

INTERNET VOTING SYSTEM USING REINFORCEMENT LEARNING ALGORITHM

Submitted in partial fulfilment of requirements for the award of
Bachelor of Engineering in
Electronics and Communication Engineering

by

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
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SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade "A" by NAAC
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI – 600119**

MARCH – 2021



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **MIRIYAMPALLI MAHESH BABU (Reg.No.37130252)** who carried out the project entitled "**Internet Voting System Using Reinforcement Learning Algorithm**" under our supervision from December 2020 to March 2021.

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Submitted for Viva voce Examination held on _____

INTERNAL EXAMINER

EXTERNAL EXAMINER

DECLARATION

I, MIRIYAMPALLI MAHESH BABU(Reg.No.37130252) hereby declare that the Project Report entitled “InternetVoting System Using Reinforcement Learning Algorithm” done by me under the guidance of Dr.R.NARMADHA is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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ABSTRACT

The main thesis of this project is to develop a secure Electronic voting machine using Finger print identification method, for finger print accessing we use AADHAR card database. At the time of voting in the elections, the e -voting process authentication can be done using finger vein sensing, which enables the electronic ballot reset for allowing voters to cast their votes. Also the voted data and voters details can be sent to the nearby Database Administration unit in a timely manner using Zigbee System with cryptography technique.

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CHAPTER 1

INTRODUCTION

1.1 Introduction:

The objective of voting is to allow voters to exercise their right to express their choices regarding specific issues, pieces of legislation, citizen initiatives, constitutional amendments, recalls and/or to choose their government and political representatives. Technology is being used more and more as a tool to assist voters to cast their votes. To allow the exercise of this right, almost all voting systems around the world include the following steps: voter identification and authentication, voting and recording of votes cast, vote counting, publication of election results.

Voter identification is required during two phases of the electoral process: first for voter registration in order to establish the right to vote and afterwards, at voting time, to allow a citizen to exercise their right to vote by verifying if the person satisfies all the requirements needed to vote (authentication). Security is a heart of e-voting process. Therefore the necessity of designing a secure e-voting system is very important. Usually, mechanisms that ensure the security and privacy of an election can be time consuming, expensive for election administrators, and inconvenient for voters.

There are different levels of e-voting security. Therefore serious measures must be taken to keep it out of Public domain. Also, security must be applied to hide votes from publicity. There is no measurement for acceptable security level, because the level depends on type of the information. An acceptable security level is always a compromise between usability and strength of security method.

1.1.1 SECURITIES OF THE E-VOTING SYSTEMS

The main goal of a secure e-voting is to ensure the privacy of the voters and of the votes. A secure e-voting system satisfies the following requirements, Eligibility: only votes of legitimate voters shall be taken into account; Un Reusability: each voter is allowed to cast one vote; Anonymity: votes are set secret; Accuracy: cast ballot cannot be altered. Therefore, it must not be possible to delete ballots nor to add ballots, once the election has been closed; Fairness: partial tabulation is impossible; Vote and go: once a voter has casted their vote, no The main goal of a secure e-voting

is to ensure the privacy of the voters and of the votes. A secure e-voting system are satisfies the following requirements, Eligibility: only votes of legitimate voters shall be taken into account; Un Reusability: each voter is allowed to cast one vote; Anonymity: votes are set secret; Accuracy: cast ballot cannot be altered. Therefore, it must not be possible to delete ballots nor to add ballots, once the election has been closed; Fairness: partial tabulation is impossible; Vote and go: once a voter has casted their vote, no further action prior to the end of the election; Public verifiability: anyone should be able to readily check the validity of the whole voting process.

It based elections voters cast their votes by simply depositing their ballots in sealed boxes distributed across the electoral circuits around a given country. When the election period ends, all these boxes are opened and votes are counted manually in presence of the certified officials. In this process there can be error in counting of votes or in some cases voters find ways to vote more than once. Sometimes votes are even manipulated to distort the results of an election in favor of certain candidates. In order to avoid these shortcomings the government of India came up with Direct-recording electronic (DRE) voting system which are usually referred as Electronic Voting Machines or EVMs.

These devices have been praised for their simple design, ease of use and reliability. However it has been found that EVMs are not tamper proof and are easily hackable. Moreover this attacks, hardware as well as software, go without any detection but are quite simple to implement. This made us to bring forth a system that is secure, transparent, reliable as well as easy to use for the citizens. Biometric e-voting systems are not a phenomenon anymore they are being actively used in countries like Ghana and Ireland and are spreading to many other developing nations. We propose an integration of the CIDR with that of e-voting mechanism to make e-voting in India a reality.

1.1.2 ISSUES OF PRESENT VOTING SYSTEM

There have been several studies on using computer technologies to improve elections these studies caution against the risks of moving too quickly to adopt electronic voting

system, because of the software engineering challenges, insider threats, network

vulnerabilities, and the challenges of auditing. Accuracy: It is not possible for a vote to be altered eliminated the invalid vote cannot be counted from the finally tally.

Democracy: It permits only eligible voters to vote and, it ensures that eligible voters vote only once.

Privacy: Neither authority nor anyone else can link any ballot to the voter verifiability: Independently verification of that all votes have been counted correctly.

Resistance: No electoral entity (any server participating in the election) or group of entities, running the election can work in a conspiracy to introduce votes or to prevent voters from voting.

Availability: The system works properly as long as the poll stands and any voter can have access to it from the beginning to the end of the poll.

Resume Ability: The system allows any voter to interrupt the voting process to resume it or restart it while the poll stands. The existing elections were done in traditional way, using ballot, ink and tallying the votes later. But the proposed system prevents the election from being accurate. Problems encountered during the usual elections are as follows:

- It requires human participation, in tallying the votes that makes the elections time consuming and prone to human error.
- The voter finds the event boring resulting to a small number of voters.
- Deceitful election mechanism.
- Constant spending funds for the elections staff are provided.

1.1.3 FINGERPRINT RECOGNITION

Fingerprint recognition or fingerprint authentication refers to the automated method of verifying a match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify individuals and verify their identity. A fingerprint looks at the patterns found on a fingertip. There are a variety of approaches to fingerprint verification. Some emulate the traditional police method of matching pattern; others use straight minutiae matching devices and still others are a bit more unique, including things like moiré fringe patterns and ultrasonic.

A greater variety of fingerprint devices are available than for any other biometric. Fingerprint verification may be a good choice for in e-voting systems, where you can give users adequate explanation and training, and where the system operates in a

controlled environment. It is not surprising that the work-station access application area seems to be based almost exclusively on fingerprints, due to the relatively low cost, small size, and ease of integration of fingerprint authentication devices. Capture the finger vein image and compare or match to database, capture finger vein and database finger vein matched means this person will be valid for polling section and if condition is satisfied automatically, E-voting machine buttons will be activate otherwise deactivate buttons. After the E-voting machine buttons are activated, the voter cast his/her vote. After completion of his/her voting process, a "voting process completed" message will be displayed on the screen. The number of votes is counted by the E-Voting machine and the information will be sent to the local electrical administrator by using wireless communication technology.

CHAPTER 2

LITERATURE SURVEY

2.0 INTRODUCTION

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, then the next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system the above consideration are taken into account for developing the proposed system.

The major part of the project development sector considers and fully survey all the required needs for developing the project. For every project Literature survey is the most important sector in software development process. Before developing the tools and the associated designing it is necessary to determine and survey the time factor, resource requirement, man power, economy, and company strength. Once these things are satisfied and fully surveyed, then the next step is to determine about the software specifications in the respective system such as what type of operating system the project would require, and what are all the necessary software are needed to proceed with the next step such as developing the tools, and the associated operations.

2.1 AN EMBEDDED REAL-TIME FINGER-VEIN RECOGNITION SYSTEM FOR MOBILE DEVICES

With the development of consumer electronics, the demand for simple, convenient, and high-security authentication systems for protecting private information stored in mobile devices has steadily increased. In consideration of emerging requirements for information protection, biometrics, which uses human physiological or behavioral

features for personal identification, has been extensively studied as a solution to security issues. However, most existing biometric systems have high complexity in time or space or both, and are thus not suitable for mobile devices. In this paper, we propose a real-time embedded finger-vein recognition system for authentication on mobile devices. The system is implemented on a DSP platform and equipped with a novel finger-vein recognition algorithm. The proposed system takes only about 0.8 seconds to verify one input finger vein sample and achieves an equal error rate (EER) of 0.07% on a database of 100 subjects. The experimental results demonstrate that the proposed finger-vein recognition system is qualified for authentication on mobile devices.

2.2 FINGER VEIN EXTRACTION AND AUTHENTICATION BASED ON GRADIENT FEATURE SELECTION ALGORITHM

In present days, Authentication by means of biometrics systems is used for personal verifications. In spite of having existing technology in biometrics such as recognizing the fingerprints, voice/face recognition etc., the vein patterns can be used for the personal identification. Finger vein is a promising biometric pattern for personal identification and authentication in terms of its security and convenience. Finger vein has gained much attention among researchers to combine accuracy, universality and cost efficiency. We propose a method of personal identification based on finger-vein patterns. An image of a finger captured under infrared light contains not only the vein pattern but also irregular shading produced by the various thicknesses of the finger bones and muscles. The proposed method extracts the finger-vein pattern from the unclear image by using gradient feature extraction algorithm and the template matching by Euclidean distance algorithm. The better vein pattern algorithm has to be introduced to achieve the better Equal Error Rate (EER) of 0.05% comparing to the existing vein pattern recognition algorithms.

