Cloud Computing and Electronic Accounting

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Abstract

Given the need to leverage on requisite technologies in the Accounting world, particularly in the face of digitalization taking the premium space in today's highly globalized world, the need to examine the twin issues of Electronic Accounting (e-Accounting) and Cloud computing has become very fundamental. By means of an exploratory approach, findings from this research analysis reveals that e-accounting system is seen as a framework derived to replace a manual system – that in a system derived from the scientific method, and certain instructions. Similarly, within the government cycles, government accounting system is based on instructions issued by the government financial management whereby electronic systems are designed in line with legislation and regulations of financial instructions which focus on government approved transactions on the specified documents, such as disbursement and payment vouchers, which are main documents under the government system. Disbursement document is for the government expenditures (current and capital) that are made as specified in the State general budget. The study therefore recommends that he government should embrace and bring to bear a well-designed e-accounting information system to cover such areas like budgeting system (from formulation, approval, implementation, disbursement, etc.), payrolls, pensions matter, just to mention a few.

Keywords: Cloud computing, Electronic Accounting, Government Budgets, ICT

INTRODUCTION

Over the past two decades, the world economy is rapidly moving from manufacturing to services. In 2010, 80% of the US economy is driven by service industry, leaving only 15% by manufacturing and 5% from the agriculture. Cloud computing benefits primarily the service industry and advance the business computing to a new paradigm. It has been forecasted that global revenue in cloud computing may reach $150 billion by 2013 from the $ 59 billion reported in 2009. In this sense, clouds aim to power the next generation datacenters by architecting them as a network of virtual computing services including hardware, database, user-interface, application logic, etc. The users are able to access and deploy applications from anywhere in the world on demand at competitive costs depending on users QoS (*Quality of Service*) requirements. Developers with innovative ideas for new Internet services no longer require large capital outlays in hardware to deploy their service or human expense to operate it. The cloud offers significant benefit to IT companies by freeing them from the low-level task of setting up hardware (servers) and software infrastructures. This will free up users to focus on innovation and creating business value for the computing services they need.

Electronic accounting on the other hand, does not have a standard definition, nut merely refers to changes in accounting due to computing and networking technologies. Most e-accounting services are offered as SaaS (Software as-a-Service). E-accounting (or online accounting) is the application of online and Internet technologies to the business accounting function. Similar to e-mail being an electronic version of traditional mail, e-accounting is "electronic enablement" of lawful accounting and traceable accounting processes which were traditionally manual and paper-based. E-accounting involves performing regular accounting functions, accounting research, and the accounting training and education through various internet-based or computer-based accounting tools, such as digital tool kits, various internet resources, international web-based materials, institute and company databases which are internet based, web links, internet-based accounting software and electronic financial spreadsheet tools to provide efficient decision making.

Concept of Cloud Computing

Cloud computing delivers infrastructure, platform, and software (applications) as services, which are made available as subscription-based services in a pay-as-you-go model to consumers. In industry, these services are referred to as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), respectively. The Berkeley Report

(Cabrera, 2010) released in Feb 2012 notes: "Cloud computing, the long-held dream of computing as a utility has the potential to transform a large part of the IT industry, making software even more attractive as a service".
Clouds aim to power the next generation data centers by architecting them as a network of virtual services (hardware, database, user-interface, application logic) so that users are able to access and deploy applications from anywhere in the world on demand at competitive costs depending on users Quality of Service (QoS) requirements (Casanovas, 2013). It offers significant benefit to IT companies by freeing them from the low-level tasks of setting up basic hardware (servers) and software infrastructures and thus enabling them to focus on innovation and creating business value for their services. The business potential of Cloud computing is recognized by several market research firms including IDC (International Data Corporation), which reports that worldwide spending on Cloud services will grow from $16 billion by 2008 to $42 billion in 2012. Furthermore, many applications making use of Clouds emerge simply as catalysts or market makers that bring buyers and sellers together. This creates several trillion dollars of business opportunity to the utility/pervasive computing industry, as noted by Bill Joy, co-founder of Sun Microsystems (Casanovas, 2013).

