

# Improving Voters' Registration and Voting Process in Nigeria Using Distributed Database

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**Abstract:- Elections have become one of the standards for measuring the democratic potency of a nation. This assertion is supported by the fact that citizens' participation in the choice of their leaders is utmost. In Nigeria today, the Independent National Electoral Commission (INEC) voting system mandates voters to cast votes only in the polling units where they were registered, and hence, has discouraged citizens from participating in elections. This work is aimed at designing a system which will allow voters cast votes from any location in the country irrespective of where they may have registered. To achieve this aim, Object Oriented Hypermedia Design Methodology (OOHDM) was adopted for requirements gathering, conceptual, navigational and abstract interface designs, and implementation. The result of this system will provide user-friendly graphical interfaces and deliver voting process easily, reliably and more quickly.**

**Keywords:-** Voting, Database, Biometrics, Elections, INEC, Voter, Fingerprint.

## I. INTRODUCTION

One of the fundamental human rights is the freedom to exercise one's franchise. Democracy is a form of government in which power and civic responsibility are exercised by all adult citizens, directly or indirectly through their freely elected representatives (Konrad, 2011). In democracy, the ideal is seeking the consent and mandate of citizens for any leader to be accepted as legitimate. Voting in elections encourage individual freedom, so that people may behave and express themselves as they choose. Hence, citizens' participation in the choice of their leaders is paramount. In response to the 1948 Universal Declaration of Human Rights which puts emphasis on the necessity of free elections, nations aim at new and improved voting procedures.

In Nigeria, the electoral process, as in most developing democracies is fraught with several challenges. Among the problems encountered during the previous general election exercises were:

1. Multiple registrations/voting: Some voters possess multiple voters card and hence casted their votes more than once.

2. Relocation issues: Registered voters who have relocated from one region of the country to another were unable to cast votes since they are only allowed to vote in polling units where they were registered.

## II. LITERATURE REVIEW

The centrality of voters' registration is the body of function of the present independent national electoral commission (INEC). This is underscored by the provision of Part III of national register of voters and voters registration Section 10 (1) of the 2006 electoral act of the Federal Republic of Nigeria which stated that, "The commission shall compile, maintain, and update on a continuous basis, a national register of voters, in this act referred to as the 'register of voters' which shall include the names of all persons entitled to vote in any federal, state, local government or area council elections".

When a person comes in to apply for registration, the biometrics details of the individual is captured using data capture machine (DCM). The intention of government is to have a clean, complete, permanent, and updated list of voters through the adoption of biometrics technology in the registration process. Any Nigerian citizen who is at least eighteen (18) years of age, a resident of Nigeria for at least one (1) year and in the place wherein they propose to vote for at least six (6) months on or before the day of the election; and not otherwise disqualified by law is eligible to register at any polling unit closest to him (Olabode, 2011b). At the end of a successful voter registration exercise, the individual is issued a voter's card. On the day of election, the individual returns to the same polling unit with the voter's card for verification and upon successful, will be allowed to cast vote. This therefore mandates individuals to only cast votes in the polling units where they were registered, as their voters' card will not be recognized in other polling units.

## III. THEORETICAL BACKGROUND OF DISTRIBUTED DATABASE

A distributed database management system is software that supports the transparent creation, access and manipulation of interrelated data located at the different sites of a computer network (Coronel et al., 2011). Furthermore Coronel et al. (2011) stated that the distributed database

management system (DDBMS) governs the storage and storage of logically related data over interconnected computer system in which both data and processing are distributed among several sites. Each site of the network has autonomous processing capability and can perform local applications. Distributed database systems are very complex systems that have many interrelated objectives of transparency, heterogeneity, autonomy, high degree of function, extensibility, openness and optimized performance (Olabode et al., 2011). A distributed system is a collection of multiple, logically interrelated databases distributed over a computer network (Ozsu and Valdurez, 2011). A distributed database management system is the software that manages the distributed database and provides an access mechanism that makes this distribution transparent to the users (Date, 2009).

With distributed system during registration exercises, data will be accessed, stored and updated across different sites on the network. This will ensure that voters cast vote at polling units of their choice, irrespective of where they may have registered.

