

Exploring the Factors that Makes the Institutions of Higher Learning in Tamil Nadu to use Cloud based E-Learning Systems

Lourdu Caroline A,

Asst. Professor,

Dept. of Computer of Applications,
St. Joseph's College of Arts & Science
(Autonomous)
Cuddalore, India.

Jayanthi P,

Research Scholars,

PG & Research Dept. of Computer Science,
St. Joseph's College of Arts & Science,
(Autonomous)
Cuddalore, India.

Sakthivel V,

Research Scholars,

PG & Research Dept. of Computer Science,
St. Joseph's College of Arts & Science,
(Autonomous)
Cuddalore, India.

Abstract— the emergence of cloud computing technology has enabled the Institutions of Higher Learning to outsource their Information and Communications Technology (ICT). The goal of this paper is to investigate the possibilities of cloud computing that can automatically change the functions carried out by both public and private Higher Learning Institutions in Tamil Nadu . This paper explores the important results concerned with the Strengths, Weaknesses, Opportunities and Threats (SWOT) that makes the Institutions of Higher Learning to choose, follow and accept cloud computing to host their e-learning services. This paper, conducts a SWOT analysis to evaluate how far the cloud computing technology has been implemented in the institutions of higher learning in Tamil Nadu. The effect of the study of this paper can be experienced in both academic and practice.

Keywords: Cloud computing, Institutions of Higher Learning, ICT, E-Learning.

I. INTRODUCTION

The main objective of Institutions of higher learning in Tamil Nadu is to acquire innovative technologies, which can help them in the teaching learning process. Examples of these technologies that are used in these institutions are development of enterprise resource planning systems, simulation laboratories and E-Learning.

E-Learning is the most recent way to conduct distance education by distributing learning material and pedagogical processes over the Internet. Its “any time, any place” nature could be part of a winning strategy for particular requirements, such as decongestion of overcrowded education facilities, support for students or teachers who live far away from schools and universities and adult education. Making remote educational data and tools available to learners requires considering their different characteristics such as cultural background, technical experience, and technological equipment, physical and cognitive abilities.

One of the main problems of E-Learning systems is satisfying heterogeneous requirements of individual

learners and groups. Some of these requirements include enabling adequate accessibility at anytime and anywhere. Some of the common E-Learning platforms found in Institutions of Higher Learning in Tamil Nadu are Moodle, Blackboard and Web Case Tools (Web CT). These are open source and hence need to be customized to meet the end user needs. However, some of the institutions have chosen to develop their own E-Learning platforms in order meet the requirements of their students.

II. OBJECTIVES

The objectives of this paper are stated below,

- Find out the level of usage of cloud computing for E-learning in Institutions of higher learning in Tamil Nadu.
- Find out whether the Institutions of higher learning have the facilities like access to the internet and provide necessary infrastructure which will enable the use of cloud computing for e-learning.
- To find out the effect of the use of cloud computing for e-learning in institutions of Higher learning in Tamil Nadu to both learners and the lecturers.
- Take necessary steps for the effective use of cloud computing for e-learning in the institutions of higher learning.

III. INDIAN EDUCATION SYSTEM SCENARIO

Education sector is the 2nd largest sector globally and Indian school system is the world's largest school system with over 1.12 million schools. As on 26th August, 2011 in India there are 42 Central Universities, 280 State Universities 130 Deemed Universities and 94 Private Universities. The development of the education sector is solution for economic growth and improvement in the standard of living.

The challenges posed by the growing demand for education requirements are gigantic. India will have about

45 million people in the age group of 18 years to 20 years by 2020. To train them, we need more than 20 million teachers and the present vacant post of teachers in India is 1.2 million as on 05.09.2011. As per present trends, we will create only 20,000 teachers by 2020.

Government of India is having the ambitious plan to establish the meta-university with "new pedagogy" in tune with the requirements of the knowledge society of the 21st century. Further on, Government is seeking to open up establishment of foreign educational institutions in India through enactment of a Foreign Education Providers Act, which will allow for 100% foreign direct investment (FDI) in higher education. Thus, the aim is to raise the present 16 million enrolments in higher education to 42 million by 2020. This means that institutions of higher education will be admitting very many students per year. E-learning is therefore very effective in delivery of education to these students.

A second wave of creating institution of excellence has been initiated by starting 8 Indian Institute of Technologies, 5 Indian Institutes of Science Education and Research, 16 central universities, 2 schools of Planning and Architecture, 3 Indian Institutes of Management, and 10 National Institutes of Technologies. The 14 innovation universities are also on anvil for setting up benchmarks in education and research. Government of India is also aiming to establish at least 50 research parks for quality research programs.

