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Design of Electronic Voting Systems for Reducing Election Process

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Abstract---the electoral process in Nigeria is known with tedious activities and time consuming. There is a serious problem in terms of delivering the electoral facilities to the voting station and securing such facilities. even before this activities there must be training of personal that will be involve in such exercise with involve huge amount of money and time consuming. it is in line with this problem the researcher intend to develop an online electronic voting systems to checkmate those problems. Each voter will be screen for eligibility, thereafter the information will be store in database so that at any time the voter can login and cast his/her vote and monitor the result online. Whenever a voter cast a vote the systems will automatically saves all his records including the ballot, username, address and password for future references. an administrator will then be able to monitor all the process and check for any illegal actions.
This systems if put into use will increase transparency an accountability as the observer can monitor all the activities during the registration/poling exercise.

I.INTRODUCTION

During the 2007 general election, Nigeria come to understand that the election process is tedious and full of ambiguity and therefore is imperfect. There after Nigeria decide in 2011 to use information and communication technology (ICT) to address such problems. To many Nigerian the deployment can go a long way in solving the problems of electoral process while others think only by reducing the level of corruption in the electoral systems can reduce the rigging and other serious problems. Unlike the transactional business, election is a national and very serious issues that involve power, money and even lives and properties. while the policies and programme of government can also reduce the level of problems, there is need also to look into how technology can be deploy to counter this existing problems. Technology can bridge the gap where policy fall short of solution.

II.LITRETURE REVIEW

The concept of electronic mail that was introduced by [1] can be used for application in electronic voting systems to reduce anonymity and increase transparency. Electronic voting has to take the place of traditional voting in order to reduce both human and material cost of voting in especially developing countries like Nigeria. so in this section the researcher tend to review anly the literature that are relevant to electronic voting systems.

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III.DESIGN AND IMPLEMENTATION OF E-VOTING SYSTEMS WITH CONTACTLESS IC CARDS

[2] define a e-voting system as any systems that allow the eligible voter to cast their votes via a computer normally connected to internet or intranet from anywhere like home or officek.Yung Ying Loiu [2] proposed electronic voting systems that use a contactless card. he design after finding the requirement for the systems from both user and administrator side the ballot card has to protect the privacy of the user based on the functionalities it is having.. the proposed systems has to has functions that will validate each and every user as to whether or not is a eligible voter and voter's authorities are limited in order to prevent his violation. The systems **is** in line with principles proposed by IPI [3] which include security and uniqueness.

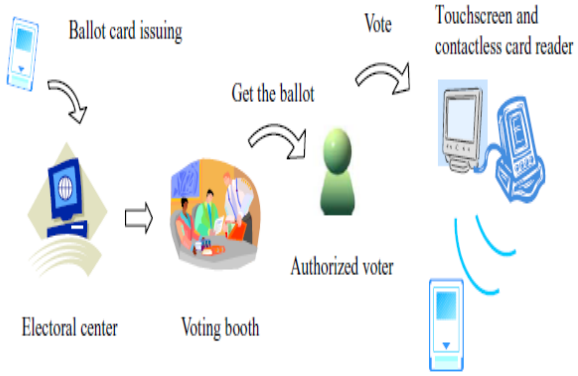

Fig 1 systems architecture for e-voting by Yung

The systems have the limitations of incomplete regulations as the absentees voters cannot be allow to vote later. It still needs to be discussed in legislative systems. To avoid this maladministration a strong and secure systems need to be proposed which can manage the electoral process effectively and save cost at the same time.

IV.E-VOTING SPECIFICATION AND DESIGN

Jamie Brown [4] suggests that in order for this electronic voting scheme to be successful, in addition to carrying out the basic task in voting systems it is also expected to be user friendly. When the proposed systems become complicated and complex such that there is drastic change with the previous systems known to users, then they may decide to shun away from the new systems. Therefore the researcher focuses on usability rather than functionality.
[5] Effectively argue that the people understanding or perception of this electronic voting system can have a great effect on their decision to use it, and subsequently their decision to cast their votes.

