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Private Cloud for College: Architecture and Possibility

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Abstract - The modern technology finally merged with each other, where cloud computing with mobile computing, and mobile computing with data analysis tools that Capable of instant analysis of large amounts of data at the real time, can blend to form PCC (Private cloud for college), for resource aggregation and processing capabilities and data access in easy secret way by the private cloud. Cloud Computing is a technology that depends on the transfer of processing and space for computer storage to the so-called cloud, a server device is accessed via the Internet, and this information technology products programs turn into services. In this paper I also purpose the architecture of PCC and additional possibilities it may use.

Keywords – *PCC, Private Cloud, Cloud Computing, Virtualization, Multitenancy, VMM.*

1. Introduction

Cloud computing is being acclaimed as the penultimate solution to the problems of uncertain traffic spikes, computing overloads, and potentially expensive investments in hardware for data processing and backups [1].

Cloud computing is receiving keen interest and is being widely adopted. It offers clients applications, data, computing resources, and information technology (IT) management functions as a service through the Internet or a dedicated network. Several converging and complementary factors have led to cloud computing's emergence as a popular IT service-delivery model that appeals to all stakeholders. Considered as paradigm change in IT, it is being adopted for a variety of applications – personal, academic, business, government, and more – not only for cost savings and expediency but also to meet strategic IT and business goals. It is transforming every sector of society and is having a profound impact, especially on the IT industry and on IT professionals – application developers, enterprise IT administrators, and IT executives. Driven by advances in cloud technology, the proliferation of mobile devices such as smartphones and tablets, and use of a variety of applications supported by ubiquitous broadband Internet access, the computing landscape is continuing to change. There is an accompanying paradigm shift in the way we deliver and use IT. Cloud computing is a radical new IT delivery and business model. Users can use cloud services when and where they need them and in the quantity that they need, and pay for only the resources they use. It also offers huge computing power, on-demand scalability, and utility-like availability at low cost. [2].

Cloud computing has become popular. It provides resources to consumers in the form of different services, such as software, infrastructure, platforms, and security. The services are made available to users on demand via the Internet from a cloud computing provider's servers, as opposed to being provided from a company's own on-premises servers. Cloud services are designed to provide easy, scalable access to applications, resources and services, and are managed by cloud service providers. A cloud service can be dynamically scaled to meet the needs of its users. Examples of cloud services include online data storage and backup solutions, Web-based e-mail services, hosted office suites and document collaboration services, database processing, managed technical support services, and more.[2]

Cloud computing services are divided into three classes, according to the abstraction level of the capability provided and the service model of providers, namely: (1) Infrastructure as a Service, (2) Platform as a Service, and (3) Software as a Service.

Although cloud computing has emerged mainly from the appearance of public computing utilities, other deployment models, with variations in physical location and distribution, have been adopted. In this sense, regardless of its service class, a cloud can be classified as public, private, community, or hybrid [3]

2. Private cloud characteristics

The U.S. National Institute of Standards and Technology (NIST) has made efforts to provide a unified way to define cloud computing and its main functionality. Despite its complexity and heterogeneous nature, NIST has identified five essential characteristics that represent a cloud computing platform:

• On-demand self-service: Cloud computing vendors Offer provision of cloud resources on demand whenever they are required by adopters.
On-demand self-service resource sourcing is considered a crucial feature of the cloud computing paradigm, as it allows users to scale the required infrastructure up to a substantial level without disrupting the host operations.
• Broad network access: Cloud computing resources can be accessed and provisioned through basic network connection and for multiple device types.
• Resource pooling: Resources are pooled for more efficient and effective use. Through multitenancy and virtualization techniques, multiple users may be served by the same physical hardware.
• Rapid elasticity: Cloud computing resources are elastic, to the extent that they can be "sized" and "re-sized" as needed, in real time. Resource allocation can be adjusted as a customer requires more (or less) servers or storage. At Its core, cloud elasticity entails continual reconfiguration in network and related controls from the cloud Internet. NIST Distinguishes two types of scaling options: horizontal and vertical, which involve launching additional services and/or resources, and changing the computing capacity of assigned resources, respectively.
• Vertical scaling: Vertical scaling involves changing the computing capacity assigned to resources while keeping the number of physical machines constant. [4]

Other characteristics that distinguish the cloud computing environment from standard on premises computing environments are the virtualization of resources and multitenancy. Multitenancy is the key common attributing of both public and private clouds and it applies to all three layers of a cloud. It refers to the ability of serving multiple tenants from the same infrastructure and software application. In a way, multitenancy is a byproduct of virtualization. Virtualization enables the creation of virtual machines, software applications, and instruments that serve multiple tenants at the same time, rendered from the same physical infrastructure. [3]

3. Forming a Trinity

The Virtual Machine Manager (VMM) elements that let you define the fabric of the private cloud, and the VMM infrastructure enable you to shield users from the mechanics of deploying resources for their use. The process of forming the private clouds with VMM is reserved for users who have either Administrator or Delegated Administrator role access.

VMM helps you organize your networks for the private cloud into easy-to-grasp concepts. Although you should not need to add all your networking equipment to VMM or fully configure our entire network from VMM, doing so is certainly a very good start and network functionality in VMM will be expanded in the future. Networking is so well integrated into VMM that deploying virtualization hosts, virtual machines, and other services (including the applications that run on top of them) is easy.[8]

Forming a trio of the multitenancy and virtualization and VMM technologies, can hence to build PCC architecture.

I suggest the possible architecture of PCC in the Figure 1. The end users interacting with server or OS or Cloud Docs by their interfaces, so that everyone have functionality to do deferent tasks. The virtual machine manager is responsible for control the servers and its services. Examples of services delivered through the private cloud include database on demand, e-mail on demand, and storage on demand.

