A Review of Cloud Computing Evolution
Individual and Business Perspective

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ABSTRACT - As times gone by, computing in particular, the cloud computing development shows its major progression. In this paper, we reviewed the advantages and disadvantages of cloud computing, what opportunities and weaknesses cloud computing brings to the business, and technological prospects. The computing industry is witnessing a paradigm shift in the way computing is performed worldwide. There is a growing awareness among consumers and enterprises to access their information technology (IT) resources extensively through a “utility” model known as “cloud computing.” Cloud computing was initially rooted in distributed grid-based computing. It has become a significant technology trend and expect that cloud computing will reshape IT processes and the IT marketplace.

Keyword – Cloud Computing, Cloud Evolution, Cloud Pros Cons

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I. INTRODUCTION

"...Cloud Computing is a completely new IT technology and it is known as the third revolution after PC and Internet in IT. To be more specific, Cloud Computing is the improvement of Distributed Computing, Parallel Computing, Grid Computing and Distributed Databases, and the basic principle of Cloud Computing is making tasks distributed in large numbers of distributed computers but not in local computers or remote servers. In other words, by collecting large quantities of information and resources stored in personal computers, mobile phones and other equipment, Cloud Computing is capable of integrating them and putting them on the public cloud for serving users...." (Sanchati and Kulkarni, 2011)

The platform idea of cloud computing first began during the 1960’s by an American Computer scientist named John McCarthy where he proposed that in the future
"computers may someday be organized as a public utility". He believed with a new way of organizing information or data, stuff that we need is only within arm's reach. According to Server Motion (2012), mentioned that in the past, massive computing combined by supercomputers and mainframes where connected to central processing units (CPU) to divide the tasks and get the results faster.

In 1999, Salesforce.com is one of the first to invest in cloud computing, they introduced the concept of delivering enterprise applications through a simple website. Second was the Amazon in 2002 when they launched the Amazon web Service. Then in 2006, came Google Docs which has spread the word of cloud computing and became the lead of public awareness.

II. LITERATURE REVIEW

FEATURES AND TYPES OF SERVICE MODELS

“...Cloud computing is an architectural model for deploying and accessing computer facilities via the Internet. A cloud service provider would supply ubiquitous access through a web browser to software services executed in a cloud data center. The software would satisfy consumer and business needs” (Katzan, 2010). In simple terms, anything involves through the internet to deliver hosted services is considered as Cloud Computing.

The National Institute of Standards and technology (NIST) defined Cloud Computing as “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. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models” (Mell, 2009). The four service deployment models are:

1. Public Cloud

The cloud infrastructure is design as open and accessible to the public, it managed by cloud service provider. This enables a consumer to extend and organize a service in the cloud with very low cost compared to the cost spend required compared to other deployment options. However, it makes Public clouds less secured than the other clouds models (Susanto, Almunawar, & Kang, 2012), because it places more flexibility and easy access for all type of users, as consequently malicious attacks and leak of information more frequent.

2. Private Cloud

The cloud infrastructure is deployed, customized, operated and maintained mainly for an organization as client where it supervised by cloud service provider. It is different
from the public cloud because all the cloud resources and applications managed by the organization and strictly closed to the public. Private cloud more secure than public cloud since it is customized features that leads to more secure of their application, as consequently only selected stakeholders within organization may access and manage on a specific Private cloud.

3. Hybrid Cloud

Hybrid cloud might be a mixture of private and public clouds that support the requirement to protect data and information in an organization. “Hybrid Cloud provides more secure control of the data and applications and allows various parties to access information over the Internet. It also has an open architecture that allows interfaces with other management systems. Hybrid cloud can describe configuration combining a local device, such as a Plug computer with cloud services. It can also describe combining virtual and physical, collocated assets -for example, a mostly virtualized environment that requires physical servers, routers, or other hardware such as a network appliance acting as a firewall or spam filter.” (Kuyoro S. O., Ibikunle F., Awodele O., 2011).

4. Community Cloud

The community cloud infrastructure is shared by a number of organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It managed by the organizations or a third party and may existed on-off premises (TWP, 2010).