National Knowledge Network (NKN) is a state-of-the-art multi-gigabit pan-India network for providing a unified high speed network backbone for all knowledge related institutions in the country. The NKN will enable scientists, researchers and students from different backgrounds and diverse geographies to work closely for advancing human development in critical and emerging areas. NKN has already connected 640 institutions and aims to connect electronically India's 572 universities, 25,000 colleges and at least 2,000 polytechnics for enabling E-Learning and content sharing across country soon.

The Indian clients such as mid-market vendors, universities, telecommunication companies and government bodies will be able to access the centre for the resource they need to pilot cloud infrastructure and application to their customer. Indian Institute of Technology, Kanpur is the first to use IBM lab. Indian IT Industries like Infosys, IBM India, Accenture etc. have shown keen interest in promoting research in cloud computing.

India's Telecom Commission proposal to create a US \$4.5 billion National Optical Fibre Network (NOFN) approved by the Department of Telecom (DoT) which will broaden the country's existing fibre optic network from the district level to the village level giving the country of 1.2 billion people services like e-Education, e-Health, e-Banking etc.

IV. FIVE STEPS TO SUCCESSFUL INTEGRATED CLOUD MANAGEMENT

A recent global IDC survey, sponsored by HP, examined the experience of this proactive group of integrated cloud managers. These organizations are actively integrating and automating application development, provisioning, security, and management across public and private cloud resources as well as Non-cloud application development and data centre operations teams. They are seeing many benefits, including faster application provisioning, lower application development and maintenance costs, improved business agility, higher service levels and improved business and IT relationships. Their experiences also highlight that success depends on cultural transformation as well as integrated and automated management processes and tools. An analysis of the experiences of these early adopters identifies five important steps for successful integrated cloud management. Specifically

Define a plan that coordinates the organization's application modernization strategy with its cloud infrastructure and Software as a Service (SaaS) agenda.

Assess current costs and develop benchmarks for application support, provisioning and on-going resource consumption.

Identify the opportunities to reduce costs and speed up service delivery via use of automation for integrated application and infrastructure provisioning.

Implement the systems to monitor and integrate application performance and real-time capacity planning analytics with automated provisioning solutions.

Integrate security strategies and priorities across the application development, release, and operations life cycle IDC recommends that organizations begin the journey toward integrated cloud management by targeting early pilot projects at developer teams and application environments that can deliver quick payback to validate the business agility benefits and operational efficiency improvements.

V. SECURITY

Education institutions are entrusted with confidential information and private data. Security plays an important role in distance education. The data either about hardware or software access Internet will be attacked by virus or Trojan when the users are dealing with the distance education. In worst case this will result in paralysis of the entire network system. The cloud storage mechanism can protect and monitor the data greatly enhanced the security of resources. As for the managers of Internet, they can unify data management, resources allocated, load balance, software deployment and the control of the security result in the reduction of investment in human resources. NIST likens the adoption of cloud computing to wireless technology. Institutions learned how to protect their wireless data as they moved forward and they will do the same with cloud computing.

VI. RELATED WORKS

There are number of initiatives of using cloud technologies in education which are more open in nature.

Xiao Laisheng et al. [1] introduced cloud computing in e-learning. The construction and maintenance of e-learning system is done interior to the educational institutions which require more investment. With cloud computing the feasibility and efficiency of investment can be greatly improved.

Padma Veni et al. [2] proposed a system for forming university clusters with resource sharing cloud. It provides a better live digital learning system so that the students from rural areas can also be benefited.

Collaborative tools are used in e-learning learning system to manage various student group activities [3]. The student contents are stored in cloud computing vendors.

Dong et al [4], [5] propose an e-learning framework whose infrastructure relies on cloud computing. The architecture of such system has several components aimed at the efficient provision and management of the e-learning services. Among other interesting features, this system is able to pre-schedule resources for the hot contents and applications before they are actually needed, to safeguard the performance in concurrent access. Vouk et al. [6] focuses on the reservation VMs to students for a specific time frame.

The combination between cloud computing and e-learning introduces benefits in terms of scalability efficiency mechanisms, technological advantages in order to build a more stable e-learning system, environment personalization per user, cost-efficient, Quality of Service (QoS)-guaranteed, resources allocation optimization, a more comprehensive and secure group of features, and maintenance-free where users are free from the maintenance job of the e-learning system focusing only their attention in the application of the e-learning solution to improve teaching quality and management level. Furthermore, new ideas from the development of cloud-type e-learning solutions can emerge as new technological solutions, which combine traditional e-learning models with the current cloud computing paradigm [7, 8].

