Elastic Property of Cloud Computing

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Abstract: *Suppose we have big ideas to streamline our business and drive sales in top level. In such cases business applications are required. Business structure is a world of complexion which require data center, office, space, power, cooling, networks, servers and storage. A complicated software stack and achieved experts install, configure and run. We need development, testing, staging, production and failover environments. When new version of software come out, we can upgrade but that might bring the whole system down. Also, the small businesses don't have a chance. Cloud computing is a better way to run business. Instead of running our application by ourself, we can run in a shared datasets. It do not require server and storage. It do not require a technical team to keep it up and running. Also it do not require any upgrade. For the applications running in cloud, just log in and customize the cloud platform to start using it.*

Keywords: pay-as-you-go, elastic, Opex, deployment

1. Introduction

The term "computing" means storing the program and data into the disk space of the computer and then accessing program data disk space.The cloud computing means storing the program and data over the internet and accessing the program data from internet, instead of using disk space for storage and access. The term "cloud" is a metaphor for internet.

The term "cloud" focusses on maximizing the effectiveness of the shared resources. The cloud resources are not only shared by the multiple users but also re-allocated per demand.For example, the cloud computer facilities that serves the european users during european business time with application (e.g. email) can also re-allocate the same resources for the North American users during north american business time with different application (e.g. server).

Cloud computing can be thought of as a network computing approach, where an application runs on a server or a group of servers owned by a provider, rather than on your own computer. This provider rents you out computational resources, storage, bandwidth and the power to run the servers according to your own needs. Being on the cloud adds a number of technical and technological advantages that are making the cloud industry grow incredibly faster nowadays. Cloud usually grants a decrease in total costs, allows virtually unlimited scalability of your infrastructure, and much more. There are many different models of cloud computing, and many different approaches to deploy your application on the cloud, each with it's own pros and cons. We'll see them in detail later.

2. Literature Survey

Cloud computing has been cited as _the fifth utility' (along with water, electricity, gas, and telephone) whereby computing services are readily available on demand, like other utility services available in today's society [Buyya, Yeo, Venugopal, Broberg, and Brandic, 2009]. This vision is not essentially new. Dating back to 1961, John McCarthy,

retired Stanford professor and Turing Award winner, in his speech at MIT's Centennial, predicted that in the future computing would become a _public utility' [Wheeler and Waggener, 2009]. In 1969, Leonard Kleinrock, one of the chief scientists of the original Advanced Research Projects Agency Network (ARPANET) project which seeded the Internet, said: _As of now, computer networks are still in their infancy, but as they grow up and become sophisticated, we will probably see the spread of ―computerutilities" which, like present electric and telephone utilities, will serve individual homes and offices across the country' [Kleinrock, 2005, p. 4]. It could be argued that cloud computing has begun to fulfil this vision of computing on demand. The first step of studying research into cloud computing is to clarify the concept. Attempts to define cloud computing have come from different perspectives within practice and academia (as listed in Table 1). Among the various definitions, the one by the NIST (National Institute of Standards and Technology) has gained recent recognition and popularity. For the purpose of this study, the NIST definition of cloud computing is adopted to facilitate the following discussions. The NIST further suggests that a cloud computing model should be composed of five essential characteristics, three service levels, and four deployment models [Mell and Grance, 2009] – private cloud, public cloud, hybrid cloud and community cloud. Ideally, a cloud should have all of the five following characteristics:

1. On-demand self-service. A consumer can unilaterally provision computing capabilities, such as server time & network storage, as needed automatically without requiring human interaction with each service's provider.

2. Broad network access. Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g. mobile phones, laptops, and PDAs).

3. Resource pooling. The provider's computing resources are pooled to serve multiple consumers using a multitenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer

demand. Examples of resources include storage, processing, memory, network bandwidth, and virtual machines.

4. Rapid elasticity. Capabilities can be _elastically' provisioned and released, in some cases automatically, to quickly scale in and scale out.

5. Measured Service. Cloud systems automatically control and optimise resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g. storage, processing, bandwidth, and active user accounts) [Mell and Grance, 2009].

Depending on the relationship between the provider and the consumer, a cloud can be classified as:-

• **Public cloud**: The cloud infrastructure is said to be public cloud if the service is provided over the cloud which is open to the users either free or by pay-as-you-go approach.

• **Private cloud**: Private cloud are operated for a single organization either internally or by third party.

• **Hybrid cloud:** Hybrid cloud is a combination of two or more types of clouds (private, community, or public). For example, an organisation may bridge its internally operated private cloud with other public clouds together by standardised or proprietary technology in order to satisfy business needs [Mell and Grance, 2009].