2.3 A NOVEL DESIGN OF ELECTRONIC VOTING SYSTEM USING FINGERPRINT

The heart of democracy is voting. The heart of voting is trust that each vote is recorded and tallied with accuracy and impartiality. The accuracy and impartiality are tallied in high rate with biometric system. Among these biometric signs, fingerprint has been researched the longest period of time, and shows the most promising

future in real-world applications. Because of their uniqueness and consistency over time, fingerprints have been used for identification over time. However, because of the complex distortions among the different impression of the same finger in real life, fingerprint recognition is still a challenging problem. Hence in this study, the authors are interested in designing and analysing the Electronic Voting System based on the fingerprint minutiae which is the core in current modern approach for fingerprint analysis. The new design is analysed by conducting pilot election among a class of students for selecting their representative. Various analysis predicted shows that the proposed electronic voting system resolves many issues of the current system with the help of biometric technology.

2.4 BIOMETRICS USING ELECTRONIC VOTING SYSTEM WITH EMBEDDED SECURITY

An electronic voting (e-voting) system is a voting system in which the election data is recorded, stored and processed primarily as digital information. There are two types of e-voting: On-Line and Offline. On-line, e.g. via Internet, and offline, by using a voting machine or an electronic polling booth. Authentication of Voters, Security of voting process, Securing voted data are the main challenge of e-voting. This is the reason why designing a secure e-voting system is very important. In many proposals, the security of the system relies mainly on the black box voting machine. But security of data, privacy of the voters and the accuracy of the vote are also main aspects that have to be taken into consideration while building secure e-voting system. In this project the authenticating voters and polling data security aspects for e-voting systems was discussed. It ensures that vote casting cannot be altered by unauthorized person. The voter authentication in online e-voting process can be done by formal registration through administrators and by entering one time password. In Offline e-voting process authentication can be done using Iris recognition, finger vein sensing which enables the electronic ballot reset for allowing voters to cast their votes. Also the voted data and voters details can be sent to the nearby Database Administration unit in a timely manner using GSM System with cryptography technique.

2.5 DESIGN A SECURE ELECTRONIC VOTING SYSTEM USING FINGERPRINT TECHNIQUE DESIGN A SECURE ELECTRONIC VOTING SYSTEM USING FINGERPRINT TECHNIQUE

Fingerprint biometric is the most widely deployed publicized biometrics for identification. This is largely due to its easy and cost effective integration in existing and upcoming technologies. The integration of biometric with electronic voting machine undoubtedly requires less manpower, save much time of voters and personnel, eliminate rigging, ensure accuracy, transparency and fast results in election. In this paper, a framework for electronic voting machine based on biometric verification is proposed and implemented. The proposed framework ensures secured identification and authentication processes for the voters and candidates through the use of fingerprint biometrics.

2.6 TECHNIQUES FOR SECURING MULTIMEDIA CONTENT IN CONSUMER ELECTRONIC APPLIANCES USING BIOMETRIC SIGNATURES

A system is described for CE appliances which employs a biometrically auditable public key infrastructure for securing multimedia content (BAPTISM). It is based on biometrically generated key-pairs and is designed to protect the fair use rights of end-users. By taking advantage of low-cost fingerprint scanners the system can be readily incorporated into networked handheld and CE appliances.

2.7 SECURE USER IDENTIFICATION FOR CONSUMER ELECTRONICS DEVICES

With the evolution of consumer electronics technologies, personal information in consumer devices is becoming increasingly valuable. To protect private information from misuses due to loss or theft, secure user identification mechanisms should be equipped into the consumer devices. This paper develops a secure user identification system for consumer electronics devices based on fingerprint identification. The fingerprint identification system is one of the biometric sensor technologies, which provides high accuracy and convenience than other identification techniques.

Specifically, the proposed system uses the orientation map and the edit-distance for immediate and accurate identification of users. Experimental results show that the proposed system achieves good performance in terms of the false rejection rate and the false acceptance rate.

2.8 USER IDENTIFICATION BASED ON FINGERVEIN PATTERNS FOR CONSUMER ELECTRONICS DEVICES

With the development of consumer electronics technologies, many more powerful consumer devices such as cell phone, PDA and laptop have brought consumers an unprecedented level of convenience and flexibility. However, how to protect personal private information stored in the consumer electronics devices from misuses owing to theft or loss is becoming a major issue. To solve the problem, more secure and reliable user identification mechanisms using biometrics technology should be equipped into the consumer electronics devices. This paper presents a user identification system framework using finger-vein technology for consumer electronics devices. The finger-vein identification system is one of the biometrics sensor technologies, which provides high security and reliability than other identification technology. The algorithm of the proposed system compose a feature extraction using Radon transform and singular value decomposition (SVD) and classification using a normalized distance measure. The experimental results indicate that the proposed system performs well for user identification and achieves good performance in terms of the false acceptance rate (FAR) and the false rejection rate (FRR).

2.9 EXISTING SYSTEM

An electronic voting system is a voting system in which the election data is recorded, stored and processed primarily as digital information. E-voting is referred as “electronic voting” and defined as any voting process where an electronic means is used for votes casting and results counting. E -voting is an election system that

allows a voter to record their ballots in an electrically secured method. A number of electronic voting systems are used in large applications like optical scanners which read manually marked ballots to entirely electronic touch screen voting systems. Specialized voting systems like DRE (direct recording electronic) voting systems, RFID, national IDs, the Internet, computer networks, and cellular systems are also used in voting process

2.9.1 DISADVANTAGE OF EXISTING SYSTEM

- Expensive and Time consuming.
- Too much paper work.
- Errors during data entry.

2.9.2 PROBLEM STATEMENT

Many problems are faced by the people in voting manually:

- Much time is required.
- As it has been observed that in some cases both capturing has been reported.
- Reduces the chances of conflicts.
- Reduces the time for ballot counting and many others.

2.10 PROPOSED SYSTEM

In this method, the details of the voter will get from the AADHAR card database. It was a newly developed database which is having all the information about the people. By using this database we took the voter's information will be stored in the Personal Computer. At the time of elections, for finger print accessing we use finger sensing module. Fingerprint recognition or fingerprint authentication refers to the automated method of verifying a match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify individuals and verify their identity.

A fingerprint looks at the patterns found on a fingertip. There are a variety of approaches to fingerprint verification. Some emulate the traditional police method of matching pattern; others use straight minutiae matching devices and still others are

a bit more unique, including things like moiré fringe patterns and ultrasonic. A greater variety of fingerprint devices are available than for any other bio metric.

Fingerprint verification may be a good choice for in e-voting systems, where you can give users adequate explanation and training, and where the system operates in a controlled environment. It is not surprising that the work-station access application area seems to be based almost exclusively on fingerprints, due to the relatively low cost, small size, and ease of integration of fingerprint authentication devices. Capture the finger vein image and compare or match to database, capture finger vein and database finger vein matched means this person will be valid for polling section and if condition is satisfied automatically, E-voting machine buttons will be activate otherwise deactivate buttons. After the E-voting machine buttons are activated, the voter cast his/her vote.

2.10.1 ADVANTAGE OF PROPOSED SYSTEM

- Saved Ballot Templates eliminate the need to configure elections from scratch. Just do it once, then save that ballot configuration, and in subsequent years, specify only the names of the candidates.
- Reduced costs are enjoyed when the expenses of printing, mailing and tabulating paper ballots are lessened or even eliminated entirely from the election process.

CHAPTER 3

AIM AND SCOPE

3.1 INTRODUCTION

Design is a multi- step that focuses on data structure software architecture, procedural details, algorithm etc... and interface between modules. The design process also translate the requirements into presentation of software that can be accessed for quality before coding begins. Computer software design change continuously as new methods; better analysis and border understanding evolved. Software design is at relatively early stage in its revolution.

Therefore, software design methodology lacks the depth, flexibility and quantitative nature that are normally associated with more classical engineering disciplines. However techniques for software designs do exist, criteria for design qualities are available and design notation can be applied.

3.2 DESIGN STRUCTURE

3.2.1 INPUT DESIGN

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

What data should be given as input?

How the data should be arranged or coded?

The dialog to guide the operating personnel in providing input.

Methods for preparing input validations and steps to follow when error occur.

3.2.2 OUTPUT DESIGN:

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

The output form of an information system should accomplish one or more of the following objectives.

- Convey information about past activities, current status or projections of the
- Future.
- Signal important events, opportunities, problems, or warnings.
- Trigger an action.
- Confirm an action.

