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Electronic-voting approach with an open cloud computing architecture

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Abstract: ***The concept of cloud computing has passed into every area and the academic lexicon in an ambiguous manner, as cloud dust is being sprinkled on an excess of emerging products. Discussing the complexity and protecting against the caprice of the moment, this paper exhibits the notion behind the hype of cloud computing and evaluates its relevance to electronic government and electronic voting information system. Adopting a cloud computing approach for electronic voting solutions is investigated, reviewing the architecture within the previously described context. Taking a further step ahead, this paper proposes a high level implementation of electronic voting system, supported by cloud computing architecture and cryptographic technologies, additionally identifying issues that require further research.***

Keywords: electronic voting, cloud computing, e-governance, cryptographic algorithm**.**

1. Introduction

In the 1960s, few could have predicted the impact that an undesired academic network of four mainframe computers, residing at different universities and research centers, would have on the future of communications. This was the predecessor to today's internet, which currently has approximately 2.8 billion users worldwide. High speed internet connections are now being perceived as a basic commodity in the global urban as well as rural market, and are treated as a key economic indicator. This paper introduces a new technology and operational model for Information Systems (IS), cloud computing and electronic voting is introduced as a critical element for improving citizen collaboration through increasing citizen participation in the decision making process. Electronic voting systems provide some characteristic different from the traditional voting technique, and also it provides improved features of voting system over traditional voting system such as accuracy, convenience, flexibility, privacy, verifiability and mobility. But it suffers from various drawbacks such as Time consuming, Consumes large volume of pare work, No direct role for the higher officials, Damage of machines due to lack of attention, Mass update doesn't allows users to update and edit many item simultaneously. These drawbacks are overcome by Online Voting System. Cloud use over the traditional electronic voting system will evolve into a new concept of integrated approach for voting system for better accuracy and less number of vulnerability of the votes in the election.

1.1 Problem Background

Electronic voting is an emerging social application of cryptographic protocols. A vast amount of literature on electronic voting has been developed over the last two decades. While e-voting has been an active area of research for the past two decades, efforts to develop real-world solutions have just begun, posing several new challenges. The use of insecure Internet, well documented cases of incorrect implementations, and the resulting security breaches have been reported recently. These challenges and concerns have to be resolved in order to create public trust in e-voting. An important step towards streamlining this effort is to develop a framework and identify necessary properties that a secure and trusted e-voting system must satisfy to reduce discovery redundancy. Such a framework will allow us to evaluate as well as compare the merits of existing and future candidate e-voting schemes.

1.2 Problem Statement

Making the electronic voting system has a security and confidence system by the user, usually user can access to the electronic voting system and voting on the text without security system, that any user can access to the electronic voting system through the ID number for another user and he/she can vote more than one time at the same text, The users could know the result of voting during the process of voting which make the system dicey and mistrust, The user can dominate the result of voting by the access that he or she has of the result before the end of election day.

1.3 Research Objective

The main objective of this research is to use of cloud computing for election voting system that provides security and trusted electronic voting.

1.4 Scope of Study

The scope of this research is that it will use the election id to cast the vote the cloud environment which will be encrypted in barcode format and be scanned by the barcode scanner only which will be available to vote over internet and automatically exited after one vote for one scan.

2. Literature review

Several concepts that are used throughout the manuscript are discussed in this section, including cloud computing, electronic voting.

2.1 Cloud computing

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources, (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. The name cloud computing was inspired by the cloud symbol that is often used to represent the internet in flow charts and diagrams. A distinct migration to the clouds has been taking place over recent years with end users maintaining a growing number of personal data, including bookmarks, photographs, music files, etc. on remote servers accessible via a network.

Cloud computing is empowered by virtualization technology, a technology that actually dates back to 1967, but that for decades was available only on mainframe systems. In its quintessence, a host computer runs an application known as a hypervisor; this application creates one or more virtual machines, which simulate physical computers so faithfully, that the simulations can run any software, from operating systems, to end-user applications. The software "supposes" it has physical access to a processor, network, and disk drive. Virtualization is a critical element of cloud implementations and is used to provide the essential cloud characteristics of location independence, resource pooling, and rapid elasticity (explained in detail in the following section). Differing from traditional network topologies (e.g. a client server), cloud computing is able to offer flexibility and alleviate traffic congestion issues.

Cloud computing is viewed as one of the most promising technologies in computing today, inherently able to address a number of issues.