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as such it is very necessary to make the characteristics of that voting machine so friendly in order to allow the eligible voter cast their vote. it is in line with this problem of acceptability [5] develop a model to test this situation. the model contain five major constructs which include: ease of use, availability, accuracy, privacy protection, and. mobility

A survey was conducted among some professional and experience internet users, the result indicated that the major factor influencing the turnout of voters are the ease of use of the device and level of confidence of voter towards the general facilities in the exercise [6]. and these results are in line with that of [12] it was also argue that previous studies of Internet elections devoted very little attention to the report a laboratory study of the usability of electronic voting systems. a lot of issues ware rise regarding the acceptability of the systems including the nature of complexity of the systems [7]

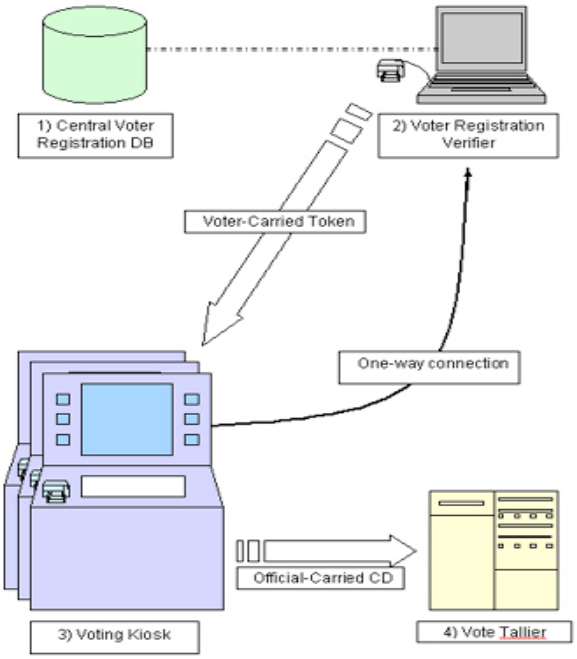

Fig. 2 E-voting systems architecture by J. Brown, 2003

in the above systems architecture we can see that the central voter registration server is link to the voter registration verifier so that whenever an eligible voter login and tries to cast or update his/her information, the administrator at the server will monitor everything. The systems use a token to verify any process initiated by the user through the voting kiosk. but the implication with this approach is that there is one way connection and therefore it is very difficult for admin to monitor the instances from his own end.

V.METHODS

The researcher deploys the use of Dreamweaver, PHP script, XAMPP, MySQL database and Macromedia Flash to develop the systems. The chapter therefore going to explain briefly how the systems was developed. Adobe Dreamweaver is a web development application originally created by Macromedia, and is now developed by Adobe Systems, which acquired Macromedia in 2005.

Dreamweaver is available for Windows operating systems. Recent versions have incorporated support for web technologies such as CSS, JavaScript, and various server-side scripting languages and frameworks including ASP, ColdFusion, and PHP. This means Dreamweaver can act as an IDE for PHP web developers.

This research is using PHP to develop the systems. Because the PHP is a server site scripting used for web browsers hence even within the HTML page you can embed PHP to executed each time the page is visited. PHP is very easy to use and does not require sophisticated knowledge in any programming language, and secondly it does not contain many system resources as such it is typically very fast and does not normally slow the system process. The PHP is also a free and open source application and therefore it is possible for users to extend it by writing their own extension and executing them.

MySQL is another open source application which the database constructs that enables PHP and Apache to work together to access and display data in a readable format to a browser. is a language that is design to process complex query. As a relational database system, MySQL allows many different tables to be joined together for maximum efficiency and speed. In the earlier days of the web, server-side scripting was almost exclusively performed by using a combination of C programs.

VI.DESIGN AND ANALYSIS

The application consists of two parts; the administrator section and the user section (voter). the functionalities of the administrator includes: registering users, candidates, and monitoring suspicious activities during the whole exercise.

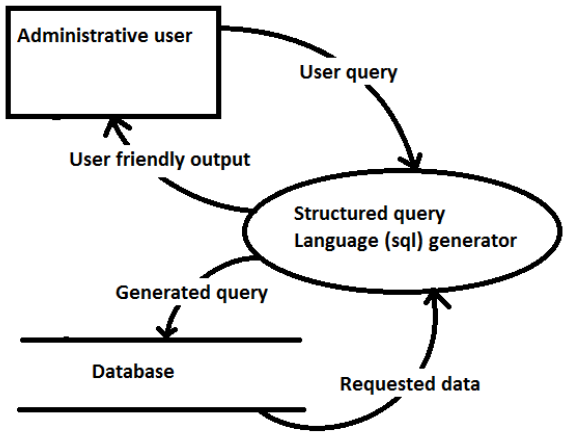

Fig 3 Data flow diagram for administrative section

The user end section provide privilege to voter to either cast his vote , view votes and view the real time situation of the exercise. The voting exercise is viewed at 500 milliseconds intervals and the content of the database is fetched and displayed on the screen by a flash application.