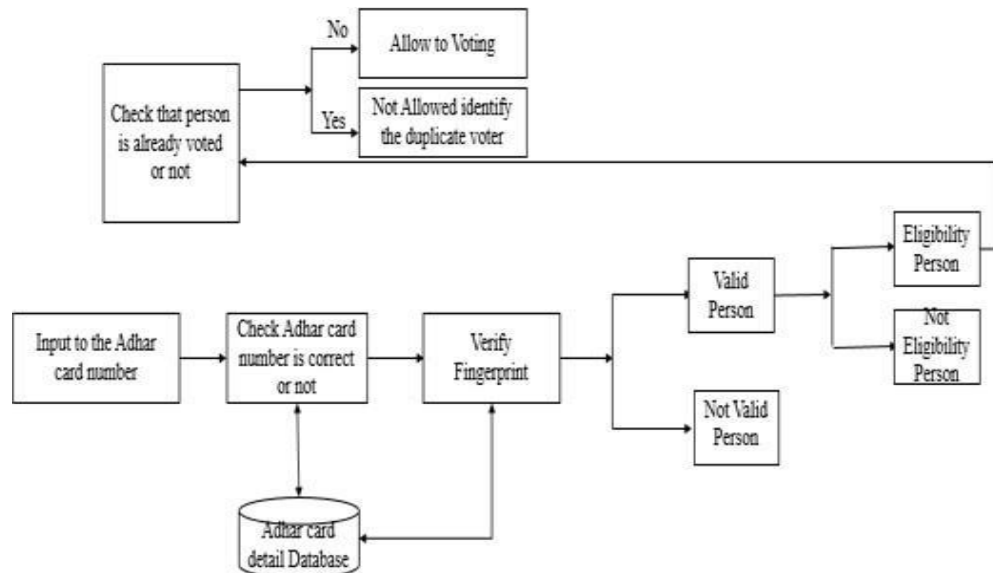


Fig 3.2.0. Block Diagram

CHAPTER 4

SYSTEM IMPLEMENTATION

4.1 MODULES

- Components Of The System
- Authentication And Verification Of The Voter
- Preventing Fraudulent Voting
- Generating Reports

4.1.1 COMPONENTS OF THE SYSTEM

We propose client-server web-enabled software architecture for the project. On the client side we have a fingerprint scanner and a GUI that accepts voter's aadhar number, provides an interface to vote and display confirmation, status and error messages. The GUIs will only act on events from the server and feedback of the voter without any extra processing. Servers are placed at remote locations from the poll booths. They are used for carrying out all the processing work such as image processing, transferring data between the client and the database, generating statistics, sending messages to voters, etc. All the zonal databases retrieve data from CIDR of only those people who come under its scope. This data is periodically updated and is stored in volatile form so that it can be erased if and when necessary such as during security attacks, natural calamities, maintenance works, etc.

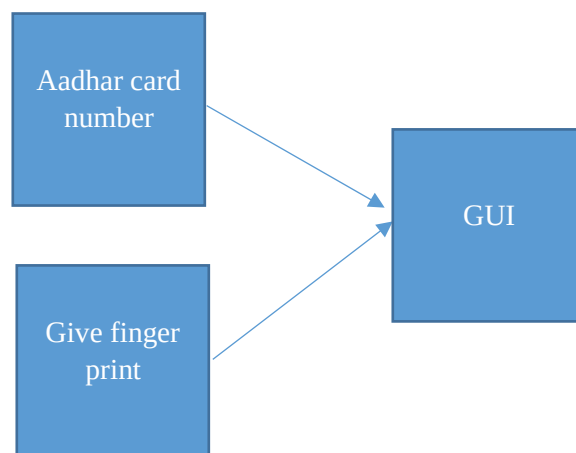


Fig. 4.1.0. Implementation

4.1.2 AUTHENTICATION AND VERIFICATION OF THE VOTER

Authentication is the process of determining whether someone or something is, in fact, who or what it is declared to be. In order to authenticate a person we require them to have a valid UID number. The number will be checked in the local database records first. If it is not found then it will search the central repository. It involves one-to-many match. If the person's number is not found in the central database then of course s/he will be devoid of taking part in the voting process. On the other hand if the number is present in the central database then the data of that person will be cached to the zonal database. This record is extracted from the local database and sent to authenticating servers for further processing. For verification the person's fingerprint will be scanned at the client-side and matched one-to-one at the servers with the data extracted from the local database. This process puts less stress on the local database and improves data traffic.

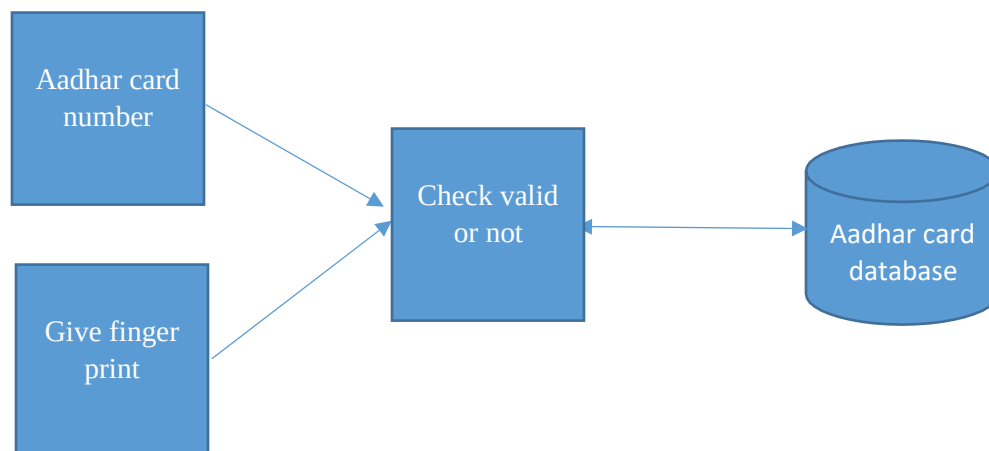


Fig. 4.1.1. Basic Algorithm

4.1.3 PREVENTING FRAUDULENT VOTING

The first and the leading thing to guarantee proper voting is by accurately validating every voter. It is essential to identify that every person coming to vote is unique otherwise it will violate the very principle of voting. Any person would be voting on behalf of others. Fingerprint matching ensures the authentication that the system requires. However in order to improve accuracy it is important to keep false reject rate (FRR) and false accept rate (FAR) as low as possible; practically close to zero. To prevent underage individuals from voting, the system calculates person's age from the birth date present in the database

records. If the calculated age is above permissible limit the person is allowed to vote and prevented otherwise. To prevent voters from voting two or multiple times we implement voting flags in the local databases. This flag is initially set to false.

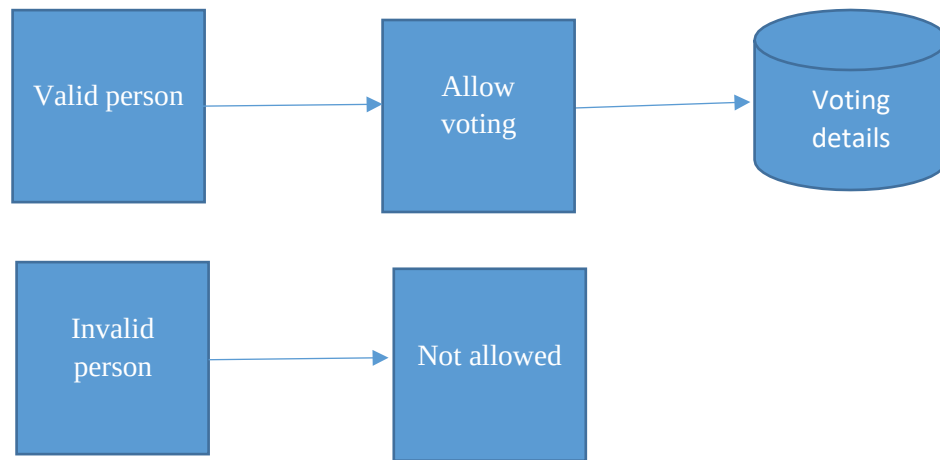


Fig.4.1.2. Algorithm 1

4.1.4 GENERATING REPORTS:

Whenever a voter casts a vote in favor of the candidate of choice, the vote count of that candidate gets incremented in the local database. The votes from all the local databases are summed up to get the final figure that the candidate has received. Thus this system provides instantaneous results and prevents unnecessary use of manpower and wastage of time. Since this is an electronic system and uses digital data it has several advantages. Statistics can be generated from the obtained data for e.g. we could answer how many people have voted from a certain region, how many females voted, which age group voted the most, the highest turnouts, comparisons from previous years, etc. all that was not possible from traditional voting methods not even from EVMs. It would provide important insights into the election results and help improve the system even further

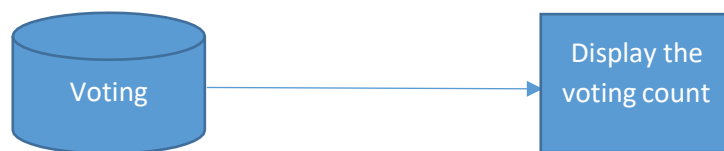


Fig.4.1.3. Algorithm 2

4.2. UML AND DATAFLOW DIAGRAM

4.2.1. USE CASE DIAGRAM

A **use case diagram** at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well.