2.1.1 A number of key characteristics of cloud computing has been identified:

Flexibility/elasticity: Users can rapidly provision computing resources, as needed, without human interaction. Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out or up.

Broad network access: Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous platforms (e.g., mobile phones, laptops, and PDAs).

Location independence: There is a sense of location independence, in that the customer generally has no control or knowledge over the exact location of the provided resources.

Reliability: Reliability improves through the use of multiple redundant sites, which makes cloud computing suitable for business continuity and disaster recovery.

Economies of scale and cost effectiveness: Cloud implementations, regardless of the deployment model, tend to be as large as possible in order to take advantage of economies of scale. Large cloud deployments can often be located close to cheap power stations and in low-priced real estate in order to lower costs.

Sustainability: Sustainability comes about through improved resource utilization, more efficient systems, and carbon neutrality.

Open free software: The need for openness and interoperability is a driving force for designing and implementing cloud infrastructures, and for moving towards open source software solutions. The massive scale of many clouds, combined with the need for many software licenses, encourages the use of free software in the development of cloud architectures. To prevent vendor lock-in, open APIs, open data formats, and standards implemented through open-source reference models are vital requirements.

Advanced security technologies: Cloud implementations often contain advanced security technologies, which are mostly available due to the centralization of data and universal architecture. The homogenous, resource-pooled nature of the cloud enables cloud providers to focus all of their security resources on securing the cloud architecture. At the same time, the automation capabilities within a cloud, combined with the large focused security resources, usually result in advanced security capabilities.

Maintaining a perspicacious vision is essential in a field that is evolving exponentially. Cloud computing is not a panacea and many believe it to be little more than market-driven hype. Cautiousness is necessary, so as not to be carried away by the caprice of the moment. In its quintessence, cloud computing has the capability to address a number of identified deficiencies of traditional architectures. Progress requires its audience to rethink their understanding of solid notions such as, the network and personal computers.

2.2 Electronic voting

Electronic voting is a vital and indispensable aspect of electronic democracy. Electronic voting has the capacity to engage citizens in a wider spectrum than what is currently available in a conventional electoral process. Electronic voting (e-Voting) provides citizens with a means to express their timely opinion on civil affairs involving, for example, legislation, election of representatives, etc. Currently, a universally acceptable definition for e-Voting is lacking. The term is being ambiguously used for a variety of IS with a wide spectrum of tasks, ranging from vote casting over electronic networks to electronic voter registration.

In general, two main types of e-Voting can be identified:

- *E-Voting*: Voting is physically supervised by representatives of governmental or independent electoral authorities (e.g. electronic voting machines at polling stations or municipal offices, or at diplomatic or consular missions abroad); and
- *Remote e-Voting*: Voting is within the voter's sole influence, and is not physically supervised by representatives of governmental authorities (e.g. voting from one's own or another person's computer via the internet (i-voting), by touch-tone telephones, by mobile phones (including SMS), or via Digital TV, or at public openair kiosks — which themselves are venues and frames for different machines, such as PCs or push-button voting machines, with or without smart card readers).

In this paper, the term e-Voting is used to represent remote electronic voting performed within the voter's sole influence (remote internet voting).

Despite controversies surrounding e-Voting, electronic voting systems are gradually replacing traditional

paper-based ones, in many countries. Numerous governments are currently in the process of evaluating electronic voting solutions. They are holding a succession of trials and pilots to determine the benefits and drawbacks offered by their deployment. Electronic voting enables citizen deliberation, by providing a method for efficiently expressing timely opinion on matters of state, thus improving citizen's participation in the democratic processes. e-Voting provides a macroeconomic, cost-efficient method for increasing election accuracy and efficiency. Additionally, by escalating usability and accessibility, these Information Systems aim at increasing transparency and openness in democracy.

2.3 Increasing citizen participation by enabling secure electronic voting

This section explores increasing citizen participation in governance by enabling electronic voting. As electronic voting security is essentially identified as the main barrier to the wide deployment of electronic voting IS, the notion of security is investigated within this context. Following a deductive analysis and extensive literature review, a number of information security threats and vulnerabilities are documented, leading to specific design principles essentially incorporated in a proposed solution, along with recommendations of considerations that can assist in reducing these threats and vulnerabilities.

