

Cloud Computing: The challenges of software business

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บทความนี้-ปัจจุบันการบริการผ่านเครือข่ายอินเทอร์เน็ตมีหลากหลายรูปแบบ เทคโนโลยีการประมวลผลแบบกลุ่มเมฆเป็นเทคโนโลยีหนึ่งที่น่าจับตามอง ถึงแม้จะไม่ใช้เทคโนโลยีใหม่แต่ส่งผลกระทบต่อปรับเปลี่ยนทางธุรกิจและองค์กรต่างๆ อย่างมาก โสคติ์และการบริการผ่านทางอินเทอร์เน็ตรูปแบบการประมวลผลแบบกลุ่มเมฆ ก่อให้เกิดประโยชน์ในการช่วยลดความต้องการสำหรับผู้ใช้ในการวางแผนล่วงหน้าสำหรับการจัดเตรียมทรัพยากรและช่วยให้ผู้ประกอบการที่กำลังเริ่มต้นธุรกิจขนาดเล็กสามารถเพิ่มทรัพยากรเมื่อมีความต้องการเพิ่มขึ้นด้านการบริการ นอกจากนี้ยังส่งผลให้เกิดความท้าทายในการพัฒนาระบบของธุรกิจซอฟต์แวร์ทั้งบริษัทภายในประเทศและบริษัทในต่างประเทศ อย่างไรก็ตามแม้เทคโนโลยีดังกล่าวจะส่งผลให้เกิดการเปลี่ยนแปลงด้านการบริการในรูปแบบใหม่ให้กับธุรกิจขนาดต่างๆ และสร้างโอกาสให้กับอุตสาหกรรมไอที แต่ระบบการประมวลผลแบบกลุ่มเมฆก็ยังคงมีทั้งประโยชน์และผลกระทบที่อาจเกิดขึ้น ซึ่งผู้ใช้งานระบบและผู้พัฒนาระบบควรคำนึงถึง ในบทความนี้เรานำเสนอความหมาย แนวคิดหลักของสถาปัตยกรรมระบบการประมวลผลแบบกลุ่มเมฆ การบริการบนระบบการประมวลผลแบบกลุ่มเมฆ ประโยชน์ของระบบการประมวลผลแบบกลุ่มเมฆ ความเสี่ยงของระบบการประมวลผลแบบกลุ่มเมฆ การเปลี่ยนแปลงของธุรกิจซอฟต์แวร์ เพื่อเป็นแนวทางในการพัฒนาซอฟต์แวร์ มุมมองในการลงทุนภาคธุรกิจ ซึ่งชี้ให้เห็นถึงช่องทางอุตสาหกรรมซอฟต์แวร์ และความท้าทายของธุรกิจซอฟต์แวร์ในอนาคต

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Abstract— Recently, the services on the Internet are provided in many different forms. The computing technology on the cloud so-called Cloud Computing is one of the very interesting technologies. Though it is not a new player, but it significantly affects the way that many companies in software industry do the business. Hosting and the service on the Internet in the form of cloud computing reduce the total cost of ownership for the user and the advanced plan of the resources when the business expands. Small businesses can adjust the resource according to the usage by the time it has to. Furthermore, cloud computing also creates the challenges in information system development in software industry worldwide. However, the development of cloud computing still has its pro and con that the users and software developers should concern. In this paper, we discuss the concept and the architecture of the cloud computing, the comparison between cloud computing and grid computing, and the services on the cloud computing, the risk in Cloud Computing, and the changes in the software industry. As a result, this paper provides the vision on the business investment and points the future of software industry and challenges on the software business.

Keywords-Cloud computing, Software business, Internet, Cloud technology

I. INTRODUCTION

As the rapid development of computer technologies in computing, storage, and the Internet connection, the cost of computer systems and devices become cheaper while they gain more performance. Therefore, every company these days uses the information system to store important information. From the user perspective, the number of people who use the Internet has significantly grown over years [1], [2]. Therefore, many businesses try to find a new approach to connecting and targeting the consumers.

Cloud computing can address this problem by allowing the company to host its information system on the Internet while reducing the cost of software and hardware investment in the organization.

In cloud computing, the service provider can be categorized into two types. Firstly, the service provider provides the basic infrastructure to hold the platform. Secondly, the service provider hosting the computing power and storage to the user. As a result, there are many users using the cloud computing. In this decade, cloud computing heavily effects on the large software company such as Google [3], Amazon [4],[5], and Microsoft. They are the largest service providers that provide cloud computing services. The trend of using cloud computing has gain attention on many businesses. The reasons behind the growth are as follow: 1) The users do not need to invest in the basic infrastructure 2) The users can reduce the operational cost. The resource on the cloud can be adjusted immediately. 3) The cost of the services can be adjusted according to the usage. 4) Easy access. 5) The company reduces the risk of the business [6].

The objectives of this paper are to propagate the knowledge on software development for the software industry in the future. Both large and small-to-medium companies that plan to use the Internet as the medium to their customers can use this knowledge as the vision in the software industry and software development in the future.

