Cost Evaluation on Building and Operating Cloud Platform

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ABSTRACT

Cost issue always is one of most important issue for enterprise in building their IT platform. With the advance of various cloud environments, enterprise’s IT executive may have different consideration in constructing their IT platform. For example, constructing an own cloud environment or renting a computing platform from cloud providers. This paper the authors, based on the Net Present Value in Finance field, propose a cost model for evaluating the tradeoff between building a self-own computing platform and renting one from public provider. The cost evaluation formulas are derived based on some cost factor, such as human salary, platform purchasing cost, energy consuming, maintenance fee, and cooling cost, for evaluating required cost on building and operating of both public and private clouds. Based on the cost model, the authors applied a well-known public cloud instance, e.g. Chunghwa Telecom’s HiCloud platform in Taiwan, to compute renting cost, and make a comparison with the derived cost of private cloud for a variety of enterprises’ settings. According to the experiments, different size of enterprises could have different options in building private cloud or renting from public cloud to make optimum cost saving.

Keywords: Cloud Computing, Cloud Platform, Cost Evaluation, Decision Model, Hybrid Cloud

1. INTRODUCTION

Cloud computing (Buyya, Broberg, Goscinski, 2011), such as Amazon EC2 (http://aws.amazon.com/ec2/), Google App Engine (http://www.google.com/apps/), Chunghwa Telecom’s HiCloud (http://hicloud.hinet.net/index.html#) and Microsoft Azure (http://www.microsoft.com/windowsazure), is an increasing research topic in recent years, and attracts IT enterprises’ attention. Although the term “Cloud Computing” is a new wave, related technologies inside the platform have been well-developed in last decade. Cloud computing is similar with the grid computing and utility computing in many aspects (Buyya, Broberg, Goscinski, 2011).

There are many advantages have been presented in cloud that make IT enterprise interested in: reducing cost, increasing storage, highly automation, flexibility and allows IT to shift focus (Avoyan, White, Weinberger, Romanski, & Strukhoff, 2008). It provides enterprise an
easy and transparent access to a flexible and high-performance computing and storage infrastructure through Internet. Recently, the number of cloud providers delivering IT Infrastructure as a Service (IaaS) has increased quickly. At the same time, the providers are rapidly diversifying their product base and pricing plans.

Public and private cloud are two different type of cloud computing. Public cloud is open for general public, individuals, and corporations or organizations. Amazon Web Services are a well-known public cloud; Private cloud means that a cloud computing-like environment within the boundaries of an organization and typically for its exclusive usage. One can use this internal infrastructure, thereby capitalizing on investments made, and catering for specific application requirements in terms of data confidentiality, security, performance and latency.

An IT platform in enterprise has their own network, servers and storage hardware. Traditionally, upgrading the hardware is a difficult and expensive way because this essentially requires changing the entire server. Using a public cloud platform could lead a different result. A public cloud platform which integrating various resources can be easily re-configured as you wish due to its pay-per-use access scheme. Public cloud users can ask provider to upgrade the platform while he want only paying the fee of the system. Besides, it promises several advantages over private cloud, such as Ease of management, eliminating the cost of infrastructure, eliminating the cost of operating and maintenance fee (Tak, Uurgaonkar, & Sivasubramainam, 2011).

In general, unpredictable work load affects the requirement of the amount of computing server. Over-provision will cause idle in a long time and under-provision cannot satisfy user required QoS (Quality of Service). A flexible manner to handle the situation is adopting Public Cloud. There are increasing famous public cloud providers, for example, Amazon EC2 and Chunghwa Telecom’s HiCloud, provide on-demand instance and elastic scaling, which can benefit the user to manage the irregular work load, and dynamically changing the number of public cloud instance in every minute. These providers usually offer their computing resources in the form of Virtual Machines (VM). This allows that different users can share the provider’s resources while being also isolated among them. Resource sharing is a key technique for provider’s profitability.

The cost of renting a public cloud mainly involve renting fee, according to the instance type we used. Even the public cloud provider provides the whole cloud infrastructure, user still need to operate and manage the platform, so human salary should also be taken into account. Using a private cloud will bring much more cost considering, from buying the hardware, to operating the machine, such as power cost, cooling cost and human salary, all aspects need to discuss clearly.

Obviously, hosting private cloud or renting public cloud has different advantages. It is a new issue for IT department of enterprise. An economic model can help CIO (Chief of Information Officer) to make right decision. More and more researches (Walker, Brisken, & Romney, 2010), (Tak, Uurgaonkar, & Sivasubramainam, 2011) have been presented for various cloud resources. The aim of (Walker, Brisken, and Romney, 2010) was to evaluate the profitability of storage resource, while (Tak, Uurgaonkar, & Sivasubramainam, 2011) was to evaluate overall platform including various cost.

In the paper we refer (Walker, Brisken, & Romney, 2010), (Tak, Uurgaonkar, & Sivasubramainam, 2011) and adopt Net Present Value (NPV) in Finance field to propose a cost model for evaluating the tradeoff between building a self-own computing platform and renting one from public provider. The derived cost evaluation formulas are based on some cost factor, such as human salary, platform purchasing cost, energy consuming, maintenance fee, and cooling cost, for evaluating required cost on building and operating of both public and private clouds. Based on the cost model, we applied a well-known public cloud instance, e.g. Chunghwa Telecom’s HiCloud platform, to compute renting cost, and make a comparison with the derived cost of private cloud for a va-
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