario**	**Test Steps**	**Expected results**
TC_01	System Availability	1. Simulate a high volume of users voting simultaneously.	System remains stable and responsive
TC_02	Error Handling	1. Intentionally enter incorrect data during the voting.	System displays appropriate error messages
TC_03	Accessibility Check	1. Access the system using different browsers and devices.	System is accessible and functions properly across devices.

5.3 Result Analysis

Analyzing the results of an online voting system means checking that votes are counted accurately, making sure no one votes twice, and keeping the system secure. It also involves protecting voter privacy, showing results clearly, and making sure the system works well for everyone. Additionally, it's important to handle errors, ensure the system is reliable, and follow the rules. Regular checks and audits help maintain trust in the online voting process.

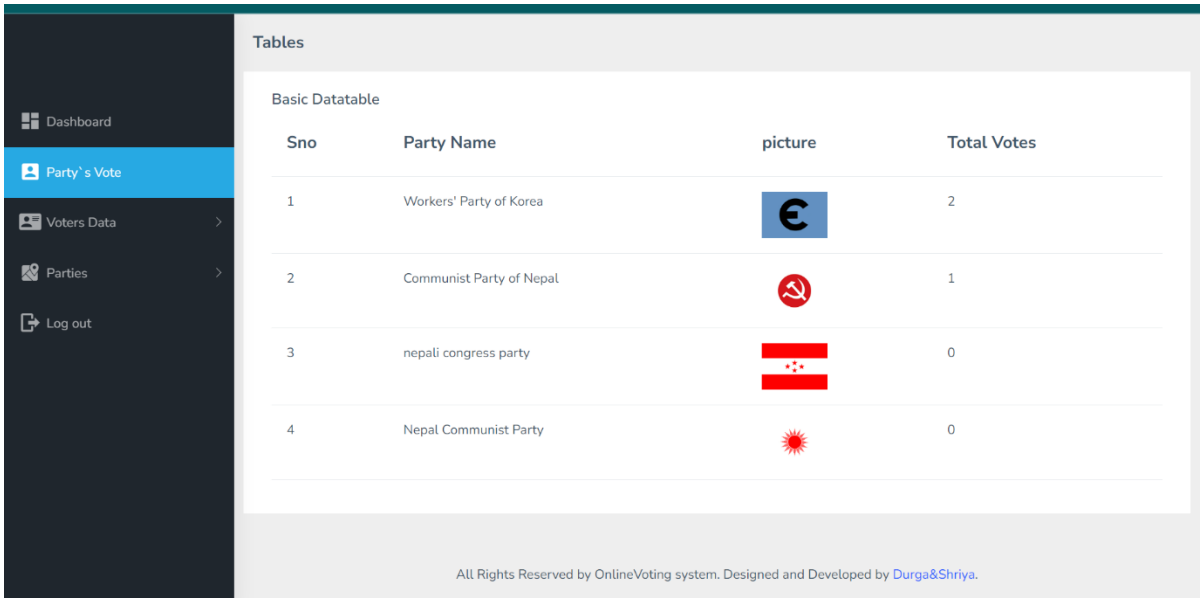

Figure 5.3. 1 Screenshot of final vote

CHAPTER 6: CONCLUSION AND FUTURE RECOMMENDATION

6.1 Conclusion

By the conclusion, this online voting system serves as a modern way of participating in elections, polls, and various voting events without the need to visit physical polling stations.

High-quality online voting systems effectively balance ballot security, accessibility, and the specific requirements of the organization's voting event, providing a convenient and efficient alternative to traditional voting methods.

The electronic voting is a challenging field. Electronic voting rapidly developed in past few years. The reason for that is development of new technologies.

6.2 Future Recommendation

It's crucial to note that the landscape of online voting systems is dynamic, and any future recommendations should be based on the latest developments and best practices in technology and security. Always consult with experts in the field and adhere to the legal and regulatory requirements of the specific region where the system will be implemented.

As last knowledge update in January 2022, online voting systems were a topic of ongoing discussion and development, with concerns related to security, privacy, and reliability. For a more accurate and up-to-date recommendation, it's essential to consider the latest advancements and changes in technology, policy, and security practices.

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Appendices

Snapshots