Moreover, three cloud service models give a view of what a cloud service is. A cloud service system is a set of elements that facilitate the development of cloud applications (Youseff, 2009). The three main cloud service delivery models are:

1. Infrastructure-as-a-Service (IaaS)

Consumers organize the systems in terms of the operating systems, applications, storage, and network connectivity, but do not for cloud infrastructure (TWP, 2010). Katzan (2010), the ability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to set up and run arbitrary software, which can include operating systems and applications. The consumer does not organize the underlying cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components (e.g., host firewalls).

2. Platform-as-a-Service (PaaS)

Customer purchase access to the platforms, enabling them to deploy their own software and applications in the cloud (TWP, 2010). The customer does not manage the operating systems and network access, and there might be constraints as to which applications
deployed, customer has control over the deployed applications and possibly application hosting environment configurations. (Katzan, 2010)

3. Software-as-a-Service (SaaS)

Customer are able to purchase the ability to access and use an application or service hosted in the cloud (TWP, 2010). As example is Salesforce.com, where crucial information for the relations between the customer and the service is hosted as part of the service in the cloud. According to Katzan (2010), the capability provided to the consumer is to deploy onto the cloud infrastructure customer-created or acquired applications created using programming languages and tools supported by the provider.

COMPARISON: LEGACY SOFTWARE AND CLOUD COMPUTING

LEGACY SOFTWARE
Businesses have big ideas to decrease operational costs, increases sales and profits. The ideas for those are through business app. However, businesses apps are too expensive. For example, businesses need a data centre with office space, power, cooling, bandwidth, network, servers and storages. Other, they also need a complicated complex software stack and teams of experts run them. The software needs development, testing, staging, production and with green initiatives. Such complex software usually creates problem where even technicians hardly to fix it. Software always came up with updates of new version where users need to upgrade them but the consequence is that it may bring the whole system down.

CLOUD COMPUTING
Cloud computing is a better way to run a business. Instead of running the app themselves, they can just run it on shared data centre where businesses can just plug in like utility and this may give benefits for businesses to get started faster and cost less. For example, by use Google application (Gmail, Docs, Video), user does not need server-storage, technicians and upgrades, everything provided by Google team, and user only used all of these stuff. similarly, in cloud, businesses only have to log in, customize it and start using it.

Therefore, cloud change the perspective review of software as business application, where it is not just customer apps but also business processes apps called by "Enterprise Cloud Computing." Businesses nowadays are running all kinds of apps in cloud computing (such as HR, Accounting, Etc). As consequence, corporate do not have to pay for the people, product facilities and servers.

PROS AND CONS

The introduction of cloud computing has bring a number of advantages not only for individuals, but also for businesses. The first common benefit of using cloud computing
is that it helps to reduce the cost in terms of time, money and storage. Cloud computing reduce costs in terms of money because it allow users to access their files from any personal computer especially the Software as a Service (SaaS) application, which caused the users to be able to use their current computer rather than buying a new one. As for time, cloud computing is more flexible compare to other types of computing systems. It can be accessed anywhere as long as there is an Internet connection, thus it is an advantage for users who are in a crunch and critical time. Moreover, cloud computing helps corporate to do their work from being time-consuming as they able to access the file we need in a shorter time than finding the file manually. Furthermore, cloud computing stored more than a personal computer. Cloud computing has no limited over the space and storage.

Although people are often worried about the security and reliability of cloud computing, it can still be an advantage of using cloud computing. However, compared to other network, cloud computing is more secured since most of the cloud service vendors has the highest security certifications, such as health insurance portability and accountability Act (HIPAA), ISO 27001 which is also known as information security management system (Susanto et al, 2011a, 2011b), SAS 70 Type II which is a statement on auditing standards by american institute of certified public accountants (AICPA) and also payment card industry data security standard (PCI DSS) (Susanto, Almunawar and Tuan, 2012a, 2012b).

The accessibility is one of advantages of cloud, where it allows users to access their files anytime-anywhere as long as there is an Internet connection and computer access. This benefit allows the users to have a greater sense of freedom as they can access the data from many devices such as mobile phones, tablets and even traditional computers. Not only that, automatic update for the server will be an advantage for both businesses and users. Businesses do not need to hire people to update the server as it automatically update and once the server is updated, users will be able to use the updated services without downloading anything.

