



Analysis of Cloud Computing in Higher Education

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Abstract: *Cloud computing, or in simpler shorthand just "the cloud", also focuses on maximize the effectiveness of the shared resources. As technologies like virtualization and cloud computing assume important places within the IT background, higher education leaders will need to consider which institutional services they wish to go away to consumer choice, which ones they desire to source and administer "somewhere else" and which services they should operate centrally or locally on campus. One significant option is the development of mutual service offerings among colleges and universities. In the present situation, many academia's are facing the problems with the growing need of IT and infrastructure. Cloud computing which is raising technology and which relies on existing technology such as Internet, virtualization, grid computing etc. can be a result to such evils by providing required infrastructure, software and storage. In this paper a basic research has been carried out to show how cloud computing can be introduced in Higher academia to improve teaching, agility and have a cost-effective infrastructure which can bring a revolution in the field of education. It also tries to bear out its benefits and limitations.*

Keywords: *Cloud computing, Characteristics of Cloud computing, Models of Cloud computing, Distance learning, Higher education.*

I. INTRODUCTION

Higher education view around the world is in a constant state of change and evolution, mainly as a effect of important challenges arising from efforts in adopting original and rising technologies. This is mainly as a result of a new kind of students with learning needs vastly different from their predecessors, and it is increasingly recognized that using technology successfully in higher education is essential to given that high excellence education and preparing students for the challenges of the 21st century. Even though the new technologies have the likely to play an important role in the development and emergence of education system, where control can shift from the teacher to an increasingly more autonomous learner, and to rescue the Higher education from this appalling state, the change is very slow or not approaching at all for various reasons. Cloud Computing is an modern technology that is transform the way we do computing. The key idea of cloud computing is that you don't purchase the hardware, or even the software, you need any longer, rather you rent some computational power, storage, databases, and any other source you need by a giver according to a pay-as-you-go model, building our investment smaller and oriented to operations rather than to assets success. But there is much more than that, of course, and there are many different ways how this move toward can be put in action. In these beginning lessons, you will get a very wide and general overview of Cloud Computing, with a provider-agnostic point of sight, to really understand and what is cloud, how it was born, and how you can get advantage of it these days. You will learn which the many service and deployment models available are, and what are the technical and economical reasons why Cloud Computing can sometimes be a better choice than the traditional way of doing computing. In the current years, where educational institutes, universities, industries are giving their full input in transforming the society and entire world economy. a range of researches are carried out to update the present IT infrastructure specially in the area of higher education. Cloud computing can be a welcomed optioned in the universities and educational institutes for higher studies. It gives a better alternative and plasticity to the IT departments by building multipurpose computational infrastructure once and then uses it for several purposes for several times. Amazon, Google have already started providing their facilities for large business group. With the help of cloud computing the platform and application the user uses can be on-campus or off-campus or combination of both depending on the institutions need. Due to the evolution of cloud computing number of services have migrated from the traditional system to the online form[1].

At present, as many universities are trying to update their IT infrastructure and data, but they are facing few challenges which can be solved by cloud computing. The challenges are:

- 1) **Accomplish economy of scale** – raise volume output or productivity with less people. Your cost per unit, project or artifact plummet.
- 2) **Decrease spending on technology infrastructure.** Maintain easy access to your information with minimal upfront spending. Pay as you go (weekly, quarterly or yearly), based on demand.

- 3) **Globalize your workforce on the cheap.** People worldwide can access the cloud, provided they have an Internet connection.
- 4) **Streamline processes.** Get more work done in less time with less people.
- 5) **Decrease capital costs.** There's no need to spend big money on hardware, software or licensing fees.
- 6) **Enhance accessibility.** You have access anytime, anywhere, making your life so much easier.
- 7) **Monitor projects more effectively.** Stay within budget and ahead of completion cycle times.
- 8) **Less personnel training is needed.** It takes fewer people to do more work on a cloud, with a minimal learning curve on hardware and software issues.
- 9) **Minimize licensing new software.** Stretch and grow without the need to buy expensive software licenses or programs.
- 10) **Improve flexibility.** You can change direction without serious "people" or "financial" issues at stake[3].

II. SERVICES OF CLOUD

Cloud computing providers offer their services according to several fundamental models:

- 1) **Infrastructure as a Service (IaaS):** can be used to assure the infrastructure needs of the students, faculties or researcher globally or locally with some exact hardware configuration for a specific task.
- 2) **Platform as a Service (PaaS):** certain providers are opening up application platforms to permit customers to build their own application without the cost and complexity of buying and managing the underlying hardware and software layers.
- 3) **Software as a Service (SaaS):** the application service provider is hosting the application which runs and interacts through web browser, hosted desktop or remote client. It eliminates the need to install and run the application on customer own computer and simplifying maintenance and support.

Following figure shows the university using the services of cloud computing.

