Assignment 2 - Research Paper

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Abstract

This paper describe on the study of cloud computing in current IT environment. It is just a preliminary study on the overview of cloud computing and what it was. In this paper, the history, benefit and security aspect in cloud computing will be explained. In addition, it will also touch about the different between cloud computing and others computer system. Besides that, it will try to elaborate on the issue of how cloud computing will change the current business and what will be happen in the future.

1. Introduction

Cloud computing is a new technology where application developers and IT related service providers distributing their product over the Internet. The distribution is either free or chargeable. The user can subscribe either pay-per-use basis or monthly basis payment. The benefit of cloud computing is that the user do not have to install the application that their want to use into their computer.

The application distributed via cloud computing can be accessed via internet at anytime thus eliminate the worries of software maintenance. The software was maintained in the server by the service provider without the concern of the user. Large and powerful servers were used to ensure the continuous streams of data are channel to the user without fail. With cloud computing, IT related business and software can be billed like public utilities such as. electricity and water.

From Wikipedia,the free encyclopedia is Internet-based (”cloud”) development and use of computer technology (”computing”). The cloud is a metaphor for the Internet (based on how it is depicted in computer network diagrams) and is an abstraction for the complex infrastructure it conceals.[1] It is a style of computing in which IT-related capabilities are provided ”as a service”,[2] allowing users to access technology-enabled services from the Internet (”in the cloud”)[3] without knowledge of, expertise with, or control over the technology infrastructure that supports them.[4] According to a 2008 paper published by IEEE Internet Computing ”Cloud Computing is a paradigm in which information is permanently stored in servers on the Internet and cached temporarily on clients that include desktops, entertainment centers, table computers, notebooks, wall computers, handhelds, sensors, monitors, etc.”[5]

Cloud computing is a general concept that incorporates software as a service (SaaS), Web 2.0 and other recent, well-known technology trends, in which the common theme is reliance on the Internet for satisfying the computing needs of the users. For example, Google Apps provides common business applications online that are accessed from a web browser, while the software and data are stored on the servers.

2. BACKGROUND

Cloud computing is an architecture that gives a whole new meaning to software as a service and it give the Internet a whole new meaning. The whole architecture rely on Internet to server their user and to satisfy the computing needs of the user. Cloud computing allow application service provider to provide application online that can be accessed through web browser, while the software and data are stored on the server.

In this new system, there will be significantly change on the workload at the user side. The user as the local computer can reduce the need of heavy computer load either software or hardware side. This requirement had been transferred to the computers in the networks and handle by themselves. Therefore, hardware and soft-

ware demand on the local computer will be decrease and the only requirement is the ability of computer to run the cloud computing system's interface software. It would be not a problem to run this software which is simple as common web browser.

We may not aware that we have similar experience on using the cloud computing concept. The web base email service like Hotmail, Yahoo!, and Gmail are some of example of cloud computing concept. Instead of running an email program in the computer, the above email can log in through the web site as long as there is internet connection. All the data and emails are not saved in the personal computer but it was located in the cloud computer services.

In cloud computing, one of the primary benefits is the speed, where by people can get the services and bypass traditional IT departments. Figure 1 show the Latest Evolution Of Hosting in cloud computing. Cloud computing differs from existing hosting services. The hosting services are based on consumption and the technology of the infrastructure and it was optimized to serve several customers. At the same time the providers use virtualization extensively and grid computing software.

Forrester research have identified several companies as "cloud providers," including Amazon.com, Akamai Technologies, Joyent,and Rackspac's Mosso software. On the other hand Microsoft and Google are also rumored to be developing a computing services on usage basis, such as hosted server processing and storage. As these providers are optimized for large-scale hosts, they could eventually serve corporate customers.

Beside that, cost factor is one of the reason for this cloud computing development. In one organisation with quite numbers of employees, the IT administrator had to ensure all the employees have the right software and hardware they need for their jobs. Ideal solution is to purchase computers for everyone with the right software. One thing to remember, each software come with licence requirement. However this solution required huge money and the more employees means the more money they need to invest. Therefore, cloud computing is the correct solution which the only need is to install one application. In this application, each user are allowed to log in to a web-based service which hosts all the programs the user need for his or her jobs.