Despite the advantages that cloud computing brings, we have to bear in mind that every technology has its own drawbacks. The first common issue for cloud computing would be their security and privacy problem. As we all know, cloud computing is about storing files and documents to another party. For individuals, they might feel uneasy about sharing their files with another party especially the sensitive files. Furthermore, cloud computing allows the files to be accessed from any personal computer, therefore viral infection and malware could occur. In addition, since the files are not restricted to anyone, unauthorized users from any part of the world can access it.

The second drawback would be in terms of control. Since cloud service providers offer to save their files through the internet, thus it is not reassuring to use it because of the data saved might be lost. With the data being lost, cloud service providers might not be able to retrieve the files back as there is no backup or restore recovery. T-Mobile’s Sidekick smart phone services where in October 2009; the data of the clients have been
lost and were not able to be retrieved. Therefore, it is quite risky to use cloud computing as there would be loss of control over the saved data.

Decreasing in terms of flexibility, cloud computing has been practiced for many years, they are consider in the “experimenting” or “developing” stages. The rate of flexibility is not hundred percent, in which this has caused some of users to find it impossible to improve their computing environment without losing some of their data, users especially the “new” users might find it difficult to use their cloud computing server as some of the cloud computing server might not provide instructions that can guide them on how to use it.

In terms of knowledge and integration, for those businesses that provide cloud services, their workers would need to be an expert in cloud computing field as it needs deeper knowledge to understand it. If those workers have never dealt or has a little experienced about cloud computing, they will find it hard to understand. Meanwhile, as for integration, it is known that not everything can be done through cloud computing.

III. **How Cloud Computing Influence Individuals and Businesses**

Cloud computing had created a new way of processing and organizing data due to that business changed their way of management. Few years back before cloud computing, employee will need to access data through specific department where bunch of files are organized. This kind of process usually takes a lot of time and costly because they will need someone to organize their data and process it. With the cloud computing, data could be accessed through internet in a short period of time and everyone wouldn’t be excluded unless it is confidential. In this way, coordination among different section of an organization is better because information shared and passed through the cloud, therefore all department managers move at the same pace. Etro (2011), swedish red cross able to improve coordination by using cloud computing which reduce their costs and enhances communication among its employers.

Cloud computing has brought e-commerce to a new generation, it becomes much cheaper to start an online shopping website because the business does not build up their own data centre and maintaining the traffic of their website and the provider might be more skilful. Since data is stored on the cloud therefore no hard disk space is needed which infrastructure for hosting website is located on the cloud, this mean that businesses can access to their website and able to change it by using portable device which mean it can be done in any location and time. According to (Aljabre, 2012; Delgado, 2010), Amazon offers cloud storage service and Saleforce’s main product is a customer relationship management web service.

Cloud computing takes a major role to increasing the use of web 2.0, it improve the infrastructure of web 2.0 which make it more convenience and more useful. Bein and Madiraju (2009) concluded that web 2.0 is product of a web technology to the traditional web where static website transforms to web application with the ability to communicate
with the user. Since the main purpose of web 2.0 is to allow reader to communicate with the writer therefore cloud computing existed to provide a better communication structure where passing of information become more effective and efficient.

Moreover, cloud provide a great assistance in knowledge management, as a solution of traditional learning and teaching in term of passing knowledge and also sharing of knowledge. Furthermore, Cloud computing could reduce the cost in education because the school doesn't need any extra IT staff to maintain their data centre or not even need a data centre therefore they have more resource to improve their facility and to student, e-book is much more cheaper than physical textbook and more variety of books are available on cloud. Singh and Sodhi (2012), Cloud will act as a core system to combine each institution to coordinate with each other therefore education cloud will contain the latest education and e-learning software.

Besides that, the benefit cost-effective from cloud computing is not just on the education but also to healthcare. Since they only pay for their action and not the infrastructure so it is obvious that it will reduced the cost on IT infrastructure and can refocus their resource. However, it is not only contribution of cloud computing in healthcare. The share of information among health centre and patient is important because data is needed to ensure that no mistake occurred and to improve their service according to patient requirement. Shimrat (2009) concluded, using cloud computing, local computing or even hybrid will be able to utilize information technology which allows better access to health care services and information that is needed to improve the result and cost saving.