Cloud computing has high potential to provide infrastructure, services and capabilities required for harnessing this business potential. In fact, it has been identified as one of the emerging technologies in IT as noted in "Gartner's IT Hype Cycle". A "Hype Cycle" is a way to represent the emergence, adoption, maturity and impact on applications of specific technologies.
Cloud computing is definitely at the top of the technology trend, reaching its peak of expectations in just 3-5 years. This trend is enforced by providers such as Amazon (http://aws.amazon.com), AT&T, Google, Sales Force (http://www.salesforce.com), IBM, Microsoft, and Sun Microsystems who have begun to establish new data centers for hosting Cloud computing applications such as social networks (e.g. Facebook- http://www.facebook.com, and MySpacehttp:// www.myspace.com), gaming portals (e.g. BigPoint- http://www.bigpoint.com), business applications (e.g., SalesForce.com), media content delivery, and scientific workflows. It is predicted that within the next 2-5 years, Cloud computing will become a part of mainstream computing; that is, it enters into the plateau of productivity phase. Currently, the term Cloud computing mostly refers to virtual hosting solutions with some or no added value for customers. This market segment is known as Infrastructure-as-a-Service (IaaS) and concentrates the majority of the big companies operating in Cloud computing. The technology and the general concepts that characterize IaaS solutions are now largely developed and well established and many companies and users already adopt the Cloud option in order to save in infrastructure costs and access huge computing power on demand. The new challenges for what concerns the mainstream adoption of Cloud computing are more concentrated on how to make a profitable use of this technology and how to simplify the development of Cloud aware applications. In particular there is an entire market related to the delivery of platforms and tools for building applications that are hosted in the Cloud or leverage Cloud services for many of their tasks. In this sense, the Cloudbus Toolkit for Market Oriented Cloud Computing provides a set of tools and technologies that, taken together, contribute to realize the vision of Cloud computing.

Electronic Accounting

In the global economy electronic accounting, or e-accounting, is defined as any accounting system which is based on information communication technology for the capture and processing of a business' financial data. E-accounting relies mainly on computers, although it may be used on other devices. The international definition of electronic accounting sustains that it is any accounting system that is based on information technology for the capture and processing of financial information in companies, the most important element for electronic accounting to take place is the use of the computer, although it may be undertaken on any electronic device (Amidu, John, & Abor, 2011; Drew, 2015). The reform is directed towards natural persons and businesses in the general classification, in addition to the financial sector with cumulative incomes greater than or equal to 4 million pesos (200,000 USD at the time of writing) during the 2013 tax year and should comply with the obligation from 2015 onwards. Charities or registered non-profits, natural persons, individuals or businesses involved in farming, ranching, forestry, and fishing, natural persons who offer professional or business services, renting properties that inscribed into the federal register in 2014 and whose incomes was lower than 4 million pesos (200,000 USD at time of writing) generated in the year 2014, should send their information from the year 2016, except those natural persons who are registered in the fiscal incorporation classification (SAT, 2016).

Components of Government E-accounting information systems

Jamus (1991) in Al-Kasswna (2012) highlights that Government e-accounting information systems depend on a range of components that contribute in achieving objectives, which include:

Equipment and devices: To achieve the system objectives, the best advanced devices must be effectively used so as to contribute to the success of these systems.

Software: Information systems cannot achieve the objectives of the system on its own. There should be programs that contribute to providing appropriate information of the software which is a series of instructions that enable the computer system of interpretation, translation and processing written in certain language.

Regulations and circulations: Any e-accounting system derived to replace a manual system is a system derived from the scientific method, and certain instructions. In the government system, government accounting system is based on instructions issued by the government financial management whereby electronic systems are designed in line with legislation and regulations of financial instructions which focus on government approved transactions on the specified documents, such as disbursement and payment vouchers, which are main documents under the government system. Disbursement document is for the government expenditures (current and capital) that are made as specified in the State general budget. Payment document is a specific model under which all amounts paid under the financial instructions and regulations are related to the collection of revenue.