The voting section is simply a PHP web page that checks users information as authentication and the possibility that the user has voted or is booked not to vote for certain period of time before it records the users information.

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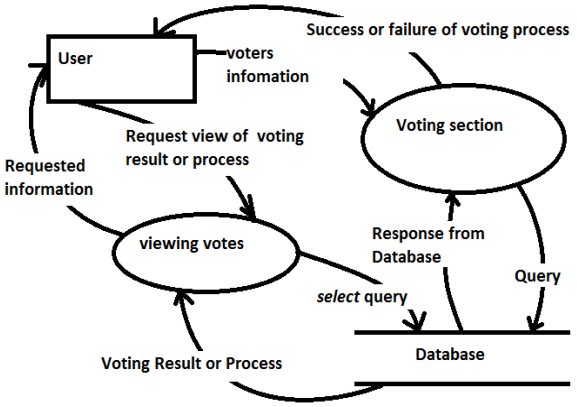

Fig 4: Dataflow diagram analysing voters section

The viewing area on the other hand is that area that allows the user to view election exercise at real time or the final results of the election This area requires no authentication since it has nothing to do with the voting tally.

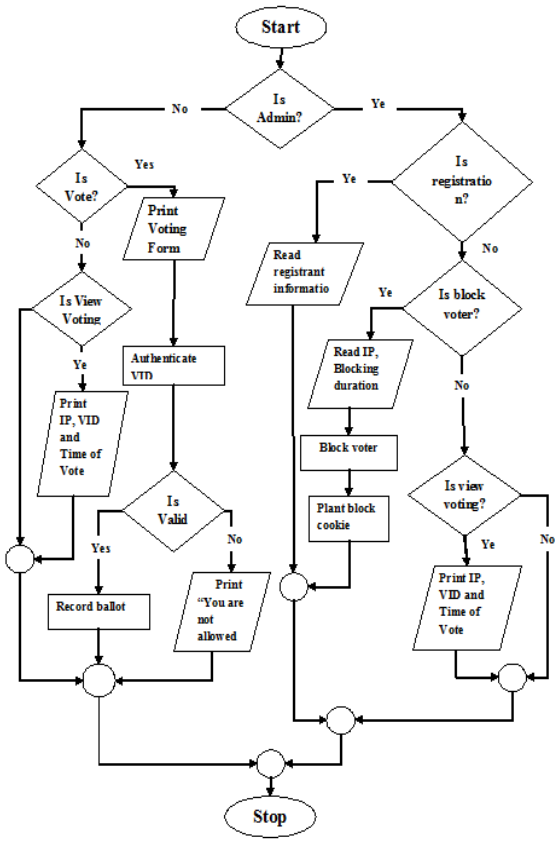

Fig 5: Flow chart for the design of the voting system.

Once a user goes to the website as a voter there are two operations that can be done by the user; Voting or Viewing the voting exercise. Every user (valid or invalid) voter can view voting process at real-time. Voting on the other hand can only be done by the registered users, therefore voters have to be authenticated, and then give access to cast their votes. Administrator on the other hand can register users, observe voting process as well as block users that are trying to rig the election.

VII.TESTING AND DEBUGING

It is merely impossible to develop a software without having errors here and there, these errors are called bugs and the act of removing these errors is called **Debugging**. Furthermore, to know and find error is only possible with testing. There are many ways of testing and debugging software, but one of the easiest methods is called the **Black box** testing [8].

In black box testing, the programmer tests the software without bringing in mind what the source code is all about. Therefore, this method tests the software and compares the software with the software requirements and in the end the programmer checks if the two are in compromise, if not where could the possible failures are? Once these failures are found they can then be debugged and the procedure is repeated.

A. TESTING

The following steps provide the report of how the website was tested.

