



Adoption of Cloud Computing In Education and Learning

K.Srinivasa Rao¹, Ratna Kumari Challa²

Assistant professor, Dept. of MCA, Yogi Vemana University, Kadapa, Ap, India¹

Assistant Professor, Dept. of CSE, JNTUKCE, JNTUK, Kakinada, AP, India²

Abstract: Change in the underlying technology supporting the subjects of Information Systems and Information Technology is not new. Since the beginning of computing technology as a subject of academic interest, changing technology has been the one constant that has driven the need to adjust the content of what is taught and how it is taught. One of the most recent changes coming on the scene is the emergence of Cloud Computing. With its roots in the Google architecture and reliance on such technologies as virtualization and commodity level computers, a new computing platform is emerging that will potentially affect everything in the curriculum. This article explores those changes on educational system. Educational establishments contain to seek opportunities to rationalize the way to manage their resources. In the near future, cloud computing will have a significant impact on the educational and learning environment, enabling their own users (i.e., learners, Instructors and administrators) to perform their tasks effectively with less cost by utilizing the available cloud based applications offered by the cloud service providers. This paper discusses the use of cloud computing in the educational and learning arena, to be called “Education and Learning as a Service”, emphasizing its possible benefits and offerings. It is essential for an educational and learning organization with its budget restrictions and sustainability challenges, to use the cloud formation best suited for a particular activity.

Keywords: Cloud computing, Education, Adoption and Learning.

I. INTRODUCTION

A cloud does not know why it moves in just such a direction and at such a speed, feels an impulsion this is the place to go now. But the sky knows the reasons and the patterns behind all clouds, and you will know, too, when you lift yourself high enough to see beyond horizons”. – Richard Bach, Jonathan Livingston Seagull.

Cloud computing is a recent concept that is still evolving across the information technology industry and academia. Cloud computing is Internet (cloud) based development and use of computer technology whereby dynamically scalable and often virtualized resources are provided as a service over the Internet. Users need not have knowledge of expertise in, or control over the technology infrastructure *in the cloud* that supports them. The definition is broad enough to cover everything from web search to photo sharing to social networking. Perhaps the key point is simply that cloud computing resources should be accessible by the end user anytime, anywhere, and from any platform. Broadly, the cloud can be described as on-demand computing, fix anyone with a network connection. Access to applications and data anywhere, anytime from any device is the potential outcome.

By understanding the type of services offered by cloud computing, one begins to understand what this new approach is all about. The following is a list of the three main types of services that can be offered by the cloud:

- Platform as a Service (PaaS): Users create and run their own software applications while relying on the cloud

provider for software development tools as well as the underlying infrastructure and operating system.

- Software as a Service (SaaS): Under this layer applications are delivered through the medium of the internet as a service. Instead of installing and maintaining software, you simply access it via the internet, freeing yourself from complex software and hardware management. The cloud provider hosts a single application which offers complete application functionality.

- Infrastructure as a Service (IaaS): Users rent computing power – either actual hardware or virtualized machines – to deploy and run their own operating systems and software applications.

Simply, the backend systems that deliver cloud services are generally deployed in one of four ways.

- Public Cloud: Customers access cloud services are store documents in large documenters Equipped with hundreds of virtualized servers that house data from multiple organizations.

- Private Cloud: A single organization uses a dedicated cloud infrastructure. Community cloud: A private cloud is shared by a group of organizations with common missions, interests, or concerns.

- Hybrid cloud: Two or more cloud types are linked to enable data and applications to flow between them in a controlled way.

II. USING CLOUD COMPUTING TECHNOLOGY IN EDUCATION.

The web social software and cloud computing will definitely have an impact on enterprise IT – but the impact on the educational system will be astounding and many in educational system don't see it coming. These trends are moving much faster than the current educational system can handle. The cloud computing environment provides the necessary foundation for the integration of platform and technology. It integrates teaching and research resources distributed over various locations by utilizing existing conditions as much as possible to meet the demands of the teaching and learning. The education sector is the second largest sector globally and the development of this sector is the key for economic growth and improvement in the standard of living. There is a need for more effort and multiple fronts to enhance the quality of educational discourse, improve standardization and increase the reach of vocational and other alternate education channels to all sections of society. Traditional forms of technology in education pose a number of other key challenges. Cost of technology, both hardware and software, which are unaffordable for the masses, cost of maintenance of IT (information technology) setups; power shortage particularly in the rural areas; and a lack of trained teachers – especially in IT awareness and knowledge are only some of the issues. Cloud computing and related business models provides answers to many of the challenges faced by the educational sector. IT in general has proven to be a catalyst in making the experience of learning more enjoyable and effective and cloud computing cloud provide answers to many of the challenges faced by the education sector.