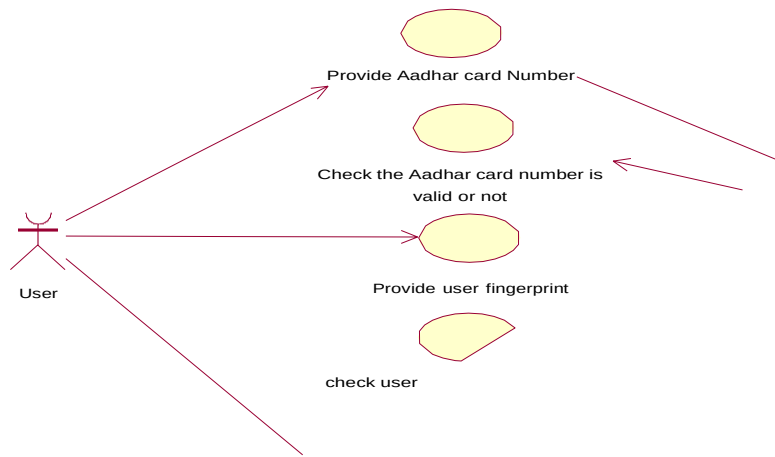


Fig.4.2.0. use case diagram

4.2.2 CLASS DIAGRAM

A class diagram is an illustration of the relationships and source code dependencies among classes in the Unified Modeling Language (UML). In this context, a class defines the methods and variables in an object, which is a specific entity in a program or the unit of code representing that entity. Class diagrams are useful in all forms of object-oriented programming (OOP). The concept is several years old but has been refined as OOP modeling paradigms have evolved.

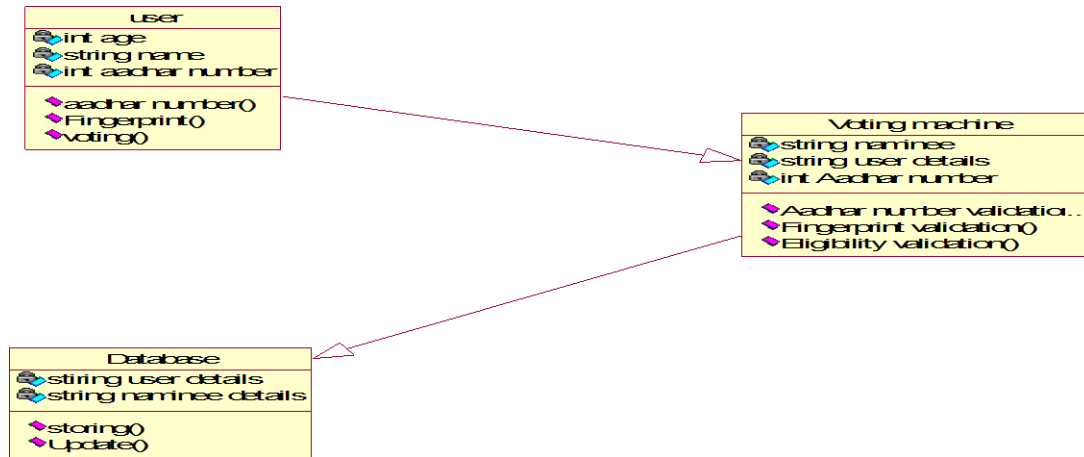


Fig 4.2.1. Class Diagram

4.2.3. SEQUENCE DIAGRAM

A sequence diagram, in the context of UML, represents object collaboration and is used to define event sequences between objects for a certain outcome. A sequence diagram is an essential component used in processes related to analysis, design and documentation.

A sequence diagram is also known as a timing diagram, event diagram and event scenario.

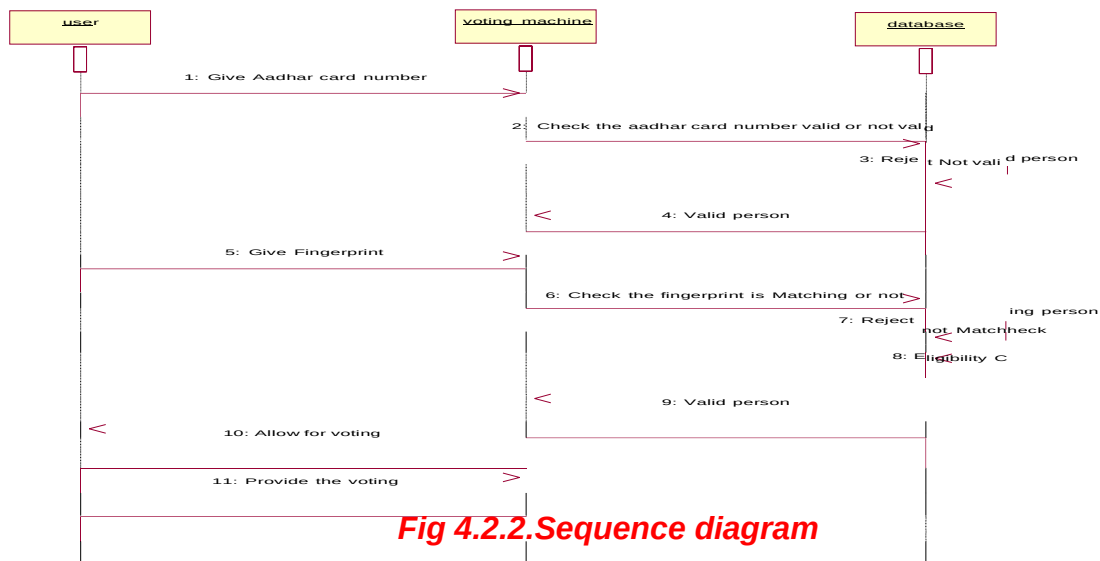


Fig 4.2.2. Sequence diagram

4.2.4. COLLABORATION DIAGRAM

A collaboration diagram, also called a communication diagram or interaction diagram, is an illustration of the relationships and interactions among software objects in the Unified Modeling Language (UML). The concept is more than a decade old although it has been refined as modeling paradigms have evolved.

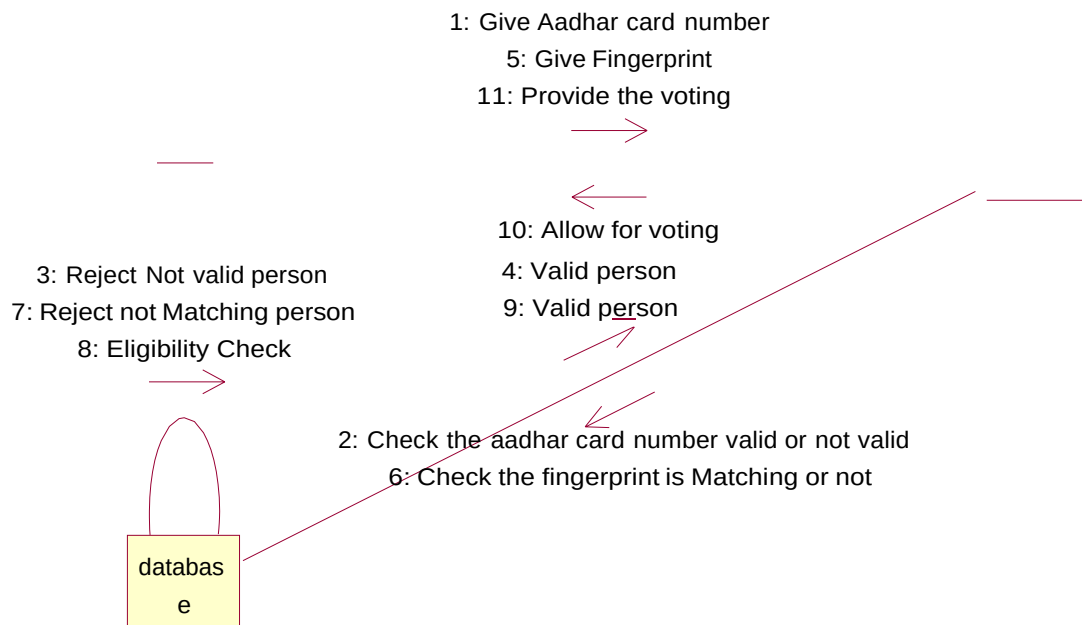
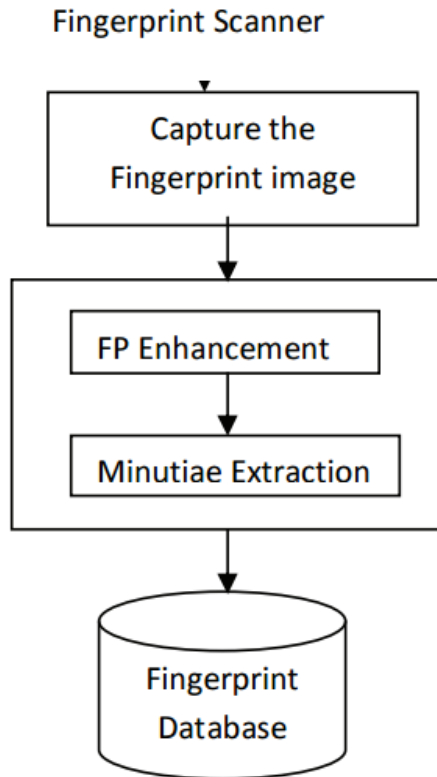