3. HISTORY

The idea of cloud computing was started way back to 1960 by John McCarty who opined that "Computing may someday be organized as a public utility". Starting by the year 2000, some big Internet base company such as Amazon.com has shown their interest in cloud computing. At that time most of the interested companies only focus on software as a service.

In 2007, the activities involving cloud computing have greatly increased. Company like Google and IBM and also some number of universities have invested a great amount of money into the development and research of cloud computing.

4. CLOUD COMPUTING VS GRID COMPUTING

Cloud computing is not like Grid Computing. Grid Computing is where a group of computers is linked together in a network to performed one very large task. Cloud computing on the other hand, can perform multiple task. It is like a server hosting for multiple application.

Grid computing has been use in current market where users make a few request which allocate large requirement each. For example, an organization may have 1000 node cluster and group it to few allocation, let say 200. Unfortunately, only a few allocation can be serve at one time where by the others have to wait and may need to reschedule for other time when the resources are released. This phenomena will results a batch job scheduling algorithms of parallel computations.[1]

Cloud computing is concentrate to small allocation requests. For example Amazon EC2 accounts are limited to 20 servers each and a lot of users allocate up to 20 servers from many thousands of servers someone else release resources. This situation is completely different resource allocation paradigm, usage pattern and results in completely different method of using computer resources.

Anyway, it not that easy to create a cloud even though it just consist a cloud management software and support by a few computers. On the other hand, it is a challenging to uphold the premise of real time resource availability. The cloud provider need to provide resources and if they fail, the whole system will collapse and the users will start hoarding servers, resulting a peak usage than normal demand.

Below table shows the summary of comparison between cloud computing and grid computing by using a model from each category.

5. BENEFITS

There are many benefits in cloud computing systems. All user either individual or organisation can en-

joy many advantages when apply to this new systems. Simple and minimum IT management with low cost requirement makes cloud computing are practically to be use for all kind of user. That is why this new practice is now in rapid development and being popular in IT environment.

- **Client or users can access their application and data from anywhere at any time. The only needs to be linked to cloud computing system is a computer with internet connection.**

- **The needs of advance hardware and software are no longer required and could be reduce the hardware and software cost. It means, the user are no longer need to buy the fastest computer with huge memory because the cloud computer system will take care all this requirement. Therefore all the user needs could be a cheaper personal computer with basic and common requirement which can easily get it from the market. A simple netbook with small in size and weight is one example that can fulfill this requirement with very low price (cost about RM 1200 1800). All this thing is the result of a system that the user doesn't need a large memory and disk space because all the user data are stored on a remote computer.**

- **In normal business situation, an organization have to make sure they have the right software for their business operations. It might be a common software that use by all their employee. In the cloud computing systems, they can provide this organization an access to their computer application for all the employee. Therefore the need of a set of software with license for all the employee are no longer required. Instead, the company are only required to pay the access fee to the cloud computing company.**

- **Some organization need to provide some space for their server and digital storage. However cloud computing can offer to this organization the option of storing data on someone else hardware. This phenomena will remove the need for physical space on the front end.**

- **The client could have advantages of the entire network's processing power if the cloud computing system's was supported by a grid computing system at the back end. There are many cases that a scientists or researchers works with very complex calculation and take so much time for individual computer to complete them. In this case, cloud computing system will tap into processing power for all available computers in the cloud and resulting reduce the calculation processing time.**

6. HOW IT BEING USED

In global IT environment cloud computing had been used widely besides we may not aware that sometimes we are part of it. Below is some example and how it being used by the user.

- **SaaS With the development of cloud computing come a new idea of distributing software through Internet. SaaS (Software as a service) is being introduced as a next step of software distribution. Using cloud computing architecture, a single application can be delivered through the browser to the user. On the user side there is no upfront investment in server of software licensing and on the provider side, they only have to maintain one application thus the maintenance cost will greatly reduce. Some examples of SaaS are Saleforce.com, Google Apps and Zoho Office.**

- **Utility computing This form of cloud computing give a whole new meaning to IT related utility where software is charge just like a public utilities such as electricity or water. Company like Amazon.com, Sun, IBM and other who offer storage and virtual server and customers can access on demand.**

Figure 3 shows as the cloud computing hireiki and the providers. Second group (2) is lately call cloud computing. In first group (1),some of underlying work done that led cloud computing. At the top (3),are examples of each SaaS type.