3. Traditional electronic voting system

In traditional voting system the voter identity is done manually by the election officers by cross verifying the voter Id and their manual data present over with them. To cast the vote over the electronic voting machine there is no restrictions over the election officers, the electronic voting machine is under the surveillance of the election officers where they can cast others vote without any restriction over the machine. The voter identity is not cross verified by the electronic voting machine, so there is no complete security over the voting system. The integrated voting is not followed in the current system. There is a need of a voting system where there is 100% cross authorization of a voter. For one voter verification there should be only one legal chance for a voter to cast the vote.

System need cloud voting system where the system verifies the voter uniquely from his database automatically present over the server.

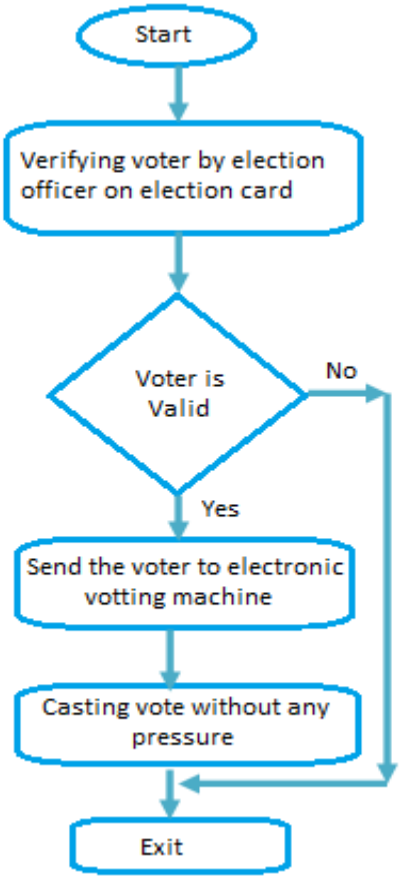

Figure 1: Flow Chart of Existing voting system without any security over electronic voting machine.

4. Proposed voting system over cloud

In this system there will be better security and authenticity of the voter over the voting system. Here, the election officers too will not have the control over the system. The cloud voting system will be controlled over the centralized server of the voting system. The voter will be authenticated by the barcode printed over the election card of the voter using the barcode scanner. As soon as the system will find the unique voter Id over the barcode onto the server database it will give the authority to only the voter once to vote onto the system. The system will open the voter link which will be encrypted with different cryptographic algorithms such as RSA, Diffie Hellman. The voter will cast the vote once then automatically the system will close the voting link for the voter.

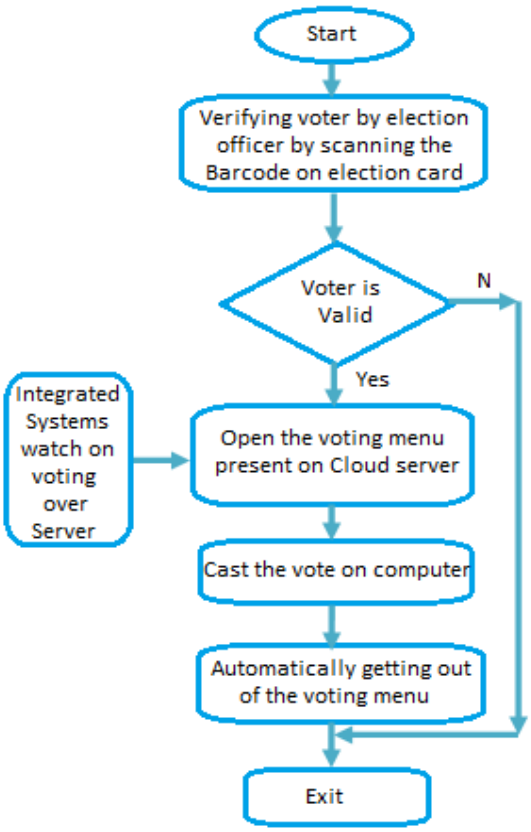

Figure 2: Flow chart of proposed cloud voting system with security over integrated cloud voting.

Conclusion

Our proposal enables a voter to cast his/her vote through cloud computing environment over internet on polling booths where duplicate voting is not possible, fast to access, highly secure, easy to maintain all information of voting, highly efficient and flexible. Hence, by this voting percentage will increase drastically with better accuracy and reliability. The use of cloud computing for voting has the capability to reduce or remove unwanted human errors. In addition to its reliability, voting over cloud can handle multiple modalities, and provide better scalability for large elections.

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