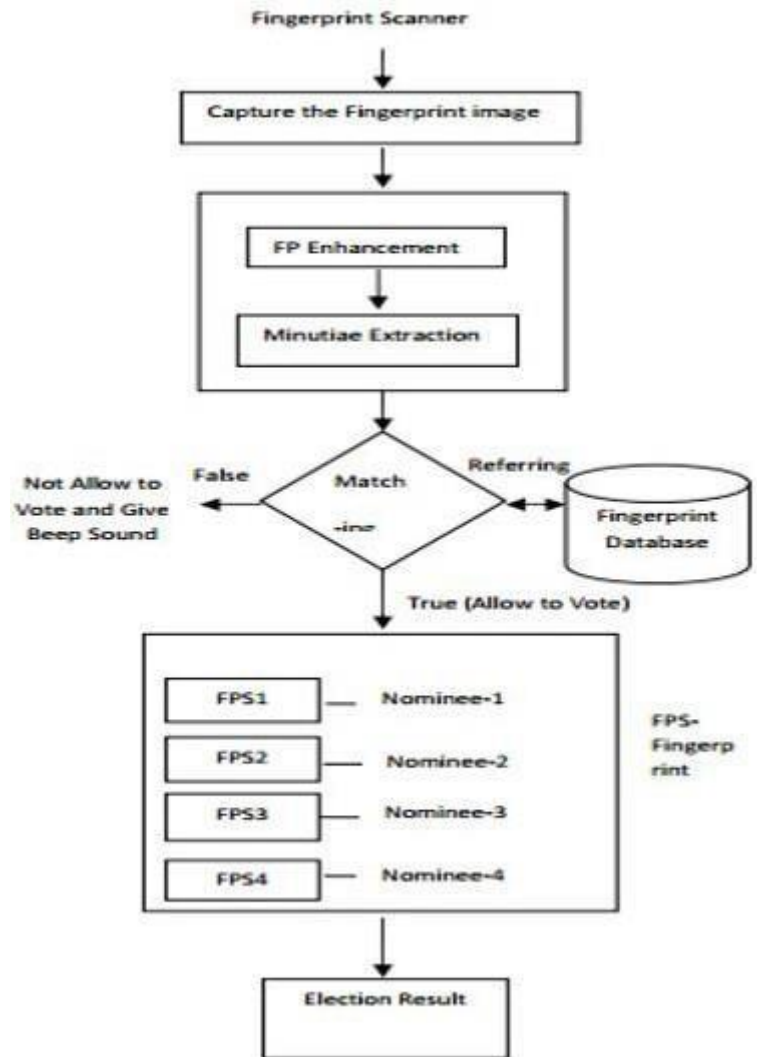
Fig 4.2.3. Collaboration diagram

4.2.5. DATAFLOW DIAGRAM

LEVEL 0:



LEVEL 1:



4.3. Reinforcement Learning Algorithms

:

- Reinforcement learning is one of the three main types of learning techniques in ML. They are supervised, unsupervised and reinforcement learnings.
- For this article, we are going to look at reinforcement learning.

- Unlike supervised and unsupervised learnings, reinforcement learning has a feedback type of algorithm.
- In other words, for every result obtained the algorithm gives **feedback** to the model under training.
- So, in this article, we will look at everything related to reinforcement learning and we might as well see some coding examples for better knowledge.
- So, let's start.

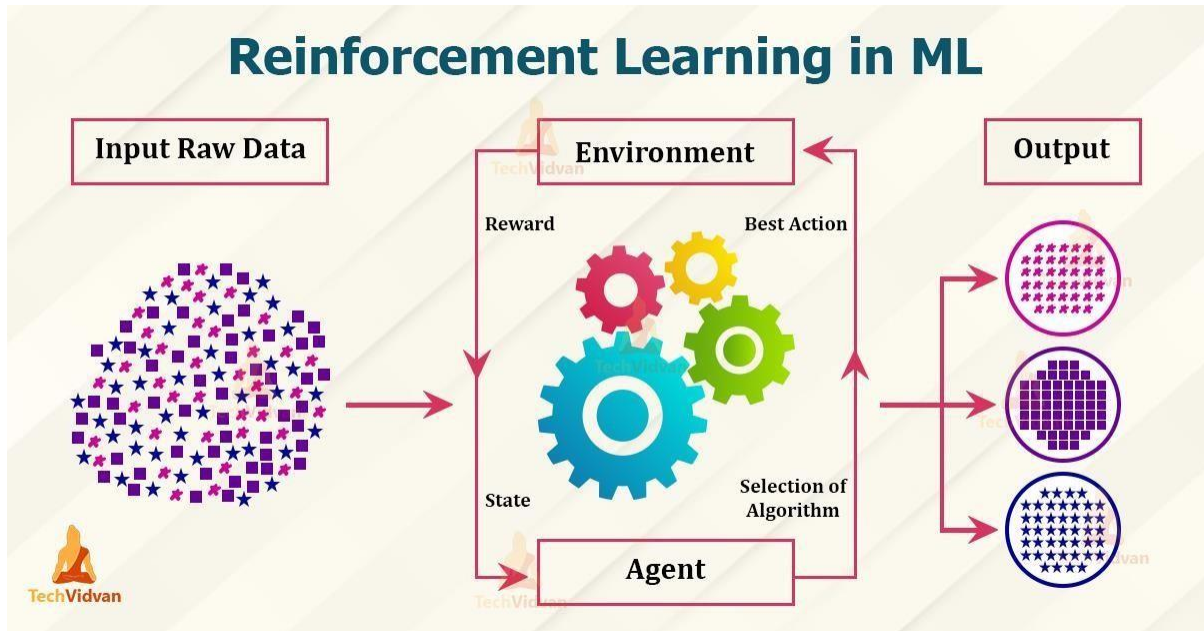


Fig. 4.3.0. Reinforcement learning in machine Learning

- Reinforcement learning is more on the active learning side. Active learning means that there are no fixed criteria as per which, the algorithm would work.

- Here, there is no predefined or labelled data. Also, the algorithm does not map the inputs and outputs but, it uses more like a trial and error approach to learning.

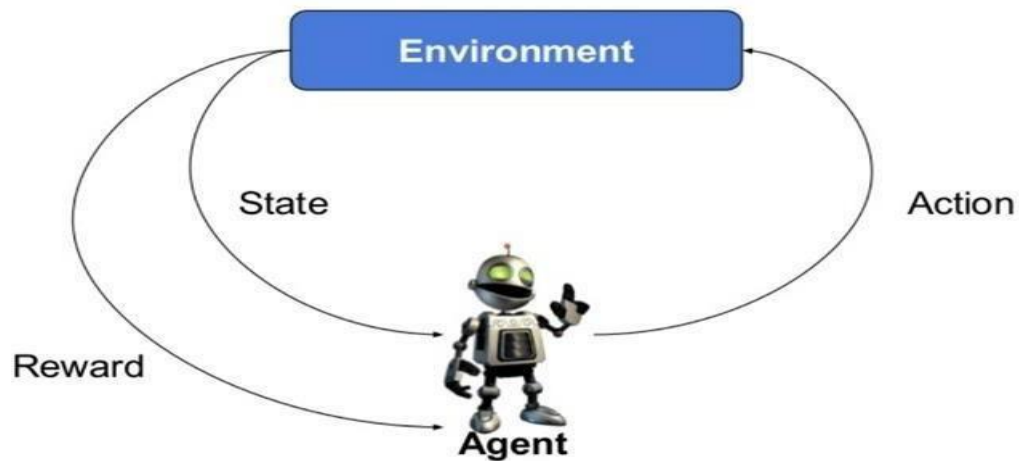


Fig. 4.3.1. Environment

- It is more closer to human learning and is more preferable for artificial intelligence models.
 - It has a reward-based system for its models to solve problems.
 - There is no external supervision, unlike supervised learning.
 - Also, an agent here interacts with the environment and learns by performing actions and learning from the rewards earned and the mistakes committed.
-
- **Agent:** It is an assumed entity which performs actions in an environment to gain some reward.
 - **Environment (e):** A scenario that an agent has to face.
 - **Reward (R):** An immediate return given to an agent when he or she performs specific action or task.
 - **State (s):** State refers to the current situation returned by the environment.
 - **Policy (π):** It is a strategy which applies by the agent to decide the next action based on the current state.
 - **Value (V):** It is expected long-term return with discount, as compared to the short-term reward.
 - **Value Function:** It specifies the value of a state that is the total amount of reward. It is an agent which should be expected beginning from that state.

- **Model of the environment:** This mimics the behavior of the environment. It helps you to make inferences to be made and also determine how the environment will behave.
- **Model based methods:** It is a method for solving reinforcement learning problems which use model-based methods.
- **Q value or action value (Q):** Q value is quite similar to value. The only difference between the two is that it takes an additional parameter as a current action.

CHAPTER 5

SOFTWARE ENVIRONMENT

5.1 MICROSOFT.NET FRAMEWORK

5.1.1 FEATURES OF JAVA

Microsoft .NET is a set of Microsoft software technologies for rapidly building and integrating XML Web services, Microsoft Windows-based applications, and Web solutions. The .NET Framework is a language-neutral platform for writing programs that can easily and securely interoperate. There's no language barrier with .NET: there are numerous languages available to the developer including Managed C++, C#, Visual Basic and Java Script. The .NET framework provides the foundation for components to interact seamlessly, whether locally or remotely on different platforms. It standardizes common data types and communications protocols so that components created in different languages can easily interoperate.