**IV. METHODOLOGY**

Object Oriented Hypermedia Design Methodology (OOHDM) was adopted for this work. The OOHDM is a model-based approach for building hypermedia applications (Barbosa, 1994). It comprises four different activities namely conceptual design, navigational design, abstract interface design, and implementation. These activities are performed in a mix of incremental, iterative and prototyped-based development style. During each activity, except for the implementation, a set of object-oriented models describing particular design concerns are built or enriched

from previous iterations. OOHDM allows users and tasks to be identified and their attributes specified using functional requirements.

This approach describe the use cases and actors that are found in the new system of enhanced distributed system for INEC registration and voting (EDSIRV). Each use case is described in details with diagrams and tables in their respective module section. These use case diagrams model the desired behaviour of the system. The Functional requirement is categorized in three main modules: the super administrator, the administrator module and the voter module.

**Super Administrator Module**

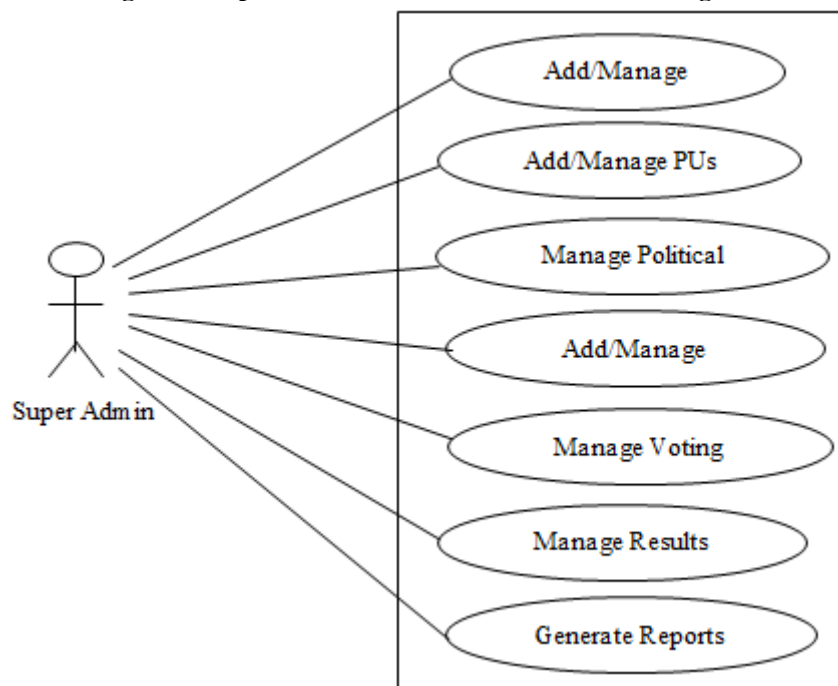
Super administrator module is module for personnel in charge of a particular election, and will operate from the head office. This module allows him to give privileges to administrators or any other assigned user.

The super administrator can:

- Add/Manage Admin
- Add/Manage Polling Units (PUs)
- Add/Manage Political Parties
- Add/Manage Electorates
- Manage Voting Process
- Manage Results
- Generate Reports

The Super administrator module use case diagram is shown in Figure 1. Table 1 and Table 2 show Super administrator module actor description and Super administrator module use case description respectively.

**Figure 1: Super Administrator Module Use Case Diagram**



**Table 1 – Super administrator module description**

Actor	Description
Super administrator	This is managing the entire system plus assigning users to different modules of the system.

