UACEE International Journal of Advances in Computer Science and its Applications – IJCSIA
Volume 3 : Issue 3 [ISSN 2250 – 3765]
Publication Date : 09 September 2013

Cloud Computing: Future Prospect For E-Voting

Abdul Mateen Ansari, Aftab Alam, Md. Aftab Alam

***Abstract*—In the present era, internet brought drastic change on the peoples' lives. It made life easy by providing information on click. Today one can just logon to internet for entertainment, jobs hunting, education, news, shopping, health suggestions, learn cosmetic techniques, food recipes and more on the interest of the individuals. Inline to the people affinity towards internet the government started shifting their elections activities over the internet; called as e-voting .the main purpose of e-voting is to enhance transparency in electoral process and rejuvenating democracy to the reach of one and all. Cloud computing has been evolved as an effective computing paradigm offer digital resource to access and maintain IT resources for optimum utilization at affordable cost. To inherit alluring features of cloud many governments are determine to shift their Election activities on the cloud. This paper aims to present an electronic voting system (E-Voting).In this research we shall investigate an impact of e-voting on citizens as well as government. Here we explain e-voting architecture, growth, future, issues and challenges.**

Keywords*— *Internet, e-Voting, rejuvenating, electoral

I. Introduction

Last year, we have seen the importance of mobile technology in our day-to-day life and what really it can do. Hurricane Sandy hit New Jersey and New York, hitting millions of civilians off the grid, with no electricity or broadband internet capability. However, several people had tablets, smartphones and mobile access connectivity with 3G and 4G service and were capable to check in with their relatives and friends over email, text messaging and over social networking sites like twitter and Facebook. Despite the fact; Network was smashed by the sand storm, it did not drop off the grid completely. Even though they don't have power in their homes, they still were able to communicate with other persons using mobile wireless signals. While they had the facility to communicate using mobile technology, most of the people in these two cities face difficulty to go physically to the polling booths to cast their vote.

Abdul Mateen Ansari,
Aftab Alam
Department of Computer Science
King Khalid University
Abha, Kingdom of Saudi Arabia
mateenjmi@gmail.com, aftabjh@gmail.com

Md. Aftab Alam
Department of Computer Science
Singhania University
Rajasthan, India
md.aftab05@gmail.com

Due to the stopped public transport systems or nearby polling centers were damaged by the storm. Voting is an effective process for the people to show their belief about a government or any issues.it is a backbone of democracy; the constitution grants every citizen the right to vote [1]

Traditional paper based ballot or manual voting system is tedious job for voters it has some drawbacks like decrease the rate of voting, inaccuracy in ballot counting and delayed elections results announcements [2]

In electronic voting (e-voting) use computers, personal digital assistant (PDAs), smarts phones and computerized equipment to cast their votes in elections. With rapid development in wireless technologies and computer networks, the internet has become a compulsion for most of the people. Across the globe, a voter can participate in the election process. The main beneficiaries are military, businessman, NREs, hospital patients, students who are doing their higher education from abroad and natural disaster affected areas people. The electronic ID card or smart card issued by the governments as electronic document which is used as an authenticated proof for voting [3]

II. Related Work

It revealed in several recent elections, votes in a handful of key states, including Ohio, Florida and Virginia are poised to decide the contest between President Barack Obama and his Republican challenger, Mitt Romney. Yet, these states and others remain ill-prepared to deal with potential problems because they lack sufficient auditing procedures to ensure the integrity of their e-voting systems [4].

Many analysts and voting officers incline to dismiss such concerns, but the truth remains there have been verified errors in the last year pools. Perhaps the most well-known example, explains Philip Meyer, occurred in Volusia County, Florida when a "corrupted memory card subtracted 16,000 votes from Al Gore's count in 2000" [4].