“.NET” is also the collective name given to various software components built upon the .NET platform. These will be both products (Visual Studio.NET and Windows.NET Server, for instance) and services (like Passport, .NET My Services, and so on).

5.1.2 THE .NET FRAMEWORK

The .NET Framework has two main parts:

1. The Common Language Runtime (CLR).
2. A hierarchical set of class libraries.

The CLR is described as the “execution engine” of .NET. It provides the environment within which programs run. The most important features are

- ◆ Conversion from a low-level assembler-style language, called Intermediate Language (IL), into code native to the platform being executed on.
- ◆ Memory management, notably including garbage collection.
- ◆ Checking and enforcing security restrictions on the running code.

- ◆ Loading and executing programs, with version control and other such features.
- ◆ The following features of the .NET framework are also worth description:

Managed Code

The code that targets .NET, and which contains certain extra Information - “metadata” - to describe itself. Whilst both managed and unmanaged code can run in the runtime, only managed code contains the information that allows the CLR to guarantee, for instance, safe execution and interoperability.

Managed Data

With Managed Code comes Managed Data. CLR provides memory allocation and Deal location facilities, and garbage collection. Some .NET languages use Managed Data by default, such as C#, Visual Basic.NET and JScript.NET, whereas others, namely C++, do not. Targeting CLR can, depending on the language you’re using, impose certain constraints on the features available. As with managed and unmanaged code, one can have both managed and unmanaged data in .NET applications - data that doesn’t get garbage collected but instead is looked after by unmanaged code.

Common Type System

The CLR uses something called the Common Type System (CTS) to strictly enforce type-safety. This ensures that all classes are compatible with each other, by describing types in a common way. CTS define how types work within the runtime, which enables types in one language to interoperate with types in another language, including cross-language exception handling. As well as ensuring that types are only used in appropriate ways, the runtime also ensures that code doesn’t attempt to access memory that hasn’t been allocated to it.

Common Language Specification

The CLR provides built-in support for language interoperability. To ensure that you can develop managed code that can be fully used by developers using any programming language, a set of language features and rules for using them called the

Common Language Specification (CLS) has been defined. Components that follow these rules and expose only CLS features are considered CLS-compliant.

5.1.3 THE CLASS LIBRARY

.NET provides a single-rooted hierarchy of classes, containing over 7000 types. The root of the namespace is called System; this contains basic types like Byte, Double, Boolean, and String, as well as Object. All objects derive from System. Object. As well as objects, there are value types. Value types can be allocated on the stack, which can provide useful flexibility. There are also efficient means of converting value types to object types if and when necessary.

The set of classes is pretty comprehensive, providing collections, file, screen, and network I/O, threading, and so on, as well as XML and database connectivity.

The class library is subdivided into a number of sets (or namespaces), each providing distinct areas of functionality, with dependencies between the namespaces kept to a minimum.

5.1.4 LANGUAGES SUPPORTED BY .NET

The multi-language capability of the .NET Framework and Visual Studio .NET enables developers to use their existing programming skills to build all types of applications and XML Web services. The .NET framework supports new versions of Microsoft's old favorites Visual Basic and C++ (as VB.NET and Managed C++), but there are also a number of new additions to the family.

Visual Basic .NET has been updated to include many new and improved language features that make it a powerful object-oriented programming language. These features include inheritance, interfaces, and overloading, among others. Visual Basic also now supports structured exception handling, custom attributes and also supports multi-threading.

Visual Basic .NET is also CLS compliant, which means that any CLS-compliant language can use the classes, objects, and components you create in Visual Basic .NET.

Managed Extensions for C++ and attributed programming are just some of the enhancements made to the C++ language. Managed Extensions simplify the task of migrating existing C++ applications to the new .NET Framework. C# is Microsoft's new language. It's a C-style language that is essentially "C++ for Rapid Application Development". Unlike other languages, its specification is just the grammar of the language. It has no standard library of its own, and instead has been designed with the intention of using the .NET libraries as its own.

Microsoft Visual J# .NET provides the easiest transition for Java-language developers into the world of XML Web Services and dramatically improves the interoperability of Java-language programs with existing software written in a variety of other programming languages.

Active State has created Visual Perl and Visual Python, which enable .NET-aware applications to be built in either Perl or Python. Both products can be integrated into the Visual Studio .NET environment. Visual Perl includes support for Active State's Perl Dev Kit.

Other languages for which .NET compilers are available include

- FORTRAN
- COBOL
- Eiffel

ASP.NET	Windows Forms
XML WEB SERVICES	
Base Class Libraries	
Common Language Runtime	
Operating System	

C#.NET is also compliant with CLS (Common Language Specification) and supports structured exception handling. CLS is set of rules and constructs that are supported by the CLR (Common Language Runtime). CLR is the runtime environment provided by the .NET Framework; it manages the execution of the code and also makes

the development process easier by providing services C#.NET is a CLS-compliant language. Any objects, classes, or components that created in C#.NET can be used in any other CLS-compliant language. In addition, we can use objects, classes, and components created in other CLS-compliant languages in C#.NET .The use of CLS ensures complete interoperability among applications, regardless of the languages used to create the application.

Constructors and Destructors

Constructors are used to initialize objects, whereas destructors are used to destroy them. In other words, destructors are used to release the resources allocated to the object. In C#.NET the sub finalize procedure is available. The sub finalize procedure is used to complete the tasks that must be performed when an object is destroyed. The sub finalize procedure is called automatically when an object is destroyed. In addition, the sub finalize procedure can be called only from the class it belongs to or from derived classes.

Garbage Collection

Garbage Collection is another new feature in C#.NET. The .NET Framework monitors allocated resources, such as objects and variables. In addition, the .NET Framework automatically releases memory for reuse by destroying objects that are no longer in use. In C#.NET, the garbage collector checks for the objects that are not currently in use by applications. When the garbage collector comes across an object that is marked for garbage collection, it releases the memory occupied by the object.

Overloading

Overloading is another feature in C#. Overloading enables us to define multiple procedures with the same name, where each procedure has a different set of arguments. Besides using overloading for procedures, we can use it for constructors and properties in a class.

Multithreading

C#.NET also supports multithreading. An application that supports multithreading can handle multiple tasks simultaneously, we can use multithreading to decrease the time taken by an application to respond to user interaction.

Structured Exception Handling

C#.NET supports structured handling, which enables us to detect and remove errors at runtime. In C#.NET, we need to use Try...Catch...Finally statements to create exception handlers. Using Try...Catch...Finally statements, we can create robust and effective exception handlers to improve the performance of our application.

The .Net Framework

The .NET Framework is a new computing platform that simplifies application development in the highly distributed environment of the Internet.

5.1.5 OBJECTIVES OF .NET FRAMEWORK

1. To provide a consistent object-oriented programming environment whether object codes is stored and executed locally on Internet-distributed, or executed remotely.
2. To provide a code-execution environment to minimizes software deployment and guarantees safe execution of code.
3. Eliminates the performance problems.

There are different types of application, such as Windows-based applications and Web-based applications.

5.2 SQL SERVER

Microsoft is the vendor of SQL Server. We have different editions of SQL Server, where SQL Server Express is free to download and use. SQL Server uses T-SQL (Transact-SQL). T-SQL is Microsoft's proprietary extension to SQL. TSQL is very similar to standard SQL, but in addition it supports some extra functionality, built in functions, etc.

T-SQL expands on the SQL standard to include procedural programming, local variables, and various support functions for string processing, date processing, mathematics, etc. SQL Server consists of a Database Engine and a Management Studio (and lots of other stuff which we will not mention here). The Database engine has no graphical interface - it is just a service running in the background of your computer (preferable on the server). The Management Studio is graphical tool for

configuring and viewing the information in the database. It can be installed on the server or on the client (or both).

SQL Server Management Studio can also be used to create a new database, alter any existing database schema by adding or modifying tables and indexes, or analyze performance. It includes the query windows which provide a GUI based interface to write and execute queries.

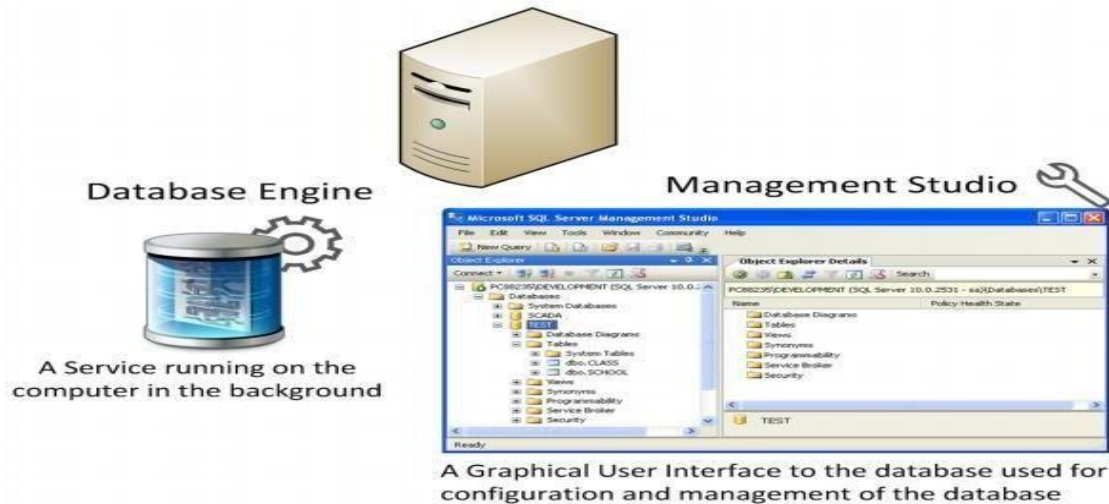


Fig. 5.2.0. SQL Server

5.2.1 SQL SERVER MANAGEMENT STUDIO

SQL Server Management Studio is a GUI tool included with SQL Server for configuring, managing, and administering all components within Microsoft SQL Server. The tool includes both script editors and graphical tools that work with objects and features of the server. As mentioned earlier, version of SQL Server Management Studio is also available for SQL Server Express Edition, for which it is known as SQL Server Management Studio Express.

