

Applications of Free and Open Source Software using Cloud Computing for School Education

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ABSTRACT

A revolution has risen with free and open source software and cloud computing. They both are excellent innovations for computer science and technology at large. Both have their loopholes. Free and open source software are not very popular since users are not familiar with them. Cloud computing will be successful, only if cuts costs. So, what if cloud computing environment is used and host applications created using open source software are hosted on them which can be used reliably, flexibility and at a lower cost. This scenario has begun to benefit many industries, entrepreneurs and organizations. The researchers, in this paper, are evaluating the applications of such software using cloud computing for education, that too, specifically for school education. AICTE, CBSE, the apex bodies of education for higher education and school levels in India have begun such initiatives. The launch of low cost Aakash tablets has added to the usability of this concept. The researchers in this paper present the current implementations of the concept in the field of education, exhibit certain individuals and organizations that are working for this cause and reveal various modes for its successful implementation. The researchers believe that an organized implementation of this concept in school education sector will bring about a major change in the way students learn and understand. This will result in filling up of loopholes that our education system is currently facing.

General Terms

Cloud Computing, Free and Open Source Software

Keywords

Free and Open Source Software, Cloud Computing, Education, CBSE, AICTE, Aakash Tablets

1. INTRODUCTION

India is a country which has its strength in its education system. IITs, IIMs, and many more form the core of education. The higher education system of India is the third largest in the world next to United States and China. Surprisingly, with such a good record in higher education sector, India is not performing great at the school level. Apart from a few well known school brands in India, majority of the schools are working under insufficient resources, like infrastructure, finances and most importantly teachers. India faces a shortage of almost 1.4 million trained teachers. With such a scenario, a solution needs to be arrived at which will fill up the large glaring gaps in our school education system. In this direction, Dr. Sugata Mitra, chief scientist at NIIT, has done phenomenal experiments in the field of unsupervised learning and computers. His experiments conducted in 1999 involved, carving a hole in the wall that separated the NIIT premise

from a slum in Kalkaji, New Delhi. A computer that was freely accessible was put through this hole. It was an instant hit with the children and they learned to use computers and picked up many concepts on their own. Group learning and the desire to know more was the major motivation in their learning. This led to Dr. Sugata Mitra's hypothesis that, *The acquisition of basic computing skills by any set of children can be achieved through incidental learning provided the learners are given access to a suitable computing facility, with entertaining and motivating content and some minimal (human) guidance.* The experiments still continue with different set of children and at different parts of the world. The results are astonishing. [1]

This poses a question in front of us, educationists. If students can achieve so much with minimal human assistance then why don't we adopt such teaching methodologies that work upon this concept? The answer is that a lot of work is being done by CBSE (Central Board of Secondary Education), the apex body in India for school education, in this direction. Teacher workshops, seminars, training sessions are being organized throughout the country.

But, the glaring challenge that remains is the availability of funds and resources. A computer is affordable today, but the cost of software and their availability and maintenance is expensive. With the reign of proprietary software, the cost of installation of a computer far exceeds the cost of the machine itself.

Here comes the role of Open source software, that are not only easily available but are also free of charge with copyleft licenses to distribute them freely. They are as good as and in some parameters better than closed-source software products. [2] So, without the guilt of piracy, schools, institutions and students all over the world can learn using these software.

2. PRESENTLY IMPLEMENTATED IN EDUCATION SECTOR

The availability of open source software can be largely enhanced by hosting applications made with open source software on clouds. [3] There are so many instances of this kind of usage and its continuously rising.

Android (an open source operating system) tablets and applications have swept the markets. They have made technology accessible. Today, children from lower income category households also desire to own tablets and thanks to the decreasing costs of technological equipments, many parents are pondering over to make such hi-tech devices available to their children. The applications on android aid in the development of mental faculties of the children.