**Table 2 – Super administrator module use case description**

Use Case	Description
Add/Manage Admin	Add/manage system admins
Add/Manage PUs	Adding/managing polling units
Add/Manage Parties	Has the privilege of adding and managing political parties
Add/Manage Electorates	Adding and managing electorates (voters)
Manage Voting Process	Handles voters verification and voting
Manage Results	Manages election results

Manage Reports	Statistical reports of the voting are available
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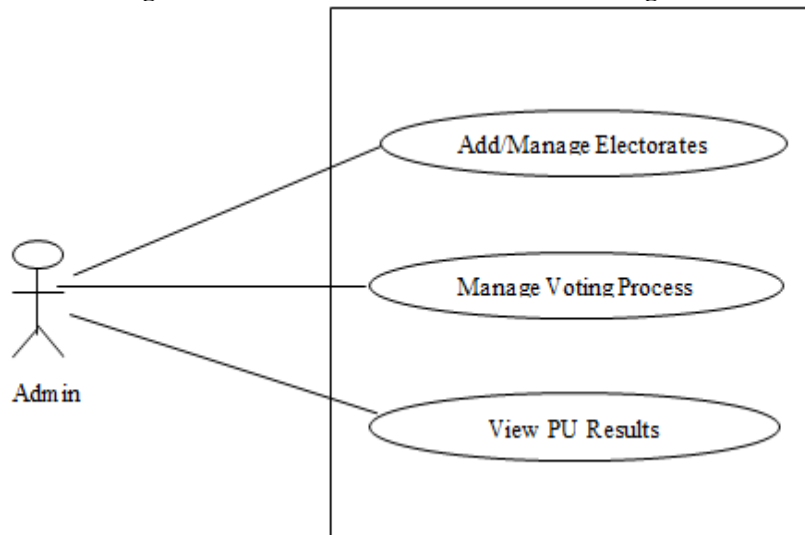
**Administrator’s Module**

Administrator module is responsible for managing a polling unit during voters’ registration and election process. This module allows the administrator to register voters and manage voters’ information. The privileges of the module will be assigned by the super administrator. The administrator can:

- Add/Manage Electorates
- Manage Voting Process
- View PU Results

The administrator module use case diagram is shown in Figure 2. Table 3 and Table 4 shows administrator module actor description and administrator module use Case Description respectively.

**Figure 2: Administrator Module Use Case Diagram**



**Table 3 – Administrator module actor description**

Actor	Description
Administrator	Responsible for managing a polling unit (PU).

**Table 4 – Administrator module use case description**

Use Case	Description
Add/Manage Electorates	The voter has filled the registration form first; given that all information regarding voter is correctly filled by the voter. After filling all necessary information, the account gets created. Further updates are also possible.
Manage Voting Process	Admin handles voter verification and voting.
View PU Result	Admin is able to view election results of his polling unit.

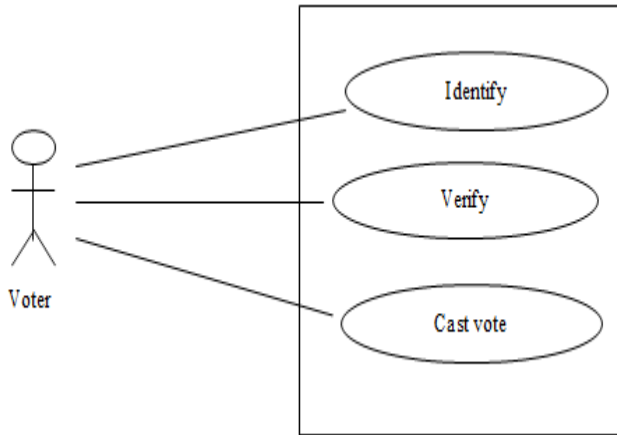
**Voter Module**

This module is for the voters. The privileges of this module would be assigned by the administrator. A voter can do the following:

- Identify
- Verify
- Cast vote

The voter module use case diagram is shown in Figure 3 while Table 5 and Table 6 shows the voter module actor description and voter module use case description respectively.

**Figure 3: Voter Module Use Case Diagram**



**Table 5 – Voter Module Actor Description**

Actor	Description
Voter	A person who has the right to vote on the election day and has certain privileges or functions assigned to him by the administrator.

**Table 6 – Voter module use case description**

Use case	Description
Identify	On election day, voter is required to identify him/herself with voter’s ID card.
Verify	Voter is verified to ensure the Voter ID card belongs to him/her.
Cast vote	If identification and verification

processes were successful, voter is required to proceed to vote by selecting or speaking parties of his choice.