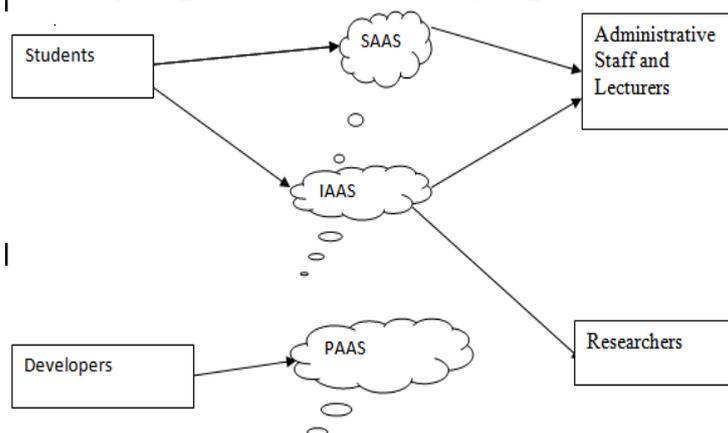


Fig. 1 academia using the services of cloud computing

III. CLOUD DESIGN FOR CAMPUS

Due to the higher ease of access, availability and effectiveness of cloud services lots of universities, businesses are trying to create use of these services. Now a day's cloud computing

Providers are presenting higher education, the opportunity to alternate their data and details in the 'cloud' for universities with existing data centers, servers and application replacing these conventional campus machines. Rising a cloud architecture for education can be separate according to the job and infrastructure of the organization and can be demanding. The universities has to follow all the rules and directive of the state and country for developing a cloud for education as many countries are very severe in cross broader transfer of information. Once the university establishes where their data will locate and gives the measure of data security an agreement called SLA (Service Level Agreement) can be made with the cloud

service provider. The SLA is a document which can ensure educational cloud users regarding the services provided by the cloud. It tries to identify the users need and simplifies difficult issues and creates a relationship between the client and the service provider. It helps to identify the privacy, consistency and integrity. Privatness is one of the significant factors which have to be taken care for cloud computing, as the service provider may require some personal information which is related to the data on what the user is trying to store in the cloud. So the universities should be very careful before disclosing the data and it should not lose the integrity of educational data. There are many solutions that can guarantee the Privatness and safety of sensitive data in the cloud. These are;

- 1) Read the user agreement to find out how your cloud service storage works.
- 2) Be serious about passwords.
- 3) Encrypt
- 4) Use an encrypted cloud service
- 5) Authorization identity management.

Following figure shows the cloud architecture for academia

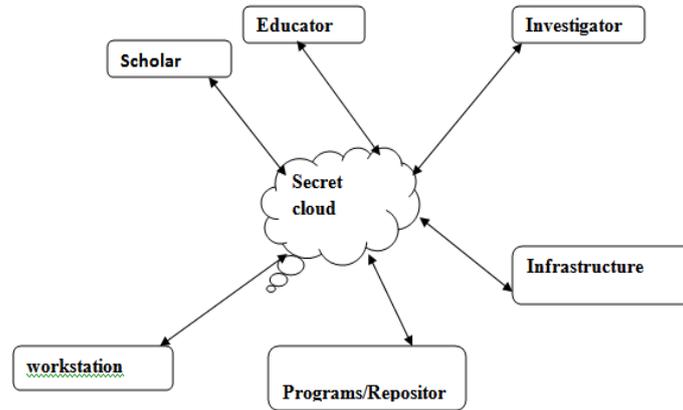


Fig. 2. (a) Private cloud design for academia

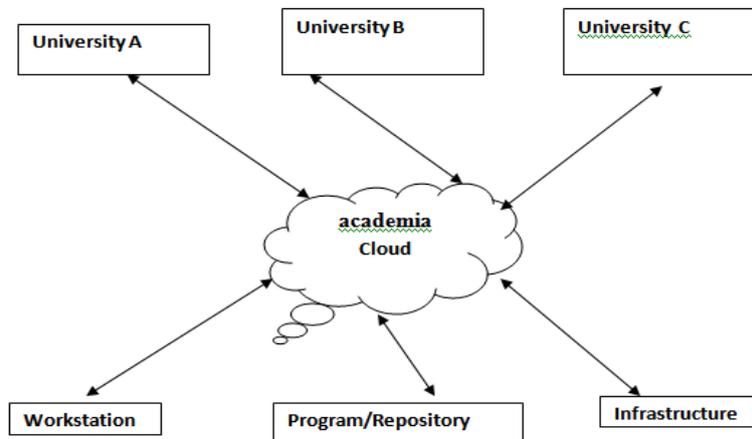


Fig. 2. (b) academia cloud architecture

Fig. 2. (a) and (b) shows the private and academia cloud architecture for education. Institutes can expand their individual cloud called as ‘private cloud’ by making use of their existing resources or multiple universities can come mutually and can develop a hybrid cloud called as ‘educational cloud’, in which they can distribute all the resources from the various universities. Private cloud makes use of the local network whereas the educational cloud makes use of public network to access the services provided by the cloud. Both private and educational cloud which is developed for education has to indicate the services provided by them.

