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Benefits and Issues of Cloud Computing for E-Government

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Editorial

Electronic government (e-government) has been adopted globally by both developed and developing countries. Many studies revealed that the e-government not only improves the efficiency of public administration but also the practice of good governance, such as increasing transparency, deducing administrative corruption, improving service delivery, improving civil service performance, citizens empowerment and improving government finance (Almunawar, Low, Habibur-Rahman, Mohidin; Bhatnagar) [1,2]. Citizens in countries with advance e-government systems such as South Korea, Australia and Singapore (the top three countries in UN e-government ranking 2014) enjoy many benefits as many government services can be accessed through the Web or through their smart phones.

An e-government system needs proper information and communication technology (ICT) infrastructure, and normally the government has to own, manage and maintain the system and infrastructure. This can be very costly. In addition, investment in system and infrastructure needs to be wisely decided. However, this is not an easy task as the conventional ICT infrastructure is rigid. If the system is too large, it will be under use, wasting resources. However, if the system is too small, scaling up is not straightforward.

Recently, a new computing model; cloud computing, has been widely adopted, including in public administration. It has tremendous growth as it can be used by any sector without many hurdles. According to Gartner [3], the utilization of cloud computing will reach $250 billion by 2017. Utilization of cloud computing for e-government is growing in many countries around the world and governments have started to capitalize on the cloud. For example, in 2014 the US government was expected to spend $1.7 billion on private clouds, which will increase to $7.7 billion in 2017 (International Data Corporation) [4].

Cloud computing has a very different model from what is conventional. In a conventional computing system, most computing resources for an organization belong to and normally reside in the organization premises and the organization incurs all cost of owning such resources, which may include investment, operation and maintenance costs. In contrast, the organisation is not required to own most of the computing resources in a cloud computing system as these resources belong to a cloud provider(s). The organization only utilizes the computing resources offered by the provider, which is accessible through the Internet. As the resources are paid using a pay-per-use method, the organization does not have to bear the burden of all the costs mentioned previously.

Some Benefits of Cloud Computing

One of the main benefits of cloud computing for government discussed in the literature is cost saving for running an e-government because computing resources are outsourced to cloud providers. As a result, governmental budget on ICT expenditure can be reduced (Wyld) [5].Furthermore, expenses on ICT resources can be easily calculated. This is because pay-per-use method is used to charge the utilization of resources. The government can also save money on the cost of maintenance of resources since this is shifted to the cloud provider.

Another major benefit is a simpler, more flexible system and quicker scaling ability as compared to conventional computing system. The management of computing resources in the cloud is very straightforward as the resources are outsourced to a cloud provider. In addition, the resource is ready to be used anytime and the needed capacity can be fulfilled upon request. Also, maintenance of computing resource is the job of the cloud provider and maintenance are normally done without service interruptions as the provider can shift its computing resources easily. The simplicity of cloud computing can make government focus more on its core business, serving the citizens (Kelton Research) [6]. Next, expanding or shrinking ICT resources used in running a cloud-based e-government or public administration system can be done easily and quickly as the government need only to contact the cloud provider to do it. In addition, expansion of resources is much cheaper than the conventional computing system because no additional investment cost is needed.

Support for government agility is another benefit of cloud computing utilization in government. Agility is the ability to quickly and effectively respond to changing environment such as a more rapid response to citizens' needs in the short term, performing strategic adaptation (adapt to trends and issues) in the medium term, and long term shaping (Parker and Bartlett) [7]. Unlike the conventional computing system, computing resources can be gathered in minutes and portable applications (services) can be developed quickly, and can be accessed anytime and anywhere using various devices.

The next benefit worth mentioning is reliability and availability. E-government services are generally accessible through the Internet regardless time and place. To ensure reliability and availability, the conventional computing system use redundant data centres. However, this is costly. A cloud computing service provider will definitely ensure high reliability and availability of its services as this is the source of its credibility.In addition disaster recovery, recovery of data loss during a disaster such as flood and fire, can easily be supported as cloud computing is supported by myriads of servers co-located in different locations.

ICT keeps changing and new technology quickly replaced the obsolete one. Therefore, update to a newer technology is necessary in order to avoid poor performance in services. However, migrating to a new system with the latest technology or system upgrade is certainly not simple. Frequently, migration requires a shutdown, followed by a

testing of the new system, which may create interruption of services. In cloud computing, migration to new technology is seamless and the interruption of services not necessary (Hashemi, Monfaredi, and Masdari) [8]. Cloud computing service providers normally keep their system up to date and the system update will have no effect on services. Cloud-based e-government systems will enjoy a seamless migration to new technology without extra cost.

Some Issues of Cloud Computing

Although many benefits are found in utilizing cloud computing in public administration or in e-government system, there are still many issues and challenges that need to be addressed.

The first and obvious issue is the government losing control of data. This can be a big issue as trust can be the main key for adoption of cloud computing by public organizations. Since data are stored in the cloud, can the government trust cloud providers to protect data on the same level as if the of protection if the data is stored locally? Trust cannot be established easily, especially if there is no third party that can guarantee the security and privacy of data or information stored in the cloud. One possible solution to this problem is to establish an assurance by an independent party through certification or accreditation (such as ISO 27001 or SAS 70).

The second issue, which is highly associated with the first one, is security and privacy. This issue is also applied to the conventional computing system, however, since government and its data are separated and the data are accessed through an open network such as the Internet, the issue highly affects the confidence in using cloud computing (Armbrust et al. and Zhu) [9]. Security problems may happen in servers within the cloud, the client machines, and the network. Subashini and Kavitha classify security issues on cloud computing into four categories: security related to a third party resource, application security, data transmission security, and data storage security. There are additional issues on security. Cloud computing security issues are discussed by Subashini and Kavitha [10].

Another potential issue is performance, especially for data intensive computation as client machines are geographically distanced, which could be a thousand miles away from the cloud. Also Internet speed will definitely affect the performance. The possibility of data transfer bottlenecks as the intensity of data processing and transfer as well as the number of users accessing the data increase may complicate the performance and costs as data transfer consumes communication bandwidth (Armbrust et al., and Kim et al.) [11]. If we assume the provider can scale-up its infrastructure, the customer only incurs the additional cost for the scale-up. However, if the provider is not in a position to fulfil the demand as the scale-up may be beyond expectation, things become complicated.

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