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APPLICATIONS' OF CLOUD COMPUTING IN ACADEMIC INSTITUTIONS

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ABSTRACT: Cloud Computing is making it probable to split the method of building an infrastructure for service provisioning from the Institutions of providing end user services. Today, such infrastructures are usually provided in huge statistics centers and the applications are executed distantly from the users. For institutions, switching to cloud-based services afford them the capability to supply superior association and research abilities, while at the same time, providing a chance to slice IT outlay while providing the similar - or superior - levels of computing services. Magnified by the need to strip overhead outlay at a moment when public and private institutions are grappling with important budget shortfalls, Cloud Computing allows institutions to not just utilize the resources of commercial cloud providers - many of which are accessible to them either for free or at condensed costs. With the cloud model, students and faculty can take benefit of the skill to work and converse from anyplace and on any device using cloud-based applications. The benefits for superior education hub upon the scalability and the finances of Cloud Computing. These will be discussed in successive sections.

Keywords: Cloud Computing, Academic institutes, Scalability, Elasticity.

1. INTRODUCTION

Students in the 21st century have diverse and enormous learning requirements which no longer can be fulfilled with conventional teaching and learning methodologies [2] i.e. lecture-based, tutorial session, use of multimedia contents etc. Even with e-learning, information transmission from academics to students is still comparable to conventional teaching learning methodologies excluding course contents i.e. lecture notes, presentations and assignments are in digital outline via the Web. Newer technologies are budding which will assist modern teaching pedagogies, facilitate more efficient information transmit and support lifetime knowledge. It is now a fact that conventional methods are inadequate to address the requirements of institutions particularly academics and students [1]. The kind of skills students need to develop to be prepared for the industry these days is dissimilar from their forefathers. Institutions are emphasizing more on upper order knowledge experiences and outcomes which requires a considerable alteration in awareness and communication-based society [2]. It is necessary for institutions to adopt novel approach and technology that will well again train and equip students for existing and upcoming employment market requirements. In this paper, we will concentrate on the role of cloud computing technology to get better teaching and learning methodology.

The subject of Cloud Computing in Institutions is key to the victory and acceptance of Cloud Computing [3].

The major thought is to construct applications accessible on flexible implementation environments mainly situated in the Internet. Numerous flavors are well-known, and three significant ones are shown in the figure below.

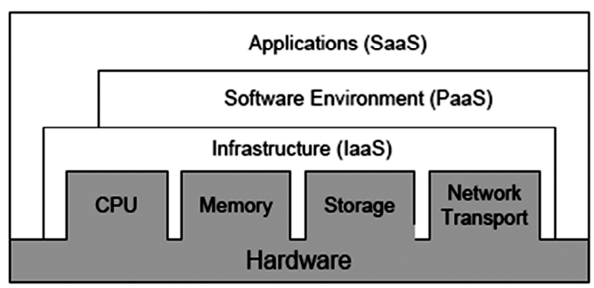

Figure 1: Outline of Cloud Computing

Infrastructure as a service refers to the sharing of hardware resources for executing services, normally by means of virtualization technology. With this so-called Infrastructure as a Service (IaaS) approach, potentially manifold users utilize existing resources. The resources can effortlessly be scaled up when demand increases, and are usually charged for on a per-pay-use basis [6]. In the Platform as a Service (PaaS) approach, the offer also includes a software implementation atmosphere, such as an application server. In the Software as a Service approach (SaaS), entire applications are hosted on the Internet so that e.g. your word processing software isn't installed locally

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on your PC any longer but runs on a server in the network and is accessed through a web browser.

2. CLOUD COMPUTING

If someone is a researcher running statistics or testing a model that is destined using exclusively the computing power obtainable on his campus computing system. For a main operation, that may signify waiting after other faculty and student projects, and then having to run his statistics over days at a point in time [7]. In the present day, that computing authority can be had at my fingertips in a matter of minutes - or even seconds.

Similarly, emails, files, programs etc. were all previously on computer – or on campus' mainframe. Nowadays, those operations – and statistics – may exist on servers in Washington State – or in Bangalore. And this might not just be for my computing requirements. Nowadays, institution's students and faculty.

Greetings to the globe of Cloud Computing!

"Computing has continually altered figure and position—mainly as a consequence of fresh technology, but often also because of shifts in demand".

-The Economist

There had been tons of innovatory computing technologies - truthfully "game altering" concepts - appear about approximately once each decade in the "recent age" of computing ever since around 1945 when computing came to denote computations performed by a device, not by man. Since the mainframe age of the 1960s to the arrival of minicomputers in the 1970s, the personal computer in the 1980s, the development of the Internet and the Web in the 1990s, and the outburst of cell phones and other smart, Web-connected devices in the past 10 years [10].

Nowadays, several imagine that Cloud Computing will be "the next large object". Certainly, the impact of the cloud model will be "no less powerful than e-business". If industry analysts are accurate, it is an inflection position - a factual paradigm change - in the evolution of computing.