Users and IT department management: To achieve success in government accounting information systems in government entities, Information Technology (IT) management must run programs, maintain programs, follow-up breakdowns in addition to developing and modernizing systems in line with modern developments and user's needs, and the need to train staff and users in electronic systems must be carried out.

Controls: The government databases include financial and non-financial information; such data faces penetration and misuse as modification or deletion that may lead to damage to society and loss of citizens' rights. Therefore, control regulations must be issued to minimize the risk of intrusion and abuse of the electronic systems by enacting appropriate controls to prevent and to ensure the safety of electronic systems.

Theoretical Framework

Popular Cloud Service Models

Cloud computing delivers infrastructure, platform, and software (application) as services, which are made available as subscription-based services in a pay-as-you-go model to consumers. The services provided over the cloud can be generally categorized into three different service models namely the IaaS, PaaS, and SaaS. These form the three pillars on top of which Cloud Computing solutions are delivered to end users. All the three models allow the user to access the services over the Internet, relying entirely on the infrastructures of the cloud service providers. These models are offered based on various SLAs between the providers and users. In a broad sense, the SLA for cloud computing is addressed in terms of the service availability performance and data protection and security aspects. Three cloud models are illustrated in Fig. 1 at different service levels of the cloud.

Infrastructure as a Service (IaaS)

This model allows users to rent processing, storage, networks, and other resources. The user can deploy and run the guest OS and applications. The user does not manage or control the underlying cloud infrastructure but has control over OS, storage, deployed applications, and possibly select networking components. This IaaS model encompasses the storage as a service, computation resource as a service, and communication resource as a service. Example for this kind of service is: Amazon-S3 for storage, Amazon-EC2 for computation resources, and Amazon-SQS for communication resources. IaaS providers charge users based on the capability and capacity of requested infrastructure for a given duration. In case of Amazon IaaS environment, users can create, launch, and terminate server instances as needed, paying by the hour for active servers.

Platform as a Service (PaaS)

Although one can develop, deploy, and manage execution of applications using basic capabilities offered under IaaS model, but it is very complex to do so due the lack of tools that enable rapid creation of applications and automated management and provisioning of resources depending on workload and users' requirements. They requirements are met by PaaS, which offers the next-level of abstraction and is built using services offered by IaaS. The PaaS model provides the user to deploy user-built

applications on top of the cloud infrastructure, that are built using the programming languages and software tools supported by the provider (e.g., Java, python, .Net).