THE GROWTH OF CLOUD COMPUTING AND THE NEED OF TECHNOLOGY

There are a lot of reasons why an individual should know and understand fully about cloud computing in this century where knowledge about Information and Communication Technology (ICT) is vital to almost all industries. Thus, Cloud computing is not a stranger to IT but it gains popularity as more people depend on their laptop, computer or tablets to store documents. Hence, as the growth of cloud computing is ascending from time to time the need to enhance technology are also essential in order to protect its users from any harm it may come across.

Most people are familiar with bits of cloud computing which are Google docs and mail to send and receive their emails, however a huge growth in cloud computing will happen when businesses move emails and documents or other things and services to the “cloud”. It has been stated by Forrester that cloud services will be delivered over the public internet in a small portion will generate $15.9 Billion revenue by 2020. Thus, this will involve companies licensing software that allow them to easily share tech resources.

The prediction on the cloud computing does not stop there, Microsoft and analyst firm IDC forecast cloud computing will create nearly 14 million new jobs worldwide by 2015 while gaining a revenue of $1.1 Trillion per year by 2015. Not only Microsoft predict the growth of cloud computing and how it will be a huge influence in the future, it has
signed a contract with the Indian government to run its cloud computing technology for the country's massive education network. Thus, the giant company will deploy its Live@edu which includes email, Microsoft Office web apps, instant messaging and online. The Live@edu will act as a service where not only it can allow students to communicate with each other but to work and create their assignments with the help of Microsoft Exchange email at the same time. As Mantha said, a Chairman of AICTE “Microsoft’s cloud platform will make for a truly progressive ecosystem and contribute to the country's technical education by providing a better communication and collaboration platform for institutes and students”.

Today's factor that contributes to the growth of cloud computing is due to the availability of low cost computing and bandwidth in the long run which therefore allows cloud hosting providers such as EarthLink Cloud to offer robust cloud services that help businesses save money. The idea of cloud service will give businesses a lower administration cost and prevent them from buying hardware that cost a lot too, attracts all businesses to invest themselves with cloud computing, although they know the initial start-up of cloud computing is expensive but in the long term they will gain economies of scale.

FUTURE OF CLOUD COMPUTING

As more business started to recognise through cloud computing, it easily save a lot of money, for example “Wise Group” a non-profit group that employs 600 workers and have a turnover of £34 millions annually saves £300,000 by using cloud. The governments are also likely to be installing cloud as the benefits more than its drawbacks. An example is a United State’s state; Minnesota has completed its migration to Microsoft Cloud after a year of testing as the state federal government signed a deal with Microsoft in September 2010. Thus, in the future there will be a lot of migration both the private sector and public sector to cloud. A strict and well-built security will be needed as there is an increasing trend of organization and individuals using cloud to store their private confidential documents. Hence, to avoid security breach by hackers has been stated that the security will move to “centralized trust” where by the authority learns to manage identities within the enterprises.

The future of cloud seems bright, it stated by the big companies acquired small companies as cloud service provider such as Dell acquired EqualLogic Inc. in 2007 for $1.4 billion as the foundation for its data-storage product, while HP bought Ospware, a data centre automation start-up for $1.6 billion, or 16-times that company’s 2006 revenue. The big international companies know that cloud influence ICT in the future, as futurologist Dr James bellini said. “If you go forward to the 2020s a successful enterprise will probably have no chief executive, no headquarters and no IT infrastructure”.

Susanto, Almunawar and Kang, 2012
IV. CONCLUSION

The main benefit of cloud computing is the ability to reduce costs where effective and efficiency. The could influence the whole society and economic of the world, businesses could refocus and rethink their resource on sales or more business opportunity for cloud provider. Furthermore, the influential power of social media or web 2.0 are all given by cloud computing where reader had a chance to communicate with writer or with other reader. However, the main problem of cloud computing is security and privacy due to its data is held on the cloud or its data is organized by third party, as consequence it increase the risk of its confidential data leaked out. Therefore, future cloud computing need to have a well-built security to ensure every user's data are secured, as in the future the number of cloud user increase.

V. REFERENCES