A lot of systems have been offered to resolve the problem of conducting local and national elections through online voting system. This prime objective of theses stems was implementing voting practices through internet. The motivations behind these processes are increasing the voter turnout and make accessibility it easier for citizens to vote and sustaining the safety and security that are compulsory for elections in a democratic world. Many pundits have already outlining the several features that is mandatory to present in a free and fair election, and all those obligatory features were present in the united states president election 2012. For example, Karro and Wang require that the following criteria

be met for an online voting system to be "secure and practical for large-scale elections": "Democracy", "Accuracy", "Privacy", "Verifiability", "Simplicity", "Mobility", "Efficiency", "Scalability", and "Responsibility" [5].

III. Cloud Computing

Cloud computing has been projected as the next-generation architecture of IT enterprise, due to its unique features like on-demand self-service, location independent resource pooling, ubiquitous network access, rapid resource elasticity, usage-based pricing etc. From users' perspective, including both individuals and IT enterprises, storing data remotely into the cloud in a flexible on-demand manner brings appealing benefits relief of the burden for storage management, universal data access with independent geographical locations, and avoidance of capital expenditure on hardware, software, and personnel maintenance, etc. [6]

Cloud computing transfer computing and data away from desktop and laptop into large data centers. All the applications offered as a service over the internet as well as to the actual cloud infrastructure-specially, the hardware and system software in data centers that make available these services. The main reason for popularity of cloud computing are the advancement in broad-band and wireless networking, minimum storage cost, and gradually progress in internet computing software.

1. *Service Model of Cloud Computing*

A. *Software as a Service (PaaS)*

It is a delivery model that provides facility to access the software and its functions remotely as a Web-based service. SaaS lets organizations to access business functionality at a lower cost than for paying licensed applications while its pricing is based on a monthly fee. Organization lives free from tension to handle the set-up, installation, and regularly daily upkeep and maintenance. SaaS is a software distribution model in which applications are hosted by service provider or vendor and its accessibility is to the customer over the network is through the internet.

B. *Infrastructure as a Service (IaaS)*

It offers the storage, networks, processing and fundamental computing resources and allows the consumer to deploy and run arbitrary software, which can include operating systems and applications.

C. *Platform as a Service (PaaS)*

Consumer can deploy their applications which are developed using programming languages and tools which is supports by the service provider, onto the cloud infrastructure.

2. *Deployment model of Cloud*

A. *Public Cloud*

In public cloud service provider makes available applications and storage for general public over the internet. Its services may be free or offered on a pay-per-usage model.

B. *Private Cloud*

This cloud infrastructure is functioning for a private organization. It is managed by the third party or organization and may exist on off premises or in premises.

C. *Community Cloud*

It is shared by several organizations that have the same objectives such as policy, mission, security requirements and compliance considerations.

D. *Hybrid Cloud*

This cloud infrastructure is a combination of at least two or more clouds (public, private or community) that remains unique entities. It is offered in one of two ways: service providers has a private cloud and formulate a partnership with a public cloud provider, or public cloud providers establish a partnership with a service provider that offers private cloud platforms.

IV. E-Voting Through Cloud

Last year, the U.S. presidential election has held, many pundits believed that, it was not just political event with a four-year cycle. This election mirrored a big impression about the evolution of media and technology. In 2008 social media was used more in election, this time cloud computing was powering the elections.

The Obama and Romney have utilize huge demographical information through data mining than ever before and that data is used to deploy targeted ads via social media and on mobile device.it is only possible through the cloud computing software Live Ballot; which makes easier for people to vote.

Twenty year ago, Television and newspapers were the predominant mediums to access information about elections and candidates.

Today, the internet and underlying cloud-based technologies give campaigns unprecedented visibility in to the minds of voters while giving voters unprecedented visibility in to the candidates.

TABLE 1: USE OF THE WEB FOR CAMPAIGN IN US ELECTIONS

Year	Rise of Role the Web in the Elections
1996	Candidate web page debates
2000	Internet used in fundraising adding "contributes" buttons to site
2004	Candidate sites used for organizing volunteers and campaign events
2008	Social media become a standard mass-communication tools for politicians
2012	Big data enables narrowly targeted messages based on volumes of voter data

The rise of smartphones and tablets are influencing how voters receive and react to the campaigns. 80 million of the voters in US has accessed the political information critical to their decision making process via cloud –based news and campaign apps on smartphones. Its growth is 200% from the 2008 presidential race. Campaigning raised 75% of donation online.

