

Technical Enablers for Cloud Computing Successful Adoption

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Abstract :

The fast growth and development of the IT infrastructure in addition to the increase usage of the Internet globally has remarkably improved the capability to adopt cloud computing services. Using the cloud, it is easier, 24/7 accessible and better way to perform services than through traditional ways. Moreover, speed and simple access as well as lower costs for both clients and providers has also contributed in the growth of cloud computing. However, even with this growth, many have several concerns with cloud computing such as security. This research explores technical enablers for cloud computing adoption that can contribute to analyze organization's existing or future cloud initiative.

Keywords-component; *Technical enablers; cloud computing; Capacity; Virtualization*

I. INTRODUCTION

The fast growth and development of the IT infrastructure in addition to the increase usage of the Internet globally has remarkably improved the capability to adopt the cloud service. According to [1], cloud service providers propose many choices of services and applications to individuals, public and private sectors, for instance, information storing and sharing, instate usage of different software, database mining and management.

Cloud computing can be defined as "A standardized IT capability (services, software or infrastructure) delivered via Internet technologies in a pay-per-use, self-service way" [2]. In [3], Gupta stated that cloud computing services are easier, cheaper and better way to perform services than through traditional ways. Moreover, speed and simple access as well as lower costs for both clients and providers. In addition to pay for what you use model made growth and variety of offered services and develop the ability to integrate.

The concept of cloud computing and its growing popularity have gained many different businesses new opportunities and advantages. There are different types of cloud computing services. For example, there are Software as a service (SaaS), Infrastructure as a service (FaaS), Platform as a service (PaaS), Hardware as a Service (HaaS), and Data as a Service (DaaS) [4].

This concept offers a lot of services throughout the internet such as data storage, software, hardware and infrastructure. In addition, with cloud, there is no need for installing and running the application or software on the client's computer. Companies that offer cloud service provide their applications and services using Internet that are accessible anytime anywhere using desktop, tablets and mobile apps.

According to Allied Market Research Report that been published in July 2014, the cloud services in the world market is expected to expand and reaching a market size of 555 billion Dollars in 2020. Furthermore, in 2014, the revenue of the global cloud services market will reach 209.9 billion Dollars [5].

However, even with this growth, many have several concerns with cloud computing. For example, unknown data storage location, loss control of the infrastructure and platform, integrity and availability of information, performance and future existence of the services provider company, maintain confidentiality and level of security at the service provider from attacks and vulnerabilities.

II. TECHNICAL ENABLERS FOR CLOUD COMPUTING

Studying literature review is performed by searching the academic publications and real cases form information technology, scientific computing and new technology adoption research fields. Our study suggests that these enablers influence the decision to adopt a cloud computing in an organization:

A. *Virtualization*

Virtualization [6] has enabled the abstraction of computing resources such that a single physical machine is able to function as a set of multiple logical Virtual Machines. Virtual Machines provide the ability to host multiple operating system environments which are completely isolated from one another on the same physical machine. Also, it offers the capability to configure Virtual Machines to utilize different partitions of resources on the same physical machine. Virtualization enables workloads to move between on-premises software and the cloud.

B. *Capacity*

It is referred to volume of work or data processing capacity that the cloud system can handle. It includes computing and storage capability. Many enterprises move to cloud computing without a clear and detailed capacity management strategy because cloud platform is seen as infinitely elastic, where capacity can be purchased as and when needed. But, there will always be limits to that elasticity though. Also, buying resources on the cloud instantly can be expensive and enterprises can relax that cost by planning for capacity in advance and avoiding over- or under-provisioning [7].

When IT executives upload smaller and familiar applications and workloads on to the cloud, they are aware of the capacity and manage it based on their expertise and experience.