An E-Learning solution in a cloud environment is only possible due to the migration of cloud computing technologies into the e-learning topic [11].

Beyond cloud developments on current learning platforms (e.g. Docebo) authors like Wang et al. [10] introduce a cloud computing e-learning platform in order to allow the integration of different e-learning standards to enhance interoperability of learning content.

Rajam et al. [9] proposed an E-Learning computational cloud (eLC2) for managing learning tasks, primary composed by a graphical user interface to render presentation and exchange IO messages between clients. This proposal follows the correct path to incorporate root

concepts of the cloud computing paradigm into a new cloud-service-driven E-Learning platform.

VII. METHODOLOGY

This paper explains about the investigation and analysis of the issues that are related within the academic and technical aspects that challenges the use of cloud computing for E-Learning in institutions of higher learning in Tamil Nadu.

Data for this study is to be essentially collected through interviews with university lecturers, information technology personnel and Information technology managers. The data analysis method that is to be applied was typically qualitative data analysis. The paper considers this design to be suitable since it guides in gathering of reliable data.

VIII. POPULATION SAMPLING

Target population is the entire set of units for which the study data are to be used to make inferences. It defines those units for which the findings of the study are meant to generalize [2]. The target population will be ten institutions of higher learning in Tamil Nadu namely; Anna University, Madras University, Annamalai University, Thiruvalluvar University, Bharathiar University, Bharathidasan University, Manonmaniam Sundaranar University, Madurai Kamaraj University, Alagappa University and Periyar University. The study population comprises of Information Technology managers, lecturers, Information Technology student information technology personnel.

TABLE I. PEOPLE TO BE INTERVIEWED

Category	Population	Sample	Percentage (%)
Lecturers	100	50	50
I.T. Managers	50	25	50
I.T. Personnel	30	5	16.7
I.T. Students	100	10	10

IX. SAMPLING DESIGN

There are two different approaches for determining the size of a sample. The first approach is to specify the precision of estimation desired and then to determine the sample size necessary to insure it. The second approach uses Bayesian statistics to weigh the cost of additional information against the expected value of the additional information.

X. DATA COLLECTION

In this paper, interviews are to be conducted so as to find out the adoption process and the decision behind it, the research is an exploratory research.

Interviews can be done in different ways when it comes to research. Open ended, closed, standardized, general and informal interviews. The researcher opts to gather most of the information and data in the form of interviews. It could be good to have some sort of other gathering method to get better reliability but interviews works as a good source.

The researcher decided to conduct interviews with the following institutions of Higher Learning in Tamil Nadu namely; Anna University, Madras University, Annamalai University, Thiruvalluvar University, Bharathiar University, Bharathidasan University, Manonmaniam Sundaranar University, Madurai Kamaraj University, Alagappa University and Periyar University. The approach is to be mostly informal in the first interview with some initial questions that will be provided in advance. The reason for this approach is that the researcher wanted to have the interviewees to take part and talk without restraint about the subject. In order to trying to get as much data as possible from the sessions, interviews are to be written down from the talk so it was in text. It has to be done right away so as to not lose any data.

XI. TECHNOLOGY DESCRIPTION

The National Institute of Standards and Technology (NIST) defines cloud computing as “A model for enabling convenient, on demand network access to a shared pool of configurable computing resources (e.g., network, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction’ [54]. The use of cloud computing therefore benefits many institutions of higher learning and they are able to store their data at a low cost. This cloud model promotes availability and is composed of five essential characteristics and three service models and four deployment models”. Cloud computing is a mechanism that enables management of computing and IT infrastructure to be consolidated in one or more data centres to reduce the overall cost of operating computing facilities. As a form of outsourcing of IT components that comes in many forms, from the use of third-party resources to store data to delivery of IT services within an enterprise, cloud computing is based on virtualized infrastructure, self-configuration, and automated provisioning. The concept incorporates infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS) as well as Web2.0 and other recent technology trends that have the common theme of reliance on the Internet for satisfying the computing needs of the users [15].

Institutions of higher learning can benefit by use of cloud computing for their e-learning models. The students can be able to access learning materials from anywhere.

XII. A SHIFT IN E-LEARNING PARADIGM

Cloud based E-Learning is the technology which migrates the traditional e-learning techniques to cloud computing technology in order to develop the e-learning environment with a large number of facilities in order to make necessary improvements in the learning experience of e-learners. The recent advancement in the information technology and networking field has resulted in the emergence of online instruction to emerge as a by-product of these innovations. As a result, online education has developed fastly in the past ten years and a new shift in learning paradigm began to emerge.