The fundamental thought after Cloud Computing is that anything that could be done in computing – whether on an individual PC or in an institute statistics hub – from storing statistics to communicating via email to collaborating on documents or crunching figures on bulky statistics sets - can be shifted to the cloud. As can be seen in Table 1, Cloud Computing encompasses a wide range of hand-outs, including: SaaS (Software as a Service), PaaS (Platform as a Service), and IaaS (Infrastructure as a Service) [12].

Cloud Computing have nowadays become "shorthand" for the bigger fashion of computing services delivered over the Internet. Cloud Computing represents "an emerging IT development, deployment and delivery replica, enabling real-time deliverance of products, services and solutions over the Internet". As one reviewer freshly characterized it: "Cloud Computing - in which enormous stores of information and processing resources can be tapped from afar, over the Internet, using a personal computer, cell phone or other device - holds great promise…to slash the outlay, intricacy and headaches of technology for companies and government agencies". Indeed, one of the hallmarks of Cloud Computing is that it enables users to intermingle with systems, data, and each other in a way that reduces concern as regards the underlying technology [9].

Table 1
Different Services Provided by Cloud Computing

Level	*Service Type*	*About Service*
User Level	SaaS-Software as a Service	Companies host applications in the cloud that many users access through Internet connections. The service being sold or offered is a complete end-user application.
Developer Level	PaaS-Platform as a Service	Developers can design, build, and test applications that run on the cloud provider's infrastructure and then deliver those applications to end-users from the provider's servers.
IT Level	IaaS-Infrastructure as a Service	System administrators obtain general processing, storage, database management and other resources and applications through the network and pay only for gets used.

According to the Cloud Computing Manifesto: "The key characteristics of the cloud are the capability to scale and provision computing power dynamically in a cost efficient way and the ability of the customer (end user, association or IT staff) to make the majority of that command without having to administer the causal intricacy of the technology".

The Economist captured the significance of this tendency in stating: "The plethora of devices wirelessly connected to the Internet will speed up a shift that is already under way: from a 'device-centric' to an 'information-centric' world…. (and) as wireless technology gets superior and cheaper, more and more diverse types of objects will connect directly to the cloud". Technology guru Clay Shirky possibly put it finest when he whispered: "What is driving this shift is an alteration in viewpoint from considering the computer as a box to considering the computer as a door". The budding Cloud Computing paradigm is thus based on a "user-centric interface that reduces user concern over the sustaining infrastructure [12].

3. COMPOSITION OF CLOUD COMPUTING?

The causal technologies of Cloud Computing comprise grid computing, utility computing and virtualization technologies. Grid computing is a form of distributed parallel computing whereby processes are split up to leverage the obtainable computing power of multiple CPUs performing in a show. Utility computing is a model of purchasing computing capacity, such as CPU, storage, and bandwidth, from an IT service provider, billed based on utilization and virtualization technologies refer to virtual servers and virtual private networks that provide the capability to rapidly reconfigure existing resources on-demand and give the essential security assurance [7].

Most researches categorized the clouds into two- public and private cloud. Public Cloud or external cloud is referred to when a cloud is made obtainable via payment which is according to the utilization of services [4]. It describes Cloud Computing in the traditional mainstream sense, whereby resources are dynamically provisioned on a fine-grained, self-service basis over the Internet, via web applications or web services, from an off-site third-party provider who shares resources and bills on a fine-grained utility computing basis[8] i.e. Amazon Web Services, Google App Engine, and Microsoft Azure.

Private Cloud refers to internal statistics centers of a business or other association that are not made obtainable to the public [4]. This type of cloud is also known as on-premise cloud which imitate cloud computing on private networks. For example, a precise cloud for FBI to address the security concerns related with a classified environment [7]. Other types of cloud variation are hybrid cloud, commercial cloud and government cloud. Hybrid cloud environment consist of manifold internal and/or external providers which is distinctive for the majority of enterprises. Commercial Cloud consists of deployment to one or more of the commercial cloud providers (e.g., Amazon or Google). It could be a simple integration with an existing SaaS service to support a subset of application functionality or could consist of a complete migration to the cloud. This may be appropriate for non-mission critical systems (e.g., < 99.99% availability) that do not process sensitive data or where sensitive data won't traverse system boundaries to the cloud. Government Cloud is the creation of one or more government cloud computing environments. These environments would be planned particularly to address the concerns that are unique to the government. For civilian agencies, this cloud could be an expansion of the current e-Government lines of business [7].

4. CLOUD COMPUTING IN ACADEMIC INSTITUTIONS

Cloud Computing is an innovatory notion in academic institutions, due to an unparalleled elasticity of resources made probable by the cloud replica. In daily exercise, elasticity is frequently considered of not just as the capability of an object to elongate out whenever required, but to also deal as essential. In computing terms, elasticity can be defined as: "The ability of a system to dynamically acquire or release compute resources on-demand". Under the cloud model, academic institutions that need more computing power have the ability to "scale-up" resources on-demand, without having to pay a premium for that capability. For example, that a researcher or a department has large, batch-oriented processing tasks. The individual or group can run the operations far quicker than earlier and at no supplementary outlay, since using 1000 servers for one hour costs no more than using one server for 1000 hours. This unique attribute of Cloud Computing is a generally referred to as "cost associativity", and it allows for computational needs to be addressed far quicker and far cheaper than in the past. In short, Cloud Computing gives academic institutions - even individual students - with unparalleled scalability.