• **Community cloud:** Community cloud is shared by several organisations and supports a specific community that has shared concerns (e.g. mission, security requirements, policy, and compliance considerations). It may be managed by the organisations or a third party and may exist on premise or off premise.
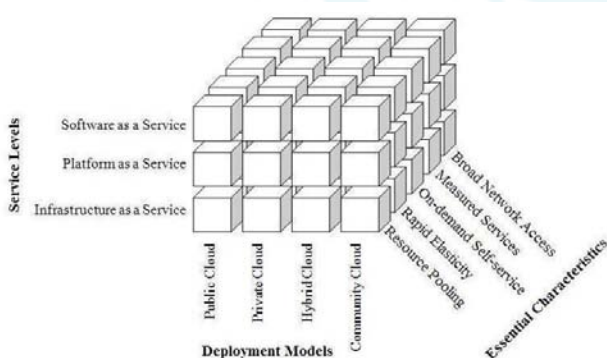

Figure 1: cloud computing anatomy [adopted by craig-wood, 2012]

Besides deployment models, cloud computing also offers services. These services are:

• **Software as a service (SaaS)**: In SaaS model, the user gain access to the application and the database. The cloud providers install and operate the software in the cloud and user access that software from cloud client. For example, salesforce.com which provides users with complete CRM applications as well as a user side customisation platform based on its PaaS by-product Force.com.

• **Platform as a a service (PaaS)**: In PaaS model, the cloud provider deliver computing platform, typically the operating system, programming language execution environment, database and web server. Application developer can develop and run their software solutions on the cloud platform without the cost and complexity of buying and managing the underlying hardware layers and the software layers to run software. Examples of PaaS are Google App Engine (that provided the platform for developing and hosting web applications in google managed data centres), Microsoft Azure (that for developing, deploying and managing applications through a global network of microsoft), Force.com (that allows to build and customize the applications that integrate into salesforce.com applications).

• **Infrastructure as a service (IaaS)**: IaaS is the lowest layer services among the service models in cloud computing. IaaS model offers virtualized computer resources over the internet. In this, a third party provider hosts hardware, software, server, storage and other infrastructure components on behalf of its user. Most prominent example is the Microsoft Azure (that constitutes IaaS offering from microsoft for their public cloud. Virtual machine allows the developer to migrate infrastructure and applications without chainging the code).

3. Problem Definition

A group of people running a business organization generally incures Capex (Capital Expenditure). In this, money is spend to acquire or upgrade physical assets such as equipements, property or industrial buildings. Although they can be capitalized, they need to be amortized over time. And the problem with computing assets is that their values can be depreciated rather quickly.
Therefore, it's very easy to overprovision and burn a lot of money, or under provision, and need to make a new investment later on especially for a start up whose growth outlook can only be roughly estimated.
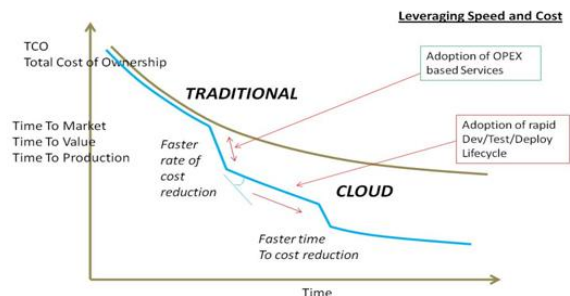
4. Pay-as-you-go Approach

Figure 2: traditional vs cloud computing approach

In cloud computing, the Opex (open expenditure) is generally incurred by the business or organization. Hence cloud computing moves our expenditure from Capex to Opex i.e. from capital to operational. It is so because you pay exactly what you need. Most if not all the providers in the cloud world has pay per use or pay-as-you-go plans. This

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provides a large number of advantages to companies reduction of up front costs, ease in pulling back from the investment if the project fails, predictability of a budget for the long term, and possibility of scaling the investment up or down and, of course, focusing on projects that differentiate their businesses instead of their infrastructure.

Also, cloud computing is having the elastic property that the resources can be allocated or deallocated according to the requirements of the users in organization quickly.

Consider an example that with power grids, you don't build a power plant to power your appliances. You buy the power from your energy provider for the time you need it and you pay exactly for the power you absorb from the network. So in the same way you probably don't need to build your own data center. Instead, you want to rent a virtual one and use it elastically just like a utility.

5. Result and Discussion

In cloud computing, the pay-as-you-go and elasticity have played an important role. Through these techniques, cloud computing allows organization to save money upto 80 %.

With this saving, there is a continuous need to maintain and even enhance IT infrastructure.
The e-commerce draws benefits from cloud computing in a way that clients and customer uses the hardware, software, web server, database and other resources. The e-commerce even allows the people to purchase the service products or service about anywhere in any time.