The cloud refers to wide – area networks, generally the intent from which remote computing resources are shared. The cloud reduces costs and complexity and provides scalability. The biggest advantage that the cloud brings is to reduce costs and improve efficiency. An institution can rely on the 'pay-as-you-go' characteristic of the three pillars of cloud: PaaS and SaaS. Ease of maintenance increase efficiency as the pain of maintaining the software is now shifted to the cloud service provider. Technical issues related to online portals for distances education programmes and online examinations are the responsibility of the cloud service provider. Interactive applications delivered through the cloud can not only standardize teaching methods and content across schools, but also add richness and verify to the learning experience. Teacher – Training programmes at remote locations are rural areas are often caught in a web of ignorance themselves. Cloud computing solutions can be used for teacher – training courses and rapidly train a larger number of teachers. Many adults, deprived of minimum education at any early stage of life, are later reluctant to go to schools or do not have the time to do so. Cloud can help bring mass awareness among the rural using newer means of delivering education through mobile phones and television.

The cloud platform can support teachers to prepare teaching portfolio, presentation on teaching to local audience, a conference presentation on teaching to a local audience; a conference presentation; a manuscript to be submitted for publication, etc. it may also include, for the purpose of critical review and evaluation, self – reported portfolios that summarize a teacher's major teaching accomplishments and strengths in the form of short descriptions of activities and achievements and strengths in the form of short descriptions of activities and achievements (e.g., what and how they teach – types of instructional methods, materials, and techniques, why they teach that way, and whether or not it works with evidences) feedback from peers based on teaching observation and peer review of related scholarly activities, feedback from students based on their views on instructional activities, and the end – of – course student evaluation instrument.

“Education is not the filling a bucket but the lighting of a fire” – William Butler Yeats.

III. IMPACTS OF CLOUD COMPUTING ON EDUCATION

Three fundamentally new impacts that must be factored into the educational system:

A. Low – Cost and Free Technology: There has been a huge growth in low – cost and free technology for social interaction, publishing, collaborating, editing, content creation, computing etc., Many technologies that were previously expensive or unavailable are now becoming free to anyone with a web browser. This is true for web sites, blogs, video sharing, music sharing, social sharing, collaboration software, editing, presentation and publishing computing platforms in the “cloud”, etc., Students are already using many of these technologies in their personal lives. In the professional world the trend of discovering and using technologies in personal life, and then bringing in into professional life is called “consumerization”. Education system should take advantage of this same trend, which will both enrich student's technology-enabled education, and importantly, reduce the budget impact.

The need for hardware and software isn't being eliminated, but it is shifting from being on-premises to being in the cloud. All that needed is a cheap access device and a web browser, broadband perhaps wireless hotspots.

B. Content Growth : The amount of content is growing at an exponential rate, available to a broad audience and anyone can contribute.

Content has traditionally come from limited, relatively “known” channels like textbooks, encyclopedias, newspapers and television. Most content now comes from relatively “unknown” sources through the web. Content can be true, partially true, or false. Content can be enriching or unsafe and debasing. There is more of all of the above available to us instantaneously. The ability to use rapidly changing and evolving technologies to safely filter and find content in order to achieve personal or professional goals is a critical goal is a critical skill.



But the web is not simply a less-trustworthy encyclopedia – it is also a place to publish and interact with content. Content creation has traditionally been very personal and content produced has often had a very short lifespan. Publishing text, images, films, art, and opinions has been limited to a small audience, and publishing tools were very limited. The scope of a student’s influence was very limited. The scope of a student’s influence was traditionally limited to a class. Information and content have traditionally been relatively static things, created once and rarely if ever changed.

This is no longer true. Anyone can create content that is available to the world instantly, and can last for many years – possibly, “forever”. Content can be constantly evolving through collaboration and interaction and updates. People don’t just refer to information, or just copy it, they interact with it. They modify it they add to it – and this is to be encouraged. Tools for publishing creating, interacting with content are changing every year. Individuals of any age can influence opinions worldwide. It is becoming easier to contribute individually and collaboratively to the art, information and opinions in the world express ourselves both individually and collaboratively, and influence and lead. The ability to use rapidly changing and evolving technologies to create, communicate, collaborate express one’s self and influence others is a skill.

C. Collaboration : Technology is rapidly improving the ability to communicate and collaborate with others.

Connecting the people has traditionally been in person or by telephone, and teams and formed and work face – to – face. The people who connect already know each other. Social tools start as personal tools, but are more and more rapidly moving from the personal to the professional world. It is becoming easier to find and connect with anyone in any new and expanding ways; mobile phones, email, instant messaging, social and collaborative software and blogs. The ability to use rapidly changing and evolving technologies to safely filter and find people who can help us achieve our personal or professional goals is a skill.