Moreover, where in the past only the largest academic institutions have had supercomputing capabilities Cloud Computing, with number-crunching capabilities obtainable on an on-demand basis, affords researchers everywhere to scale their computing power to contest the scale of their research question - bringing supercomputing to the mainstream of research. Cloud Computing might just "enable new insights into challenging engineering, medical and social problems", as researchers will now have new found capabilities "to tackle peta-scale type(s) of problems" and to "carry out mega-scale simulations".

Several in higher education are coming to consider that coincide with the Cloud Computing will be the replica of the future for information technology delivery and utilization in academic colleges and academic institutions. Across higher education, the cloud computing scene should be quite active over the next few years, as we will see both coordinated efforts and "rogue" operations that will test how and where Cloud Computing can be effectively applied [6]. As we have seen, colleges and institutions will in many instances lead the way. These entities will continue to do so, based on their need for computing power on demand and for providing the types of ready - and in many cases free - IT resources - to their faculty and students. With pressure to reduce the fixed costs of higher education - and IT being a very affluent goal - the move to cloud may be more enforced in a few cases than may be dictated by the on-the-ground conditions. Certainly, a few of the most stimulating uses and best practices for cloud computing could well appear from the globe of higher education.

Table 2
Cloud Computing Applications in Academic Institutions

Open Science Grid http://www.news. wisc.edu/12927	A project to develop and expand a national Open Science Grid to provide computing power and data storage to solve large, dataintensive challenges in science.
Splashup http://www.splashup.com	Easy photo and video editing
CouldTrip http://www.cloudtrip.c om/index.php?category= Education	A directory of cloud-based applications, sorted into categories.
SlideRocket http://www.sliderocket .com	Enable presentations and slide shows to be presented to a mass audience.
GapMinder World http://graphs.gapminde r.org/world	A cloud-based visualization tools for students to explore statistical information about income, health, life expectancy, fertility rates, natural resources, and etc. in visual, interactive way.
Socratica http://socratica.com	A cloud-based classroom for students in chemistry, physics, astronomy, biology, and computing use classroom in the cloud, to access, create and study modules. Teachers can add modules as well, creating a growing, open resource that is available free of charge.
Earthbrowser http://www.earthbrows er.com	An application to study real-time, real-world data which combines a desktop interface with the data storage and computing power available in the cloud to create an interactive map populated with weather, geological, and other data.

5. CONCLUSION

The move to further cloud-based applications will certainly bring fresh found abilities to converse, collaborate and carry out research to the academic institute faculty, staff and students. Nevertheless, it will also necessitate a flurry of policy decisions that will be required to be made and operational regulations that will be required to be implemented [13]. For example, there will have to be IT policy decisions made as to who can access what files and what type of access they will have (i.e. read-only, editing access). The move will also necessitate academic institutions to scrutinize how Cloud Computing will secure and procure their computing environment.

Academic institute IT leaders should pick one area - even one precise project - to "cloud pilot" and review their capability to manage and bring such a project to completion. As with any fresh technology, we are considering a big deal of pure experimentation with Cloud Computing - "science project" like work for the majority part up till now. All of us who use the Internet are experimenting with cloud applications in our daily lives - from Twittering to Gmail to using photo-sharing sites. In the same way, we will see academic institutions conducting Cloud Computing trials - what one writer termed as "science experiments" in the utilization of the technology. Such efforts that are far away from their core IT operations and many times on (or trying to connect) the periphery of the academic institutes. Many times - even in the public sector and especially on campuses, these experiments may be "rogue" operations - taken on by individuals and units to test the utility of the technology. These are important efforts, and they should be supported - and reported within and outside the academic institution - so that others in the IT and the wider community can learn of the successes - and the downsides - of operating in the clouds [12]. Thus, it will be vitally important to share both "best practices" and "lessons learned" in Cloud Computing. Indeed, many predict that such "science projects" in large and small organizations will drive the eventual acceptance and adoption of Cloud Computing. Institutions' often outdated and byzantine procurement rules and regulations, some of which may even preclude the use of Cloud Computing in select instances, will need to be changed to be more cloud-friendly and encourage the savings and efficiencies that can come from this new model of IT. There will also need to be changes made in not just the language, but in the mindset of contracting for computing services. For while IT administrators look at capacity and systems, end users look to performance.

6. FUTURE WORK

In future, we want to build a public and private cloud of various well known academic institutions is to be made, where the data of all the departments are to be stored at one place and all the departments will take the services from that place. The applications like the online examinations, results making, attendance checking, and conduction of various youth festivals etc. can easily be conducted from there. A private cloud is to be build for the administration departments so that they can easily exchange the data and manage the records of students. Managing everything on one place will not only increase the security but also improves the performance levels.

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