II. TERMINOLOGY

Cloud computing refers to the service of information technology that provides the resources for the system on the Internet. Cloud computer consists of the basic infrastructure of information technology to the software application in many forms [7]. It also provides the virtual resources that the users can manage themselves. The users also need to pay only for what they use. This is similar to basic infrastructures such as current, water, and telephone bills. [7], [8], [9]. Cloud computing can be categorized into 4 types [10 -13] as follows:

A. Public cloud/External cloud

This type of cloud has public access of resource. The service provider takes care of system administration. This cloud provides the resource and basic utility through the Internet, web applications, and web services. It is suitable for typical users.

B. Private cloud/Internal

The service provide manages the system itself by creating the cloud computing in the intranet, which is not publicly available. The information has security and can be trusted at some level. It is suitable for government agencies and private companies that do not want to expose the service outside.

C. Community cloud

Community cloud can be built from cooperation between companies by sharing the resources together.

This resource could be hardware, software, security policies, or any access controls. This type of cloud costs more than public cloud but it is cheaper than private cloud.

D. Hybrid Cloud

Hybrid cloud which can expose some information to the Internet happens between the public cloud and private cloud. It is mainly used in private companies.

Main Concept of Cloud Computing Architecture

The main concept of cloud computing is to collect the outstanding technologies together. For example, the service on the package software called Software as a Service (SaaS), Web 2.0, and other technologies that depend on the Internet to response to the user. For example, Google develops Google Apps to provide the service on a software application that is suitable for doing online business. The application can be accessed through the browser. The data and the software are stored on the service which allows anywhere access. This is very suitable for doing economic IT business such as laptop and mobile phone that most of the people use nowadays. Choosing cloud computing is really attractive for the company that wants to reduce to cost of software resource in the organization. Cloud computing is the virtual system that is easy to manage and maintain by connecting high-performance hardware, software, and application that are installed within the same location to the Internet, and has professional maintain the system for the users.

The architecture in cloud computing in terms of marketing contains 4 components as follows: [7], [14].

A. The user

The user is the person the request for the service which can be from anywhere in the world.

B. Service level agreement resource allocator (SLA resource allocator)

Service level agreement resource allocator is analogous to the connector between the cloud service provider and the user. SLA Resource Allocator contains 6 modules as follows: (1Service Request Examiner and Admission Control module that translates the user request and the quality of services. (2Pricing module is the module that calculates the resource usage according to the conditions such as time and rate. (3 Accounting is the module that journaling the resource usage when requested and cost the user. This information can be used to adjust the resource allocations. (4 Virtual Machine Monitor module stores the information of the virtual machines (VM) and their associated resources that are ready to be used. (5The dispatcher is the module the dispatch the job when the service is requested and accepted to run on the virtual machine. (6 Service Request Monitor is the module that stores the progress of the requested operations.

C. Virtual machine (VM)

Virtual machine can be one or multiple machines. Multiple virtual machines can independently operate multiple applications on the same physical machine.

D. Physical machines

Physical machines are the servers that the service provider uses to allocate the resource to the users.

III. SERVICE MODELS

In cloud computing, the service providers advanced virtualization technology to help to allocate the resources. The service model can be categorized into 3 types [15] as follows: 1) Public cloud or external cloud is the computing service that provides to normal users. The users can request for the service and pay only what they use. 2) Private cloud or internal cloud is the computing service that is used within the private networking. The service provider will approve the user case by case. The users can control and manage the system themselves. This is mainly used for an internal purpose so as to reduce the task of security and trusting the system. The company uses this cloud model to reduce the cost of new technology investments. 3) Hybrid Cloud is the model that provides both public cloud and private cloud.

The service levels in cloud computing typically have 5 levels as follows:

- Software as a Service (SaaS) is the service that provides the packages, out-of-box application on the server.
- Platform as a Service (PaaS) is the service that provides the preinstalled operating system and the system software that come with the operation system.
- Infrastructure as a Service (IaaS) is the service that provides the physical resources of the server so that the users can install their own operation systems. The IaaS can be suitable for the system that requires huge resources.
- Data Storage as a Service (dSaaS) is the service that provides the huge data storage so that the user can store an unlimited amount of data. In a large company, the stored data should support full-text searching.
- Composite Service (CaaS) is the service that provides the linkage between the applications or ordering the working across the network including the security. This is suitable for distributed computing such as grid computing.

IV. THE BENEFITS OF CLOUD COMPUTING

Cloud computing comes from the concept of distributed computing, grid computing, and utility computing altogether. Using virtualization technology which allows the service to provide at a lower price, cloud

computing attracts the users as the total cost of ownership and the usage cost are low. These costs are calculated based on the real usage without any upfront fee. This flexibility allows the users to scale the system without complex hardware investment plan as the users do not need to invest in hardware. However, the users must study the terms and conditions before choosing the service provider. We point out the basic issues in terms of cloud computing security as follows:

A. *Access Control*: the service provider should have the mechanism to control the access to the system to prevent unauthorized access.