A key motivation for opting for a private cloud is security. A private cloud infrastructure offers tighter controls over the geographic location of data storage and other aspects of security. Other benefits include easy resource sharing and rapid deployment to organizational entities. [6]

The private Cloud services offer greater control over the infrastructure, improving security and service resilience because its access is restricted to one or few organizations. Such private deployment poses an inherent limitation to end user applications i.e. inability to scale elastically on demand as can be done using pubic Cloud services. An organization can buy more machines according to expanding needs of its users, but this cannot be done as fast and seamlessly as with public Clouds. [9]

A private cloud (Figure 1) is owned by an organization or college, located on the premises, and offers a collection of IT resources to various departments or parts of the

organization. It centralizes IT resources within a usually large organization so that its various parts experience all the advantages of cloud computing: elasticity, on-demand self-service, and scaling. The organization is at the same time a cloud provider and a cloud consumer.

Being a cloud provider, the organization assumes all the costs of capability planning for the IT resources, the burden of resource administration, and reliability and security assurances. This Increases the level of control and security of organization assets as they can determine and enforce their own security policies and mechanisms.[5]

Private clouds are virtual distributed systems that rely on a private infrastructure and provide internal users with dynamic provisioning of computing resources. Differently from public clouds, instead of a pay-as-you-go model, there could be other schemes in place, which take into account the usage of the cloud and proportionally bill the different departments or sections of the enterprise. [7]

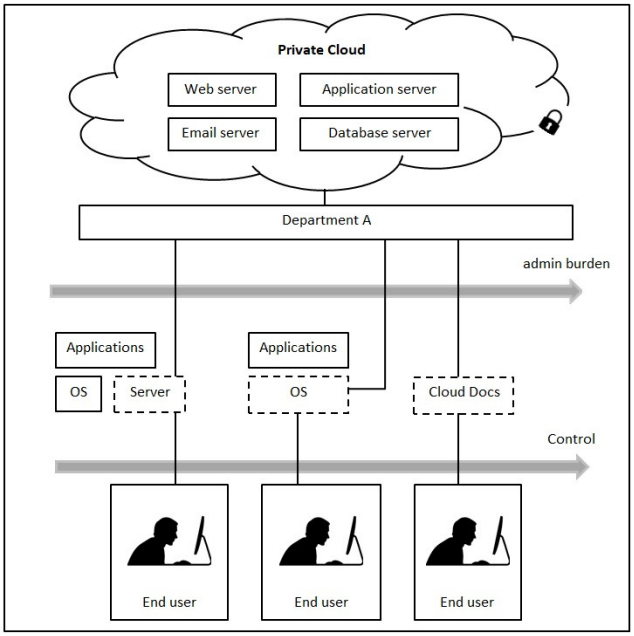

Fig 1 PCC Architecture

4. Possibility

Private cloud service offers a number of advantages that make it a more viable cloud solution instead of a public cloud service option.

1- Greater control - Due to the fact that the hardware is on-site, organizations have more control over their data. The organization is in charge of monitoring and maintaining the data giving them complete oversight of their data. Example when the end user form department A adds a scientific problem to be solves the end users from the same department or another department can view this problem and support to solve it.

2- More security – Because private cloud services are dedicated to a single organization, the hardware, data storage, and network can be designed to assure high levels of security that cannot be accessed by other clients in the same data center. To be clear, this is not said that public cloud service is not secure. It's just that certain companies will feel the data is more secure by having it reside in-house. Another reason that a private cloud would be desirable has to do with country regulatory issues. In certain countries, the data center hosting a public cloud service must reside within the local country where its users reside as well. When there is no public cloud option that can be provided from the local country, a private cloud is the only option that can be used.

3- Higher performance - The private cloud is deployed inside the firewall on an organization's intranet, meaning that transfer rates are dramatically increased versus using the Internet. In addition, there's no worry of slow page access times that may happen with using a public cloud service.

4- Customizable – Hardware performance, network performance, and storage performance can be specified and customized in the private cloud since it's owned by the company.

5. Conclusion

Usability of private cloud of college ensures the provision of several scientific requirements to processing problems in very short time, and provides the security to keep the resources and data that owned by the college in secret place.

The availability of PCC in colleges involve statistical list of the numbers of end users that used the information technologies and scientific research to get the knowledge in deferent departments, and also the private cloud Provides possibilities does not exist in the others cloud and therefore the user always on touch with PCC.

References

[1] JOHN R. VACCA, Cloud Computing Security Foundations and Challenges, Boca Raton : CRC Press, 2017.

[2] San M., IRENA B., Encyclopedia of cloud computing, John Wiley & Sons, 2016.

[3] P. Mell and T. Grance, The NIST Definition of Cloud Computing, National Institute of Standards and Technology, Information Technology Laboratory, Technical Report Version 15, 2009.

[4] Knight, F. H. Risk, uncertainty and profit. Courier Corporation, 2012.

[5] Zhang, Y., Juels, A., Oprea, A., and Reiter, M. K. Homealone: Co-residency detection in the cloud Via side-channel analysis. 2011 IEEE Symposium on Security and Privacy (SP), IEEE, 2011.

[6] International Telecommunication Union, Cloud Computing Overview and Vocabulary. ITU-T Y.3500. International Telecommunication Union, 2014.

[7] M. Armbrust, A. Fox, R. Griffith, A.D. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoika, and M. Zaharia, Above the clouds: A Berkeley view of cloud computing, Technical Report, UC Berkeley Reliable Adaptive Distributed Systems Laboratory, February 2009.

[8] Aidan Finn,Hans Vredevoort,Patrick Lownds, Damian Flynn: Microsoft ® Private Cloud Computing, John Wiley & Sons, Inc., 2012.

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