A central feature of SQL Server Management Studio is the Object Explorer, which allows the user to browse, select, and act upon any of the objects within the server. It can be used to visually observe and analyze query plans and optimize the database performance, among others. SQL Server Management Studio can also be used to create a new database, alter any existing database schema by adding or modifying tables and indexes, or analyze performance. It includes the query windows which provide a GUI based interface to write and execute queries.

When creating SQL commands and queries, the “Query Editor” (select “New Query” from the Toolbar) is used (shown in the figure above). With SQL and the “Query Editor” we can do almost everything with code, but sometimes it is also a good idea to use the different Designer tools in SQL to help us do the work without coding (so much).

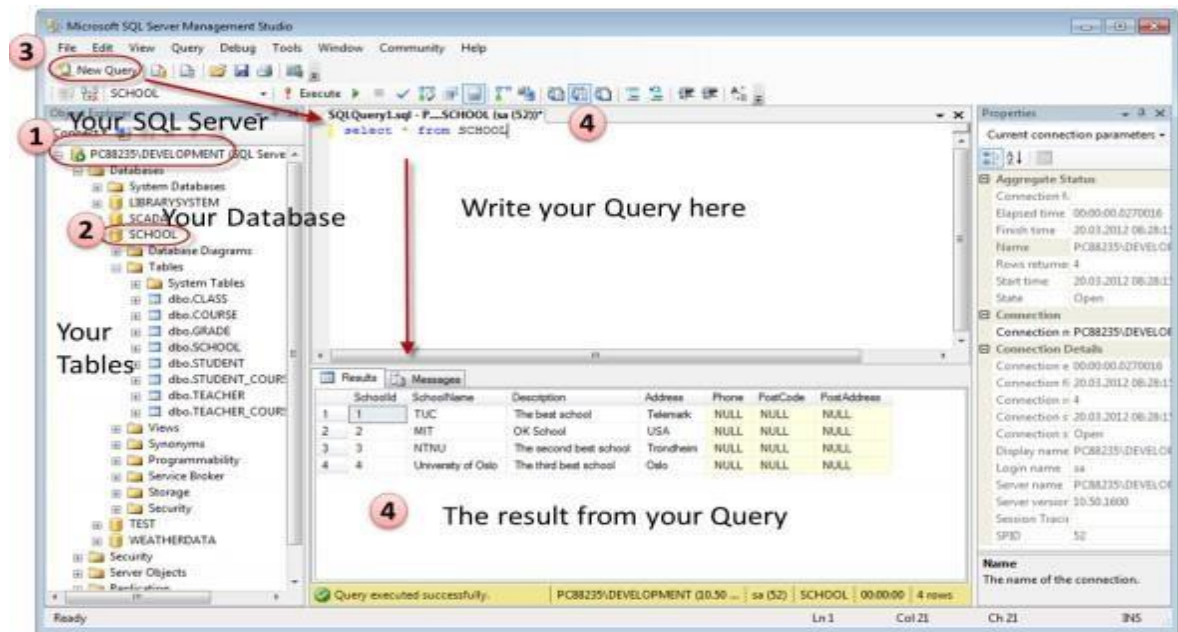


Fig 5.2.1. SQL Server Management Studio

5.2.2 Create a new Database

It is quite simple to create a new database in Microsoft SQL Server. Just right-click on the “Databases” node and select “New Database...”

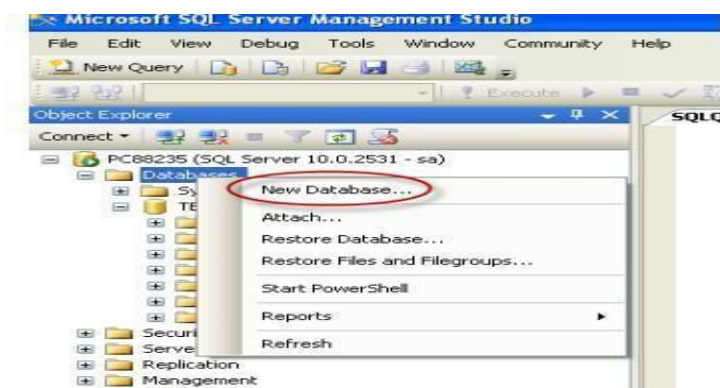


Fig 5.2.2. New database

The OLAP Services feature available in SQL Server version 7.0 is now called SQL Server 2000 Analysis Services. The term OLAP Services has been

replaced with the term Analysis Services. Analysis Services also includes a new data mining component. The Repository component available in SQL Server version 7.0 is now called Microsoft SQL Server 2000 Meta Data Services. References to the component now use the term Meta Data Services. The term repository is used only in reference to the repository engine within Meta Data Services

SQL-SERVER database consist of six type of objects,

They are,

1. TABLE
2. QUERY
3. FORM
4. REPORT
5. MACRO

Table

A database is a collection of data about a specific topic.

Views of Table

We can work with a table in two types,

1. Design View
2. Datasheet View

Design View

To build or modify the structure of a table we work in the table design view. We can specify what kind of data will be hold.

Datasheet View

To add, edit or analyses the data itself we work in tables datasheet view mode.

Query

A query is a question that has to be asked the data. Access gathers data that answers the question from one or more table. The data that make up the answer is

either dynaset (if you edit it) or a snapshot (it cannot be edited). Each time we run query, we get latest information in the dynaset. Access either displays the dynaset or snapshot for us to view or perform an action on it, such as deleting or updating

REQUIREMENT ANALYSIS

Requirement analysis, also called requirement engineering, is the process of determining user expectations for a new modified product. It encompasses the tasks that determine the need for analysing, documenting, validating and managing software or system requirements. The requirements should be documentable, actionable, measurable, testable and traceable related to identified business needs or opportunities and define to a level of detail, sufficient for system design.

FUNCTIONAL REQUIREMENTS

It is a technical specification requirement for the software products. It is the first step in the requirement analysis process which lists the requirements of particular software systems including functional, performance and security requirements. The function of the system depends mainly on the quality hardware used to run the software with given functionality.

Usability

It specifies how easy the system must be use. It is easy to ask queries in any format which is short or long, porter stemming algorithm stimulates the desired response for user.

Robustness

It refers to a program that performs well not only under ordinary conditions but also under unusual conditions. It is the ability of the user to cope with errors for irrelevant queries during execution.

Security

The state of providing protected access to resource is security. The system provides good security and unauthorized users cannot access the system there by providing high security.

Reliability

It is the probability of how often the software fails. The measurement is often expressed in MTBF (Mean Time Between Failures). The requirement is needed in order to ensure that the processes work correctly and completely without being aborted. It can handle any load and survive and survive and even capable of working around any failure.

Compatibility

It is supported by version above all web browsers. Using any web servers like localhost makes the system real-time experience.

Flexibility

The flexibility of the project is provided in such a way that it has the ability to run on different environments being executed by different users.

Safety

Safety is a measure taken to prevent trouble. Every query is processed in a secured manner without letting others to know one's personal information.

NON- FUNCTIONAL REQUIREMENTS

Portability

It is the usability of the same software in different environments. The project can be run in any operating system.

Performance

These requirements determine the resources required, time interval, throughput and everything that deals with the performance of the system.

Accuracy

The result of the requesting query is very accurate and high speed of retrieving information. The degree of security provided by the system is high and effective.

Maintainability

Project is simple as further updates can be easily done without affecting its stability. Maintainability basically defines that how easy it is to maintain the system. It means that how easy it is to maintain the system, analyse, change and test.

CHAPTER 6

TESTING PROCESS

6.1 TESTING PROCESS

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product it is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

6.2 TYPES OF TESTS

6.2.1 Unit Testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program input produces valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of business process performs accurately to the documented specifications and contains clearly defined inputs and expected result

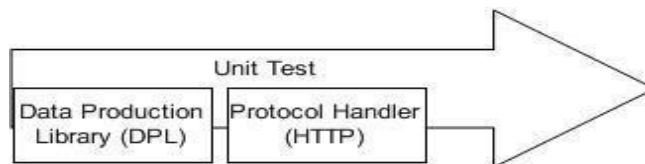


Fig. 6.1 Unit Testing

6.2.2 Integration Testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

6.2.3 Functional Testing

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation and user manuals.