Social media facilitate more customized conversations within individual voters plus a chance for voters to learn more about candidates. Variety of cloud-based social media is utilized in 2012 US presidential elections: Facebook, twitter, YouTube...etc.35% of the social media users have used their social network to encourage voting.

TABLE 2: PARTY WISE ENCOURAGEMENT FOR VOTING TO THEIR VOTERS THROUGH SOCIAL MEDIA IN 2012 US PRESIDENTIAL ELECTION

Party	Democrats	Republican	Independents
%	42	36	31

During the first debate, 17.5 million tweets were sent during the first 90-minutes debate. Debate Tweets peaked at nearly 170,000 tweets a minutes =11,900,000 copies of the entire Twilight series per minute.

Online Voting & Voter Registration Ratio in 2012 US Election, Fifteen states were registered for online voting:

Arizona (AZ), California (CA), Colorado (CO), Utah (UT)Connecticut(CT),Delaware(DE), Hawaii(HI),Indiana(IN), Kansas(KS),Louisiana(LA),Maryland(MD),Nevada(NV),Oregon (OR), South Carolina (SC), and Washington (WA).Online voting empower the military and overseas voters. It allows the overseas voters to cast their ballots in the cloud using Live Ballot. Live Ballot has already used in 300 elections. Online voting registration started in 2002 but in this election 70% of voter registrations now done online. Saving 75% less paper used. 180,802,372 registered voters; if all did online registration would save $144,641,897.