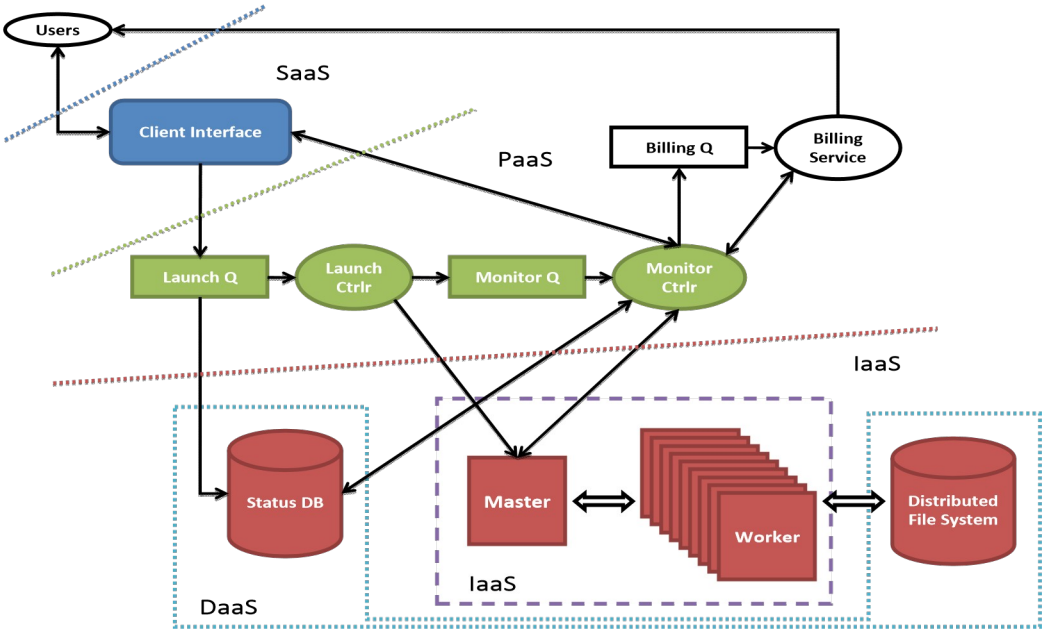

Figure 1: The IaaS provides virtualized infrastructure at user's costs. The PaaS is applied at the platform application level. The SaaS provides specific software support for users at web service level. DaaS (Data as a Service) applies the status database and distributed file system.

The user does not manage the underlying cloud infrastructure. The cloud provider facilitates to support the entire application development, testing and operation support on a well-defined service platform. This PaaS model enables the means to have a collaborated software development platform for developers from different parts of the world. Other service aspects in this mode include the third party to provide software management, integration and service monitoring solutions. Cloud services offered under PaaS model include: Google App Engine, Microsoft Azure, and Manjrasoft Aneka.

Software as a Service (SaaS)

This refers to browser-initiated application software over thousands of cloud customers. Services and tools offered by PaaS are utilized in construction of applications and management of their deployment on resources offered by IaaS providers. SaaS model provides the software applications as a service. As a result, on the customer side, there is no upfront investment in servers or software licensing. On the provider side, costs are rather low, compared with conventional hosting of user applications. The customer data is stored in the cloud that is either vendor proprietary or a publically hosted cloud supporting the PaaS and IaaS. Vast majority of the business logic software are delivered as a service. Microsoft online SharePoint and CRM software from Salesforce.com are good examples.

Providers such as Google and Microsoft offer integrated IaaS and PaaS services whereas others such as Amazon and GoGrid offer pure IaaS services and expect third parties PaaS providers such as Manjrasoft to offer application development and deployment services on top of their infrastructure services. To help our readers identify some cloud applications in enterprises, we share the following stories on three real-life cloud applications related to HTC, news media, and business transactions. The benefits of using cloud services are self-evident in these applications.

Success Stories on Cloud Service Applications

(1) To discover new drugs through DNA sequence analysis, Eli Lily Company has used Amazon's AWS platform with provisioned server and storage clusters to conduct high-performance biological sequence analysis without using an expensive supercomputer. The benefit of this IaaS application is a reduced drug deployment time with much lower cost.

(2) Another good example is New York Times applying Amazons, EC2 and S3 services to retrieve useful pictorial information quickly from millions of archival articles and news papers. The N.Y. Times has significantly reduced their time and cost in getting job done more effectively.

(3) The third example is Pitney Bowes, an e-commerce Company, offers their clients the opportunity to perform B2B (*Business-to-Business*) transactions using Microsoft Azure platform, along with .net and SQL services. They end up with a significant increase in their client basis.

CONCLUSION AND RECOMMENDATIONS

The following recommendations are proffered towards ensuring the that corruption in the Nigeria economy in general and the public sector in particular is curbed, through the installation of cloud computing and electronic accounting information system.

- **i.)** The government should embrace and bring to bear a well-designed e-accounting information system to cover such areas like budgeting system (from formulation, approval, implementation, disbursement, etc.), payrolls, pensions matter, etc.
- **ii.)** The government should ensure adequate investment on modern IT gadgets for the sector's operation at a global standard level.
- **iii.)** Regular enhancement of public sector operators" skills in using information technology equipment and tools for the discharge of their duties rather than the current manual/paper approaches. iv.)
- **iv.)** Scholars should endeavor into more researches on the impact of e-accounting information system in fighting wastes, redundancy, ghost/fictitious records, fraud and corruption in the government sector of the economy.

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