C. *Interoperability*

It is referred to the ability of supporting heterogeneous cloud configurations. It includes applications to utilize multiple distributed heterogeneous resources. Cloud computing facilitates scalability and virtualized resources over internet as a service providing cost effective and scalable solution to customers. Cloud computing has evolved as a disruptive technology and picked up speed in 2008 and 2009 with the presence of many vendors in

cloud computing space. With the presence of numerous vendors, the need is emerging for interoperability between clouds so that a complex and developed business application on clouds is interoperable [8].

D. Compatibility

It is universally acknowledged today that cloud computing works out to be the most cost efficient option for companies. However, the problem arises out of the fact that the company would have to replace much of its existing IT infrastructures in order to make the system compatible on the cloud.

Compatibility is another key that restrains large organizations from embracing cloud technology. When existing IT infrastructure may not be compatible with cloud technology or too complex to restructure, hybrid clouds might be the answer to data deployment. A third party provider will handle transition and reduce dramatically time and costs with personnel and technology for your business. One simple solution for this problem is to use the hybrid cloud, which is capable of addressing most of these compatibility issues [9].

E. Fault Tolerance

Since cloud computing environments are extremely heterogeneous and dynamic, with resources joining and leaving the cloud all the time, more faults are likely to occur in cloud environments. Also, the likelihood of errors occurrence is exacerbated by the fact that many cloud applications will perform long tasks that may require several days of computation. This will lead to a number of new conceptual and technical challenges to fault-tolerance researchers. The most important one is the scheduling of user jobs to cloud resources with meeting the user's Quality of Service (QoS) in existence of resource faults.

F. Security

Cloud computing infrastructure is a promising new technology and greatly accelerates the development of large scale data storage, processing and distribution. Private data of data owners are now placed on public clouds which are out of their trusted domains in cloud computing. Data owners do not have direct control over their sensitive data and are increasingly worrying about possible data loss and/or illegal use of their private data. Usually, cloud servers are considered as curious and untrusted entities. Data owners will hesitate to adopt cloud technologies if there are risks of data exposure to a third party or even the cloud service provider itself. Therefore, providing sufficient security protections on sensitive data is extremely important, especially for those applications dealing with health, financial and government data. To prevent information disclosure, the mainstream solution is to encrypt private data before uploading it onto the cloud server [10].

G. Trialability

Trialability is one of the most important components in the process of adopting a new technology. It represents a characteristic of cloud computing services and its potential has not been fully recognised as a determinant of adoption of cloud services.

“Trialability is defined as the degree to which an innovation may be experimented with on a limited basis” [1]. It refers to the ability to try or experiment with the performance of cloud computing services on a limited basis, with the benefits of characteristics of on demand, pay-per-use and try-before-you-buy. Trialability acts as a proxy to behavioural intent, or adoption.

H. Resiliency

Putting your IT assets into the cloud transforms a traditional server infrastructure into a dynamic environment that enables better utilisation of hardware and more flexible management of computing demand. However, a cloud environment is only as good as the resiliency built into the system. Whether you’re looking to set up your own private cloud or employ the services of one of the many external cloud providers, it is essential that the cloud infrastructure is built and delivered with availability at its core if you are to stay in control of your critical systems [11].

I. Complexity

The cloud’s complexity is a source of concern for some clients’ employees, which can result in resistance to its adoption. Although training is of course one way to mitigate this concern, providers must also work to build systems that are intuitive to use[12].

III. CONCLUSION

This research explored technical enablers for cloud computing adoption that can contribute to analyze organization’s existing or future cloud initiative.

Moreover, the research helps to deliver a better understanding of how these enablers impact on adoption cloud computing and in turn guide decision maker in organizations to a more knowledgeable decision regarding adoption of cloud computing. This research was exploratory, therefore, more work must be done carefully examine the implementation on the cloud computing and its technical enablers in order to achieve a better understanding on cloud computing adoption.

The researcher wants to perform several case studies on both cloud service providers and their clients. Using face-to-face interviews with senior decision makers in companies that provide the cloud services as well as interviewing their clients, the researcher hopes to identify the technical enablers for cloud computing adoption. This method will help the researcher to validate these technical enablers for better implementation of cloud computing.

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