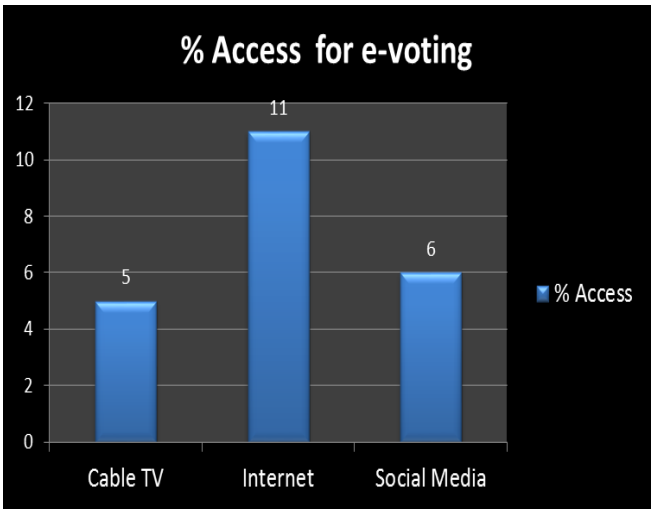

Figure 1. Between January 2012 and October 2012 campaign new access grew

V. Proposed Service Oriented Architecture (SOA) For E-Voting

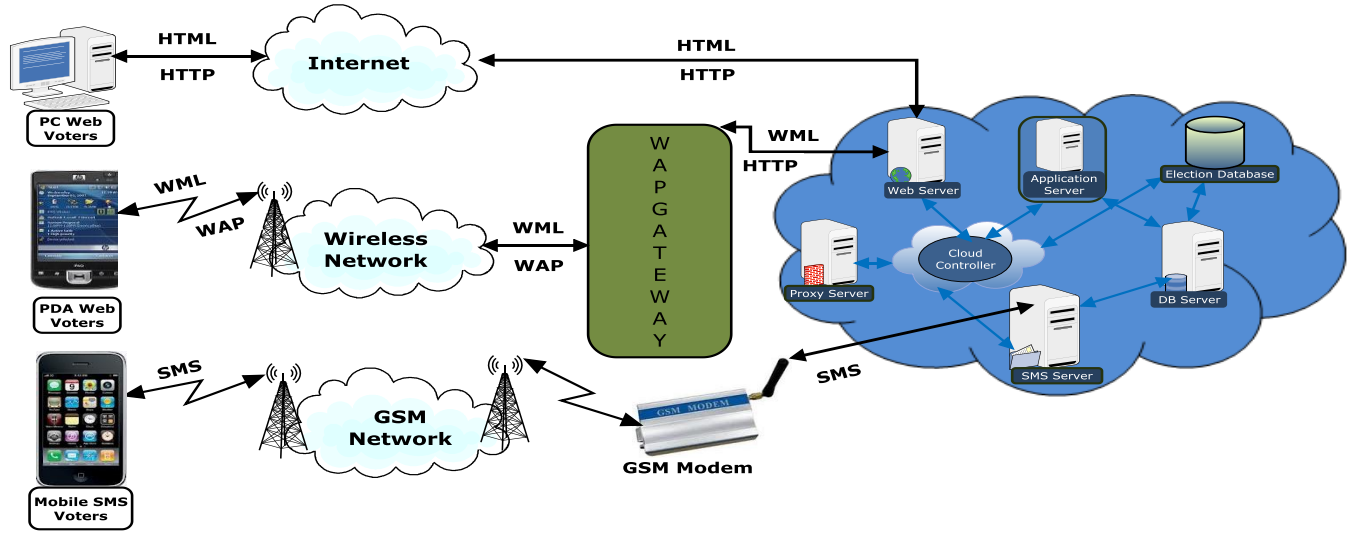

Figure 2. Service Oriented Architecture

In present situation, for the e-voting the user use Personal Computer (PC), Personal Digital Assistant (PDA) and mobile from home. Usage of these devices applications is potentially increased, due to the integration of these devices technologies with the cloud. Cloud delivers services to its remote users over the IP network often through a web browser without referring to the boundaries. These computing technology whereas connects its users in mobile or non-static environment across the network(s). This is accomplished by connecting PC, PDAs and mobile computing activities wirelessly through the internet or a private network. In general so many limitation of e-voting, at the time of election server will be heavily use, at pick time server may be crass due to heavy load, hardware problem, some machine are not working accurately,

efficiently, and services are not providing scalable, reliable and high performance mode all these problem arise due to resource less environment. These limitations can be removed or minimized with the integration of resource rich, reliable, service-centric cloud technology. The integrated (PC, PDA, mobile and cloud) technology describes as cloud computing deploys in heterogeneous radio access environment such as WiFi, 3G, WLAN, WiMax, GPRS. It is implemented through wireless connectivity. The prime features are access 24X7, on-demand, pay per use, energy efficient, and economically feasible even for low data rate cloud controlling signals. Mobile applications can be launched on the device or cloud, and can be migrated between them according to dynamic changes of the computing context or user preferences [7].

Mobile and PDAs are quickly becoming the information worker's most valuable tools. Young workers and their strong affinity for go-anywhere technology is changing the shape of the enterprise right here, right now!! Enterprise Mobility is becoming more and more Anytime, Anywhere service in a true sense! Voters' electronic device cloud computing architecture is primarily based on cloud computing infrastructure or in other way is the combination of cloud and voter's technology. Relies on a machine-to-machine computing model in which voter's devices outsource their computing tasks to the cloud. Voters can access through consumer electronic devices irrespective of time, location and mode of access. It exploits voter identification such as location, context, accessed services, and network intelligence. Electronic Cloud Computing provides a widely accepted solution to minimize the limitations of voter electronic device. It refers to an infrastructure where both data storage and data processing happens outside of the voter electronic device. Mobile cloud applications move the computing power and data storage away from voter mobile phones and into the cloud, bringing applications and mobile computing to not just smartphone voters but a much broader range of mobile voters. It is a centralized computing environment, applications executed in clouds and accessed over the wireless computing network through web browser on the voter's electronic devices. MCC offers a feature set consisting of reduce capital expenditure, location Independence, device Independence, multiple tenancy, high availability, reliability, scalability and security [8]. It offers a great advantage over traditional mobile computing; it minimizes the limitations of voter's electronic device in respect to the processing power and the scalability of data storage. In practice it enhances the computing power above the voter's device configuration and opportunity of flexible storage.