With the help of the cloud computing for E-Learning, the students who were isolated by geographical locations, physical disabilities or family and work responsibilities are now provided with the opportunity to continue their education in the self-driven manner thereby improve their skills.

One-third of all colleges and universities in India provide courses in distance learning mode. With the use of cloud in the E-Learning, these universities will get more benefits. More than 8% of these colleges provide college level degree or certificate programs completely online through mode of distance learning. Cloud will help them to improve their outreach to remote areas also. Nearly 55% of 2-year and 4-year institutions provide college-level credit-granting distance learning courses at either the undergraduate or graduate level. The National Centre for Education Statistics has said that this number has increased by around 19%, to 18.2 million during the year of 2013. The largest factor affecting enrolment will be the increasing likelihood of traditional college-age students, 18-24 year olds, to participate in distance learning on-line programs. It seems that with the arrival of cloud computing services, this percentage will certainly increase in the near future.

One of the important use of cloud computing is educational cloud. It can focus the power of thousands of computers on one problem, thereby helping researchers to search and find models and make innovations more rapidly than ever.

The universities can also out source their technology infrastructures to both private, public sectors for research and development. The advantages of cloud computing can help universities to keep pace with ever growing resource requirements and energy costs. A student mostly wants to connect their personal mobile devices to connect to campus services for the purpose of education. Faculty members opt for efficient access and flexibility when integrating technology into their classes.

Researchers want instant access to high performance computing services, without the activities that are to be taken care of by them for managing a large server and storage farm.

The role of cloud computing at university education should not be underestimated as it can provide significant advantages and improvements in offering direct access to a wide range of different academic resources, research applications and educational tools

XIII. DEVELOPMENTS

As part of socio-economic pillar, there is an immediate requirement for skilled labour force, which needs advanced training at degree level. This requirement was realized in the current scenario of Indian education and it has necessitated the development and expansion of university education. This was however, further reinforced by the increasing Indian population. So it is clearly understood E-Learning has improved the level of high quality education that students obtain from Institutions of Higher Learning.

Strengths, Weaknesses, Opportunities and Threats for Institutions of Higher Learning in Tamil Nadu

A. STRENGTH

1. Access of information from any computer irrespective of geographical location.
2. Enhances easy communication between lectures and students.
3. Makes registration easy.
4. Economical, no need for students to photocopy notes. They download at their convenience.

B. WEAKNESS

1. Low internet connectivity
2. Poor infrastructures like few computer laboratories.
3. Lack of enough technical skilled lecturers.
4. Some of the platforms like Moodle are open source, so they have to be highly customized to meet the students and the lecturer's needs.
5. Moodle lacks a help button; students who are not computer literate have a hard time navigating through it.

C. OPPORTUNITIES

1. Learning new skills.
2. Being marketable in the industries.
3. High chances of good jobs.
4. Allows the student to get feedback from the lecturers.
5. Students can easily interact with each other and also with others from different parts of the world.

D. THREATS

1. Technological challenges
2. Privacy issues
3. Security issues

XIV. BENEFITS OF CLOUD COMPUTING

This study has led to the findings that the respondents of the sample data are able to get information from any computer irrespective of geographical location. This study has also added to the findings that the students are able to communicate with the concerned lecturers in a more efficient manner. Through the use of cloud computing on e-learning, the student are able to register for new courses easily and download the notes at their own convenience, by residing in any location which eliminates the need to take the photocopy of the notes. The lecturers will be in a position to upload their notes and also the semester's calendar in advance. This leads to convenient way teaching for both the lecturers and the students.

CONCLUSION

The findings shows that cloud computing will help to facilitate the task of e-learning to be carried out easily in an efficient manner. This paper concludes that institutions of Higher Learning that use cloud computing to facilitate e-learning can make the students to perform better and hence they will have relevant knowledge and be equipped with the necessary skills that the current scenario of education expects from them. If the country has to achieve its educational goals completely, then more Institutions of Higher Learning should be encouraged to use this form of

technology. This paper tries to find out both internal and external factors that are associated with the use of cloud computing for E-Learning. Also the finding of this study indicates that Institutions of Higher Learning have the immediate requirement to focus their attention more towards the user interactivity with the cloud computing based e-learning platforms.

FUTURE WORK

It is recommended for the future research, an exploratory study based on software user ability measurement inventory. This study is considered to be one of the immediate requirements in the current scenario of Indian education, because this study approaches the evaluation based on the user's perception.

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