7. SECURITY IN CLOUD COMPUTING

Here are seven of the specific security issues Gartner says customers should raise with vendors before selecting a cloud vendor.

- **Privileged user access.**

Sensitive data processed outside the enterprise brings with it an inherent level of risk, because outsourced services bypass the ”physical, logical and personnel controls” IT shops exert over in-house programs. Get as much information as you can about the people who manage your data. ”Ask providers to supply specific information on the hiring and oversight of privileged administrators, and the controls over their access,” Gartner says.

- **Regulatory compliance**

Customers are ultimately responsible for the security and integrity of their own data, even when it is held by a service provider. Traditional service providers are subjected to external audits and security certifications. Cloud computing providers who refuse to undergo this scrutiny are ”signaling that customers can only use them for the most trivial functions,” according to Gartner.

- **Data location.**

When you use the cloud, you probably won't know exactly where your data is hosted. In fact, you might not even know what country it will be stored in. Ask providers if they will commit to storing and processing data in specific jurisdictions, and whether they will make a contractual commitment to obey local privacy requirements on behalf of their customers, Gartner advises.

- **Data segregation.**

Data in the cloud is typically in a shared environment alongside data from other customers. Encryption is effective but isn't a cure-all. ”Find out what is done to segregate data at rest,” Gartner advises. The cloud provider should provide evidence that encryption schemes were designed and tested by experienced specialists. ”Encryption accidents can make data totally unusable, and even normal encryption can complicate availability,” Gartner says.

- **Recovery.**

Even if you don't know where your data is, a cloud provider should tell you what will happen to your data and service in case of a disaster. ”Any offering that does not replicate the data and application infrastructure across multiple sites is vulnerable to a total failure,” Gartner says. Ask your provider if it has ”the ability to do a complete restoration, and how long it will take.”

- **Investigative support.**

Investigating inappropriate or illegal activity may be impossible in cloud computing, Gartner warns. ”Cloud services are especially difficult to investigate, because logging and data for multiple customers may be co-located and may also be spread across an ever-changing set of hosts and data centers. If you cannot get a contractual commitment to support specific forms of investigation, along with evidence that the vendor has already successfully supported such activities, then your only safe assumption is that investigation and discovery requests will be impossible.”

- **Long-term viability.**

Ideally, your cloud computing provider will never go broke or get acquired and swallowed up by a larger company. But you must be sure your data will remain available even after such an event. ”Ask potential providers how you would get your data back and if it would be in a format that you could import into a replacement application,” Gartner says.

8. CLOUD COMPUTING FOR MALAYSIAN GOVERMENT

Cloud computing is still in its early stages, but the public sector is already beginning to see advantages. Despite its possible security and privacy risks, Cloud Computing according to a magazine article due to be published later this Fall has six main benefits that the public sector and government IT organizations are certain to want to take advantage of. In very brief summary form they are as follows:

- **Reduced Cost**

Cloud technology is paid incrementally, saving organizations money.

- **Increased Storage**

Organizations can store more data than on private computer systems.

- **Highly Automated**

No longer do IT personnel need to worry about keeping software up to date.

- **Flexibility**

Cloud computing offers much more flexibility than past computing methods.

- **More Mobility**

Employees can access information wherever they are, rather than having to remain at their desks.

- **Allows IT to Shift Focus**

No longer having to worry about constant server updates and other computing issues, government organizations will be free to concentrate on innovation.

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10. Conclusion

From the current situation, cloud computing technologies are still immature, which may lead to problems in service management and usability. However the potential of cloud computing benefit will make it interesting and therefore many people will participate in the progress and development of it. There will be more challenges on this technology, but it will not make it stop. Furthermore it will growth just like the internet today and will be commonly use in the near future.

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References

[1] Microsoft, *A Guide to Network Infrastrucure LaTeX*, 3rd ed., .