VI. Benefits Of E-Voting

A. Empowerment

Voting is the most powerful way for the people to express their opinion to their leadership as well as the government. When election process is fair than citizens' increase their trust in democratic systems.

B. Accessibility

Online voting allows the citizens to access their ballots from anywhere at any time, only the thing is required, they must have the internet connection to avail this facility. This makes casting a vote conveniently. People can cast their votes from home, from the work place "or on the travel" through their mobile phones.

C. Cost Effectiveness

It decreases the election budgets by limiting production costs like paper, printing and postage costs. In addition to this, staff will save time because e-voting eliminates the requirement to gather ballot packages and manually tabulates votes.

D. Security and Confidentiality

A robust and secure internet voting system has safeguards in place to protect voter identities and voting information. A voting website hosted on a secure server will only be accessible to authorized members through unique voter logins. Online ballots are transmitted from voters' computers or mobile devices to balloting systems using SSL (Secure Sockets Layer), the same encryption technology used by U.S. financial institutions. These layers of protection form a technology shield that detects unauthorized access, eliminates ballot tampering, and reduces the chance of voting fraud [9].

E. Eco-Friendly

Web-based polling's saves resources by reducing the amount of paper associated with an election. Paper ballot, envelops, handouts, and other paper collateral are either moved to electronic format or eliminated. This is mainly important if you election commission are sensitive to the use of natural resources.

F. Appeal to Younger Members

According to the Pew Internet and American Life Project, 95 percent of Americans between the ages of 18 and 29 use the Internet. This means that online options such as web voting might be a great way to get younger members involved in the decision-making process [10].

G. Fast, Accurate Results

With e-voting there are no invalid, mismarked or rejected ballots. Results are automatically prepared, excluding the need for manual counting and dreaded recounts. Computerized tabulation allows lection superintendent to quickly declare the results.

References

[1] Chun-Ta Li, Min-Shiang Hwang, Yan-Chi Lai. "A verifiable Electronic Voting Scheme over the Internet" IEEE Intl Conf on IT:NG 449-454 , (2009).

[2] Kalaichelvi.V, R.M.Chandrasekaran "Secured Single Transaction E-Voting Protocol",Journal of ScientificResearch,51(2), 276-289, (2011).

[3] CAO Feng,CAO Zhenfu,"A secure anonymous Internet Electronic voting scheme based on the polynomial",WU Journal for Natural Sciences Vol 11(6) , (2006).

[4] http://www.seas.upenn.edu/~cse400/CSE400_2004_2005/34writeup.pdf.

[5] Karro J.; Wang J.; Towards a Practical, Secure, and Very Large Scale Online Election.Computer Security Applications Conference, Proceedings, 1999, 15th Annual, 161-169.

[6] M. Armbrust, A. Fox, R. Griffith, A. D. Joseph, R. H. Katz, A. Kon winski, G. Lee, D. A.Patterson, A. Rabkin, I. Stoica, and M. Zaharia,"Above the clouds: A berkeley view of cloud computing," University of California, Berkeley, Tech. Rep. UCB-EECS-2009-28, Feb 2009.

[7] Le Guan, Xu Ke, Meina Song, and Junde Song, "A Survey of Mobile Cloud Computing", 2011 10th IEEEACIS International Conference on Computer and Information Science (2011).

[8] http://www.cloudserve.co.uk/our-platform/what-is-cloud-computing.aspx.

[9] http://www.socialfish.org/2012/08/online-voting-advantages-and-challenges-for-associations.html

[10] http://www.socialfish.org/2012/08/online-voting-advantages-and-challenges-for-associations.html.

About Author (s):

Abdul Mateen Ansari

Department of Computer Science
King Khalid University
Abha, KSA
mateenjmi@gmail.com

Abdul Mateen Ansari (First Author)

Aftab Alam

Department of Computer Science
King Khalid University
Abha, KSA
aftabjh@gmail.com

Aftab Alam (Second Author)

Md. Aftab Alam

Department of Computer Science
Singhania University
Rajasthan, India
md.aftab05@gmail.com

Md. Aftab Alam (Third Author)