6. Conclusion

Cloud computing is used by many the large companies as well as small companies. Otherwise, the small companies would have no chance of increasing it's mainstream and drive sales. In 2002, the AWS (Amazon Web Service) was founded. In 2006, the EC2 (Elastic Cloud Compute) was founded. Later on, the Google App Engine and Microsoft Azure was founded. And in this way, the cloud computing has been reached to many organization. In future also, many platform of cloud computing can be developed as technologies are developed and expanded.With the growing demands of space to store data, cloud computing has played an important role as it is cost effective.

7. Future of Cloud Computing

There is a wealth of chatter and hype around the cloud right now, especially as more startups continue to go public. Separating the hype and fleeting trends from the reality is often difficult. That said, here are my top five cloud predictions for the coming years:

Figure 3: future of cloud computing

1. More application availability on the cloud. With most new software being built for cloud from the outset, it is predicted that by 2016 over a quarter of all applications (around 48 million) will be available on the cloud (Global Technology Outlook: Cloud 2014: A More Disruptive Phase).

2. Increased growth in the market for cloud. According to Gartner, the cloud is here, and it is accelerating globally. Based on their forecast for 2011-2017, Gartner expects adoption to hit $250 billion by 2017. In the fourth quarter of 2013, we saw this prediction supported by enterprises worldwide—enterprises that were increasingly relying on cloud to develop, market and sell products, manage supply chains and more.

3. More hybrid cloud adoption. Gartner proposes that 50 percent of enterprises will have hybrid clouds by 2017. As we see more and more companies adopt cloud, we see CIOs crafting well-thought-out strategies that include cloud. However, pure cloud implementations are the exception and not the rule. And this is to be expected.

4. Increased development for the cloud. More development is going to go to the cloud. According to Evans Data Corporation, there are more than 18 million software developers worldwide yet less than 25 percent are developing for the cloud today. We can expect that as cloud continues to be adopted, more developers will develop for the cloud—especially when you consider that 85 percent of the new software being built today is for cloud according

5. More innovation because of cloud. Increased competition in the cloud space will give way to better products, services and innovation.

References

[1] What is cloud Computing ? (2009, Feb 25) Retrieved March 30, 2016 from https://www.youtube.com/watch?v=ae_DKNwK_ms

[2] What is Cloud Computing? (2015, APRIL 18) Retrieved from http://in.pcmag.com/networking-communications-software/38970/feature/what-is-cloud-computing

[3] Introduction to Cloud Computing (n.d.) Retrieved from https://cloudacademy.com/cloud-computing/introduction-to-cloud-computing-course/

[4] Yang, H. and Tate, M. (2012) "A Descriptive Literature Review and Classification of Cloud Computing Research, " Communications of the Association for Information Systems 31(2), pp. 36-38.

[5] Cloud Deployment Models: Public, Private, and Hybrid Clouds (n.d.) Retrieved from https://cloudacademy.com/cloud-computing/introduction-to-cloud-computing-course/public-private-hybrid-cloud-models.html

[6] Cloud Computing (2016, 31 March) Retrieved from https://en.wikipedia.org/wiki/Cloud_computing#Software_as_a_service_.28SaaS.29

[7] Cloud Computing (2016, 31 March) Retrieved from https://en.wikipedia.org/wiki/Cloud_computing#Platform_as_a_service_.28PaaS.29

[8] Google App Engine (2016, 15 March) Retrieved from https://en.wikipedia.org/wiki/Google_App_ Engine

[9] Infinite Microsoft Azure Development Service Offering (n.d.) Retrieved from http://www.infinite-ind.com/Services/AzureCloudServices

[10] Cloud Computing (2016, 31 March) Retrieved from https://en.wikipedia.org/wiki/Cloud_computing#Infrastructure_as_a_service_.28IaaS.29

[11] Microsoft Azure (2016, 6 April) Retrieved from https://en.wikipedia.org/wiki/Microsoft_Azure#Biztalk_services

[12] Economical advantages of Cloud Computing (n.d.) Retrieved from https://cloudacademy.com/cloud-computing/introduction-to-cloud-computing-course/economical-advantages-of-cloud-computing.html

[13] Aydin, N. (2015, March/April) "Cloud Computing for E-Commerce, " IOSR Journal of Mobile Computing & Application (IOSR-JMCA) 2(1), p. 30.

[14] The future of cloud computing: 5 predictions (2014, May 22) Retrieved March 31, 2016 from http://www.thoughtsoncloud.com/2014/05/future-cloud-computing-5-predictions/

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