Functional testing is centered on the following items:

Valid Input is used to identified classes of valid input must be accepted.

Invalid Input is used to identified classes of invalid input must be rejected.

Functions is used to identified functions must be exercised.

Output is used to identified classes of application outputs.

Systems/Procedures is used to interfacing systems or procedures must be invoked. Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive

processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

6.2.4 System Testing

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

6.2.5 White Box Testing

White Box Testing is a testing in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is used to test areas that cannot be reached from a black box level.

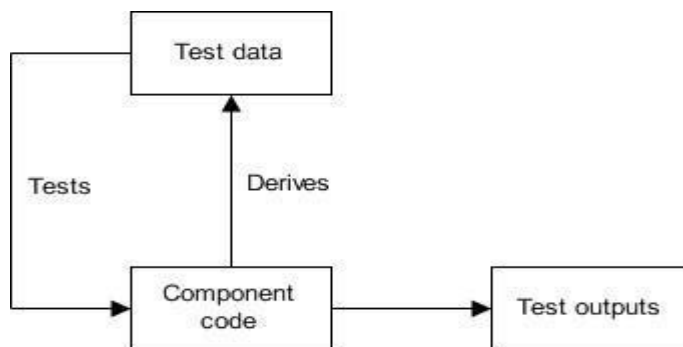


Fig. 6.2 White box Testing

6.2.6 Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements

document. It is a testing in which the software under test is treated, as a black box .you **cannot “see” into it. The test provides inputs and responds to outputs without** considering how the software works.

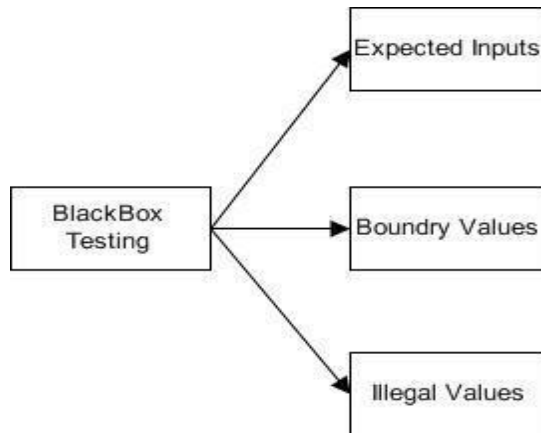


Fig. 6.3 Black box Testing

6.3 TEST STRATEGY AND APPROACH

Field testing will be performed manually and functional tests will be written in detail.

6.3.1 Test Objectives

- ☐ All field entries must work properly.
- ☐ Pages must be activated from the identified link.
- ☐ The entry screen, messages and responses must not be delayed.
- ☐ Features to be tested
- ☐ Verify that the entries are of the correct format
- ☐ No duplicate entries should be allowed
- ☐ All links should take the user to the correct page.

6.3.2 Integration Testing

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications.

6.3.3 Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

6.4 ALPHA TESTING

In software development, alpha test will be a test among the teams to confirm that your product works. Originally, the term alpha test meant the first phase of testing in a software development process. The first phase includes unit testing, component testing, and system testing. It also enables us to test the product on the lowest common denominator machines to make sure download times are acceptable and preloaders work.

6.5 BETA TESTING

In software development, a beta test is the second phase of software testing in which a sampling of the intended audience tries the product out. Beta testing can be considered "pre-release testing." Beta test versions of software are now distributed to curriculum specialists and teachers to give the program a "real-world" test.

CHAPTER 7

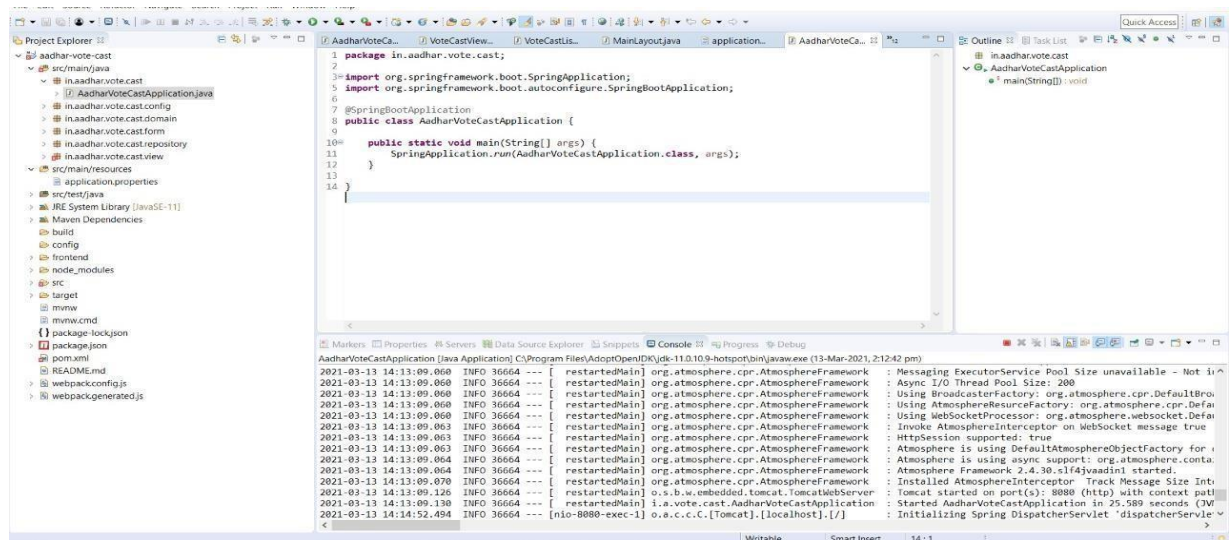
CONCLUSION AND FUTURE ENHANCEMENT

7.1 CONCLUSION

In this paper, we have proposed an online voting system which is better and faster than previous systems. The new system prevents access to illegal voters, provides ease of use, transparency and maintains integrity of the voting process. The system also prevents multiple votes by the same person and checks eligibility of the voter. It also allows a person to vote from anywhere provided that the voter is within electoral limits.

7.2 FUTURE ENHANCEMENTS

Future enhancements focused to design a system which can be easy to use and will provide security and privacy of votes on acceptable level by concentrating the authentication and processing section.



7.3. Results :

Step 1:

Fig 7.3.0. Eclipse software

Step 2:

Aadhar vote cast

Log in

Username *

Password *

Log in

[Forgot password](#)

AUTHOR CARD V...docx

Show all

Fig. 7.3.1. Login page

Step 3:

Aadhar vote cast

admin Log out

Aadhar details

Voters details

Casted Votes

Filter by id...

Add voter

Id	Name	Father Name
122760589074	NITHISH	EKAMBARESWAEIAH
732070676566	Mahesh	peddababulu
709492165227	somasekhar	sai baba

Voter id

Name

Father Name

Gender

Date of birth *

Door number

Street name

Landmark

Fig 7.3.2. Add voter details to server

Step 4:

The screenshot shows a web browser at localhost:8080/vote. The page title is 'Aadhar vote cast'. A user is logged in, with a 'Log out' link. A 'Cast vote' link is on the left. The main content area says 'Welcome to Vote casting !!! Your vote is very important for nation' and 'Please enter below details to confirm your identity'. The form includes dropdowns for Nationality (Indian), State (Andhra Pradesh), District (Kadapa), Taluk (Proddatur), and Ward (3). There is a text input for 'Enter Aadhar Number' with the value 365666209183. A checkbox 'I agree that all the details are correct' is checked. 'Cast vote' and 'Reset' buttons are at the bottom.

[Cast vote](#)

Welcome to Vote casting !!! Your vote is very important for nation

Please enter below details to confirm your identity

Nationality: Indian

State: Andhra Pradesh

District: Kadapa

Taluk: Proddatur

Ward: 3

Enter Aadhar Number: 365666209183

☒ I agree that all the details are correct

[Cast vote](#) [Reset](#)

Fig 7.3.3. Casting vote

Step 5:

The screenshot shows a web browser at localhost:8080/casted-votes. The page title is 'Aadhar vote cast'. An admin user is logged in, with a 'Log out' link. The left sidebar has links for 'Aadhar details', 'Voters details', and 'Casted Votes' (which is active). The main content area displays a table of casted votes.

Aadhar	District	Id	Nationality	State	Taluk	Ward
866328363773	Kurnool	1	Indian	Andhra Pradesh	Nandyal	2
249706710274	Kurnool	2	Indian	Andhra Pradesh	Nandyal	4
365666209183	Kurnool	3	Indian	Andhra Pradesh	Nandyal	1
123456789009	Kurnool	35	Indian	Andhra Pradesh	Nandyal	4
234567890123	Chennai	36	Indian	Tamil Nadu	Tambaram	1
123456789012	Chennai	37	Indian	Tamil Nadu	Tambaram	1
654321098752	Chennai	38	Indian	Tamil Nadu	Tambaram	3
863961995882	Chennai	39	Indian	Tamil Nadu	Tambaram	2
872135907643	Chennai	40	Indian	Tamil Nadu	Tambaram	4
949047690542	Kurnool	41	Indian	Andhra Pradesh	Nandyal	3

Fig 7.3.4. voting results

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