- Apache and MySQL server were turned on.
- The web pages were copied from there folder and pasted in 'htdocs' folder in the application folder of Apache.
- The home page was renamed to 'index.htm'.
- The home page is the double-clicked to start the debugging the software.
- The page to be tested is then navigated to.
- The page is then tried to be used for its purpose and the deviations are recorded as bugs.

B. DEBUGGING

Once an error is found using the steps in section 4.2, the error (bug) is removed by either elimination (i.e. total removal of the error) or by producing a source code that can solve the problem. Table 4.1 has provided some of the errors found during testing and the solutions.

Table 1.Testing and debugging result

S/No.	Bugs	Solution
	Candidate's registration page does not show all candidates. It always miss the first candidate.	"mysql_fetch_array()" function was called twice because it was typed twice therefore one removed.
	The flash application cannot fetch data.	The accompanying PHP pages that gets data from Database and gives it to the flash is not present. The webpage "view_election.php" was created.
	registration page does not add new records.	The webpage cannot connect with the batabase, Therefore, 'mysql_connect ("localhost", "root", "");' was added where 'root' is the database username and 'pass' is the password.
	Result was not appearing.	A loop was created so that the different votes appear in different rows.

VIII.DISCUSSION AND CONCLUSSION

The main objective of this study is to design an appropriate application for real online electronic voting systems for Electoral commission.

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After the analysis of the current situation, the researcher was able to design a good system that will replace traditional method of voting in Nigeria Electoral commission. the proposed system will provide the voter/user to cast his vote where ever is he has much as he has access to the internet or intranet. The systems will allow administrator to properly monitor the activities and process throughout the registration exercise. The voter can as well login and cast his vote and can also monitor the real time situation of the registration process.

The system has the capability to check the validity and eligibility of voter, there by blocking invalid votes and illegitimate user to the systems. This validation is as a result of earlier screening that was done for the entire voter. The result of this screening was saved in the database so that at any point in time the system can validate any user/voter.

Despite the fact that the system can reduce cost and increase transparency, Software's are like human beings for them to work perfectly they need a conducive atmosphere, it is therefore necessary to provide all the necessary conditions required for the software to work. These conditions are; The server must have no less than version 2.0 of MySQL database, It must also have at least PHP 4.0, Client's computer must also requires 64 Random Access Memory (RAM), 1GB hard disk and any web browser that supports cookies preferably internet explorer or Opera. The computer must also have internet connection capabilities with a connection of at least 10kbps.

The proposed system is subjected to some limitations as follows: The e-voting system has many limitations due to the fact that it is an internet application and not a standalone. The other limitations of this software are; the software cannot be installed on computers and moved around with. The software only works with MySQL database. The software only works on a server with a PHP engine.

REFERENCES

1. D. L. Chaum, "Untraceable Electronic Mail, Return Addresses, and Digital Pseudonyms," *Communications of the ACM*, Vol.24, No.2, 1981, pp.84-88.
2. Qadah, G.Z., Taha, R.: Electronic voting systems: requirements, design, and implementation. Comput. Stand. Interf. 29(3), 376–386 (2007).
3. A. M. Keller, A. Dechert, K. Auerbach, D. Mertz, A. Pearl, and J. L. Hall, "A PC-based Open-Source Voting Machine with an Accessible Voter-Verifiable Paper Ballot," *Proceedings of the USENIX Annual Technical Conference*, U.S.A., 2005, p.52.
4. Brown, J.S., Duguid, P.: Borderline Issues: Social and material aspects of design. Human-computer interaction. Lawrence Erlbaum Associates, Inc 9(1):3–36 (1994).
5. Yao, Y., Murphy, L.: Remote electronic voting systems: an exploration of voters' perceptions and intention to use. Eur. J.
6. Inf. Syst. 16(2), 106–120 (2007).
7. Smith, A.D.: Acceptability of internet voting and CRM principles among the internet savvy. Int. J. Bus. Inf. Syst. 3(5), 498–528 (2008).
8. Conrad, F.G., Bederson, B.B., Lewis, B., Peytcheva, E., Traugott, M.W., Hanmer, M.J., Herrnson, P.S., Niemi, R.G.: Electronic voting eliminates hanging chads but introduces new usability challenges. Int. J. Hum. Comput. Stud. 67(1), 111–124 (2009).
9. E-vote 2011 (2009) Use case specification: 2.1 E-voting: Project: E-vote 2011. Systems specification document. Norwegian ministry of local government and regional development

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