Collaboration has been a one – time, relatively static and sequential process. New technologies make interactive collaboration possible on the web, between students in the same class, or around the world. Dynamic teaming and very interactive collaboration are skills of cloud computing.

IV. BENEFITS OF CLOUD COMPUTING

Cloud computing is a significant alternative for today’s education environment. Advantages that come with the newest technology can help resolve some of the common challenges.

- Universities can open their technology infrastructures to business and industries for research advancements.
- The efficiencies of cloud computing can help universities keep pace with ever-growing resources requirements and energy cost.

- The extended reach of cloud computing enables institutions to teach students in new, different ways and help them manage projects and massive workloads.
- When students enter the global workforce they will better understand the value of new technologies.
- The cloud computing release the institutions from data management, ensures that the users always have the newest documents and reduces the requirements and costs associated with data security.
- It offers a range of online tools and services that provide secure communication and collaboration capabilities.
- Cloud computing allows both the teachers and the students to access, share and publish documents, class calendars or web pages.

V. ADOPTION OF CLOUD COMPUTING

Despite the fact that cloud computing is a relatively young concept, there is overwhelming consensus regarding the potential of this paradigm in advancing technology and providing new avenues for enterprises to explore that may cut cost and adopt better IT capabilities. New advanced network technologies make the move to cloud computing. From a financial perspective, purchasing, installing, and maintaining extensive hardware for high – powered servers contribute to some of the higher budgets that universities are currently forced to allocate. This is parried with the soaring cost of licensing for the software packages that are scattered across campus. In contrast, adoption of a cloud environment relieves the institution of the need to acquire an actual costly server in order to conduct research. Researchers are provided with the ability to leverage the “rent-by-the-hour” or “pay-as-you-go” concept to rent computing and storage horsepower. The elasticity in a cloud service provides a researcher with the advantage to rent exactly the capacity that they need with the ability to adjust it on a need basis, which is typically challenging and costly in case of in-house servers.

Adoption of cloud computing permits significant savings in the area of supportive technologies, such as the massive air conditioning that is typically installed in university in-house server rooms in order to maintain a required level of temperature. Complexity can be reduced with cloud computing. The varieties of disciplines that are inherent within a university learning environment impose the need for a variety of hardware and software platforms that are installed on campus. This contributes to the increase in the complexity of such platforms and adds to the already challenging tasks of IT administrators, including those that manage network and software. This can be even more detrimental with the budget cuts that affect the allocation of sufficient IT staff, thus overwhelming these administrators even further. The adoption of cloud computing is hoped to relieve these administrators from such burden. However, adoption has to be planned carefully as different applications make different usage of resources.

However, there are also concerns that arise, sometimes even overshadowing these benefits, which is the subject of the following sections.

VI. CONCERNS OVER ADOPTION

There are several obstacles computing faces before adopted.

1. **Security:** There are several concerns surrounding the implementation of security in cloud computing and one of them is data privacy. The users do not have control or know where their data is being stored.
2. **Performance and Availability:** experiments that are research endeavors computing power. Some of the concerns include how to guarantee such performance from an outside vendor. Availability of services is another related concern in terms of the possibility of massive vendor outages. This is especially true since it may impact student learning or the timely delivery of the research results, which are typically tied to strict timelines.
3. **Integration with in house IT and customizability:** University IT administrators typically use their own in – house applications with a considerable portion that is customized to their own lab structure. The concern is the transition of such in – house applications to the cloud environment and how much of the customizability will be lost in that process.
4. **Cost** is another factor that may be introduced by additional vendor relationship management or possibly additional measures that are unique to cloud computing.
5. **Interoperability:** A universal set of standards and interfaces have not yet been defined, resulting in a significant risk of vendor lock – in.
6. **Control:** The amount of control that the user has over the cloud environment varies.
7. **Latency:** All access to be cloud is done via the internet, introducing latency into every communication between the user and the environment.
8. **Reliability:** Many existing cloud infrastructures leverage commodity hardware that is known to fail unexpectedly.

VII. CONCLUSION

Cloud computing is an emerging computing paradigm which promises to provide opportunities for delivering a variety of computing services in a way that has not been experienced before. It is essential for an educational and learning organization. With its budget restrictions and sustainability challenges, to use the cloud formations best suited to its IT activities. Several benefits of the transition to cloud computing were pointed out in this paper along with concerns regarding the adoption. Cloud computing paradigm is still relatively young in terms of maturity and adoption. The expectation is that it will undergo several changes in the future, in terms of resources, issues, risks and ultimately best practices and standards. One main conclusion that we draw is that cloud computing may have considerable potential in improving the IT application and infrastructure at education institutions. In the future, as

cloud computing continuous improvement of performance and this will bring new opportunities for the development of education.

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