Following table shows the differences between private and academia cloud.

Cloud characteristic	Private Cloud	Educational Cloud/Public Cloud
managed by	Single university	many universities
Access	restricted to employees and students of single University	By subscription
Control and customization	Yes (own university)	None control and Customization by Private Cloud

IV. ADVANTAGES AND DISADVANTAGES OF CLOUD COMPUTING

Advantages of Cloud Computing

Cost Savings

Perhaps, the most significant cloud computing benefit is in terms of IT cost savings. Businesses, no matter what their type or size, exist to earn money while keeping capital and operational expenses to a minimum. With cloud computing, you can save substantial capital costs with zero in-house server storage and application requirements. The lack of on-premises infrastructure also removes their associated operational costs in the form of power, air conditioning and administration costs. We pay for what is used and disengage whenever you like - there is no invested IT capital to worry about.

Reliability

With a managed service platform, cloud computing is much more reliable and consistent than in-house IT infrastructure. Most providers offer a Service Level Agreement which guarantees 24/7/365 and 99.99% availability. Our organization can benefit from a massive pool of redundant IT resources, as well as quick failover mechanism - if a server fails, hosted applications and services can easily be transited to any of the available servers.

Manageability

Cloud computing provides enhanced and simplified IT management and maintenance capabilities through central administration of resources, vendor managed infrastructure and SLA backed agreements. IT infrastructure updates and maintenance are eliminated, as all resources are maintained by the service provider. You enjoy a simple web-based user interface for accessing software, applications and services – without the need for installation - and an SLA ensures the timely and guaranteed delivery, management and maintenance of our IT services.

Strategic Edge:

Ever-increasing computing resources give you a competitive edge over competitors, as the time you require for IT procurement is virtually nil. our company can deploy mission critical applications that deliver significant business benefits, without any upfront costs and minimal provisioning time. Cloud computing allows you to forget about technology and focus on your key business activities and objectives. It can also help we to reduce the time needed to market newer applications and services.

Disadvantages of Cloud Computing

Downtime

As cloud service providers take care of a number of clients each day, they can become overwhelmed and may even come up against technical outages. This can lead to your business processes being temporarily suspended. Additionally, if your internet connection is offline, you will not be able to access any of your applications, server or data from the cloud.

Security

Although cloud service providers implement the best security standards and industry certifications, storing data and important files on external service providers always opens up risks. Using cloud-powered technologies means you need to provide your service provider with access to important business data. Meanwhile, being a public service opens up cloud service providers to security challenges on a routine basis. The ease in procuring and accessing cloud services can also give nefarious users the ability to scan, identify and exploit loopholes and vulnerabilities within a system. For instance, in a multi-tenant cloud architecture where multiple users are hosted on the same server, a hacker might try to break into the data of other users hosted and stored on the same server. However, such exploits and loopholes are not likely to surface, and the likelihood of a compromise is not great.

Vendor Lock-In

Although cloud service providers promise that the cloud will be flexible to use and integrate, switching cloud services is something that hasn't yet completely evolved. Organizations may find it difficult to migrate their services from one vendor to another. Hosting and integrating current cloud applications on another platform may throw up interoperability and support issues. For instance, applications developed on Microsoft Development Framework (.Net) might not work properly on the Linux platform.

Limited Control

Since the cloud infrastructure is entirely owned, managed and monitored by the service provider, it transfers minimal control over to the customer. The customer can only control and manage the applications, data and services operated on top of that, not the backend infrastructure itself. Key administrative tasks such as server shell access, updating and firmware management may not be passed to the customer or end user. It is easy to see how the advantages of cloud computing easily outweigh the drawbacks. Decreased costs, reduced downtime, and less management effort are benefits that speak for themselves.

V. CONCLUSION

Cloud computing is a promising computing model and next generation stage that can provide fabulous value of information of any size. The shift towards cloud university grounds would enable the universities and educational institutions to save money and take benefit of the developing technology. Besides, using cloud campus could be share and distribute the educational resources such as books, lecture notes, and other educational resources to any kind of devices and platforms. This means that, the students able to access to the cloud content by using computer tablet, Smartphone, computer notebook, etc.

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AUTHOR PROFILE



I (Prof. Y. S. Chouhan) have more than 20 Years of Experience in academics and administration. I have attended many conference and Seminar at National and International Level and published more than 25 Research Papers. I have also published a book on Computer Science.



Makhan Kumbhkar received my M. Phil(CS) from Devi Ahilya University, Indore, MP, India. I am working as Assistant .Professor in Christian Eminent College Indore, MP, India. i have attended many conferences and seminars at national and international level. I have published more than 3 papers in International Journal