B. *Security Procedure*: the service provider should be evaluated by the certified professionals and have the certified process of evaluation.

C. *Data Location*: Since data can be stored anywhere in the cloud, the service provider should inform the physical data location to the user and comply with the users' privacy law according to the data center location.

D. *Data Distribution*: Since the data in the cloud can be accessed from the multiuser environment. The service provider should inform the user how to handle data distribution, data security, data encryption, and data loss prevention [16].

E. *Data Recovery*: The service provider should have the mechanism to recover the 100% of data in case of loss or virus infected. For example, data redundancy in different data center.

F. *Support in terms of Security*: The service provider should investigate any suspected activities that could disobey the law especially system usage as the data tends to be distributed to another location.

G. *Continuation of Service*: The user should consider only the service provider that will be longevity running. Furthermore, the company should provide the mechanism to obtain the data back to the company premise.

In addition to security concern, the company that considers cloud computing should consider if the following benefits are what the company want [17].

- Cloud computing provides easy to manage and scalability of the system.
- Internal cloud computing in the company can be implemented if necessary.
- Cloud computing hides administrative tasks on the server or the applications.
- In the software industry, the business model has changed from licensing the software to selling the support and maintenance of the software such as SaaS.

- The user can reduce the hardware and software investment by using pay per use scheme on the cloud computing.
- The service provider can support the infrastructure without too high cost.
- Cloud computing allows the entrepreneurs to start the SaaS business easier.

V. RISK IN CLOUD COMPUTING

From the information technology specialists’ aspects, the security and the risk are the main issue in manage and develop the network system. The study [10] found that the riskiest issues in cloud computing is security, third-party, and operations and change management accordingly. These issues mainly affect the data and the resource for processing on the cloud infrastructure. If the security management is not handled properly, the vulnerability of the system can be discovered easily. This result to the risks in privacy, user identity, failure authentication, and illegal use of software license.

Cryptography is one of the techniques that helps converting plaintext to ciphertext so that the text is not readable by another. This prevents the person who does not have the key to decrypt the ciphertext on standardized algorithm to access the system. The cloud computing today uses the encryption process for enhancing the security on the Internet such as digital signature, e-commerce so as to prove the authenticity of the transactions.

VI. THE CHANGE OF BUSINESS SOFTWARE

Cloud computing system significantly affect the entrepreneurs in Thai software industry. Many software houses that develop the software on the customer specific, sell the system, and maintenance support altogether as a bundle will be affected from the low-price and pay per use scheme in cloud computing. Table 1 shows the comparison between the service from cloud computing and from software houses [18], [19].

TABLE I. COMPARISON BETWEEN THE SERVICE FROM CLOUD COMPUTING AND FROM SOFTWARE HOUSE.

Cloud computing	Software house service
Use fewer human in software development.	Use more human in software development.
Support various scale from small to large business.	Support only medium-large business due to the system-specific development.
Low budget required.	Large budget required.
Pay per use.	Pay in the amount that covers the future growth of the business.
Easy to use.	Depending on the software development.

Easy to manage. No need to hire a system administrator.	Need to have staffs to perform administrative tasks.
Scalable on demand.	Limited scalability.
Reduce the cost of hardware and software investment.	Need to invest in the hardware and software to setup the server.
Management can be done through various platforms.	Management can be limitedly done only on the implemented platforms.

Cloud computing has the advantages that can attract the new entry to move to the cloud. The software houses should adapt themselves to the change by moving from selling the software license to selling the support or maintenance of the system. This could also challenge the large software companies such as Microsoft, Google, and Amazon. For example, Amazon web service uses Linux, Apache, MySQL, Perl/PHP platforms (LAMP platforms) while Google App Engine uses a proprietary format, and Windows users prefer GoGrid [20]. These companies try to move their platforms to cloud computing. In the first phase, cloud computing can be the killer that changes the traditional selling method. In the long term, this can be benefits the Thai software industry. The Thai software entrepreneurs should adapt themselves to the changes. Cloud computing also helps to reduce the cost of network investment. The entrepreneurs can develop a module and start selling it. However, the entrepreneurs should concern on the support after the sales. The entrepreneurs should provide a high quality of support. On the other hand, the user will start using the pay per use scheme which helps to reduce the license cost.

VII. CONCLUTION

The main objective of this paper is to provide the knowledge on cloud computing and the trends in the software industry. Cloud computing helps the service provider the efficiently manage the resource among the massive users. The system can be designed to support the only current load, and scaled when there are more customers. Cloud computing can be setup anywhere. The users do not need to know the physical locations but enough bandwidth. Therefore, we can move computer system to a new data center with a low cost. Cloud computing also separates the hardware maintenance from software maintenance. This can be done by using virtualization and dynamic provisioning that control and manage the resource on demand. The reader can use this knowledge to suitably decide on the information technology investment, the software development, the efficiency and the benefits of the cloud computing.

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