**V. RESULTS AND DISCUSSION**

The new system comprises of the following modules:

**a) Registration Module**

The registration module handles voters’ registration and updating voters’ information. Here, voter information is captured and stored in the database. Before this process is completed, the fingerprints templates are compared with the ones already in the database to avoid multiple registrations.

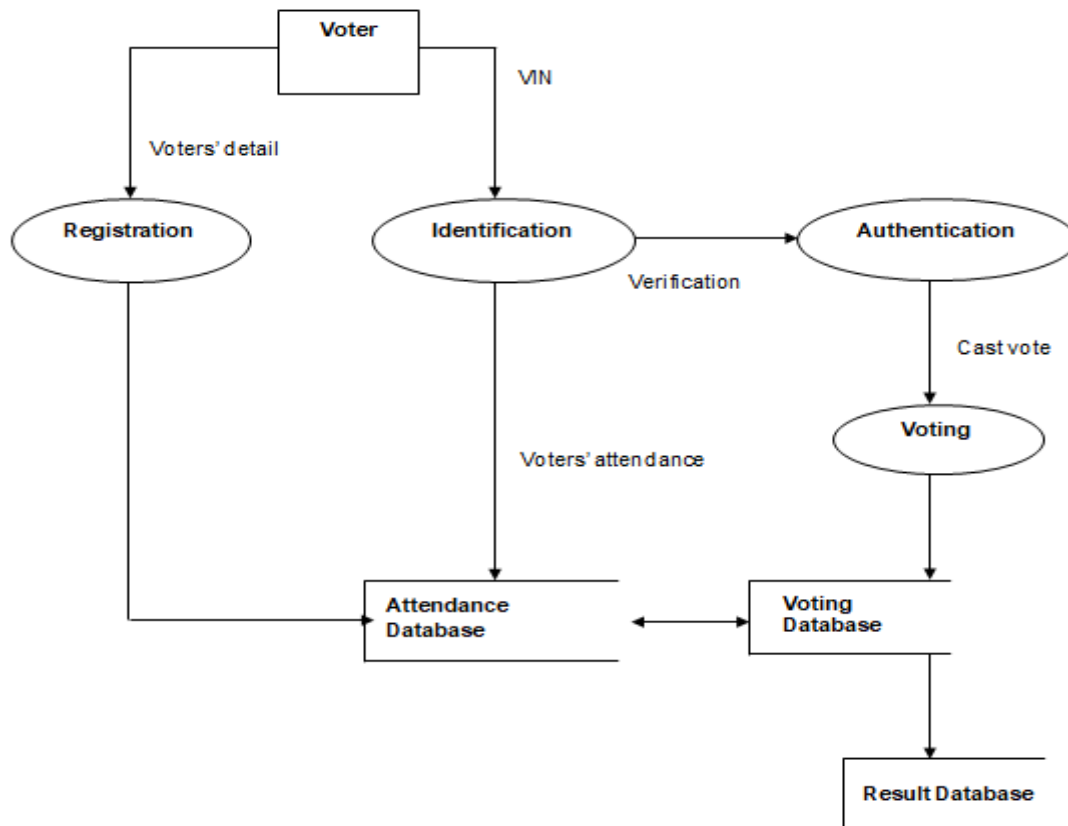
**b) Identification and Verification Module**

Before voting, registered voters are identified by the system and their details verified. Identification is done with the unique vote identification number (VIN) on the voter’s card. These two processes (identification and verification) must be successfully completed before a voter can proceed to vote.

**c) Voting and Result Module**

After successful identification and verification, a voter is allowed to cast vote. The system provides evidence of votes, including votes casted away from the registered units, and results are generated. Figure 4 presents the high level model of EDSIRV.

**Figure 4: High level model of EDSIRV**



## VI. CONCLUSION

This work implemented an enhanced distributed system for INEC voter registration and voting process (EDSIRV), which improves the existing electoral system in Nigeria. EDSIRV allows the super administrator to properly monitor activities and processes of registration and voting. Also, the system has the capability to check the eligibility and validity of voters, thereby eliminating double/multiple registrations and voting by voters. Voters are at freedom to cast votes from any polling unit nearest to their location.

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