A host of open source software are used to develop applications for clouds which are providing an economic solution to libraries all over the world. For example, Japan is using JAIRO cloud service for its universities and research institutions. WorldCat Local is a powerful Library Application of cloud computing. In India too, a Rs. 1,000 crore plan is being implemented to link 9,000 libraries of India. China has deployed open source application on cloud for e-learning system. [4]

On 13th December, 2013, VoiceofSikkim, an open source based cloud application bagged the 4th NE ICT Award, 2013, at the North Eastern Summit held at Itanagar. This application will be useful in health, education, agriculture, natural disaster, traffic, etc.

AICTE has provided Live@Edu Cloud solution offering for students and faculties. It is going to increase collaboration among students and sharing of rich educational content. [5] AICTE has collaborated with Microsoft for this initiative. [6]

Applications like Scriblink and Edusim are providing classroom interactive whiteboards.

Lovely Charts and LucidChart applications help the students in creating effective charts and diagrams.

Moreover, with communities like Openstack, it has become very convenient to create public and private clouds and hold applications of your choice. Openstack is supported by NASA and is being used the world over by researchers, educationists, service providers, corporations, etc. With such communities, the development of clouds and applications hosted on them is endless. [7]

3. OPPORTUNITIES AND CHALLENGES

In India the literacy rate is fairly low and government has introduces many schemes and policies to elevate this rate; the recent being, Right to Education (RTE) Act. Cloud applications in education are beneficial in the following ways,

- Cost effective
- Far-reaching
- A collection of related applications
- Easily available through remote and virtual classrooms

But, with every opportunity is associated a challenge.

- Connectivity and bandwidth issues
- Land required for setting up data centers
- Security of data is still a concern for cloud based infrastructure.[8]

4. VARIOUS MODES FOR IMPLEMENTATION

4.1 Uniformity

Many private firms have adopted the cloud infrastructure in India. But, private sector implementation again means that only the fortunate few who have the money and resources will be able to access the educational clouds. For the results of cloud to reach the masses, the government will have to implement the cloud infrastructure at a massive scale in all its schools and provide clouds that host similar applications to public and private schools. Uniformity in applications, the learning resources can only bring equality among the students

living with hi-tech facilities of a metro and the rural background of a village. [9]

4.2 AICTE (All India Council for Technical Education)

AICTE has taken a step in this direction and others should follow suit. Such initiatives should also be taken for school level education.

4.3 CBSE (Central Board of Secondary Education)

CBSE has taken such initiative in July, 2013 and announced “Personalized Learning Solutions” for 11 million CBSE students. This effort will bridge the digital gap and will provide online study material of one lakh questions, over 4,500 animations, 80 hours of live lectures and six hours of simulated laboratory sessions. This content if efficiently utilized will be better than the best that public schools provide. Just sharing this content with students with minimal human guidance, the students with team work and discussion will learn far better than they are doing presently.[10] These resources will be made available free of cost to Government schools affiliated to the board. The best part is that this content will also Rs. 2 per month for classes I to VIII and Rs. 10 per month for Secondary level. This program is likely to launch from August, 2013. The idea of CBSE is to standardize the quality of education in schools throughout India by providing standardized educational resources. [11] CBSE has, in February 2013, offered free ICT teacher training in collaboration with Oracle Academy to all CBSE affiliated school teachers. The software covered were all free and open source software, like Alice, Eclipse and Greenfoot. [12]

4.4 Open Development

Apart from this, national educational bodies should create clouds and invite developers to design applications and host them on the cloud; a model that PlayStore is using for Android phones and tablets. In this manner the students have the choice to select the best out of the available resources.

4.5 Compatible Hardware

Every software application needs a relevant hardware to use it. The Indian government has launched Android based tablets called Aakash in an initiative to connect 25,000 colleges and 400 universities. Aakash tablet, the world’s cheapest, will be available to 220 million students nationwide at a hugely subsidized price of \$20 (Rs. 1,130/-), starting with college students. Datawind, the manufacturer of Aakash tablets has tied up with TES India to preload educational content with course of Bachelor of Arts, Commerce and Education, along with general awareness, discussion on social topics and CBSE content. This initiative is basically for higher education. Gradually, it should be implemented for school education also.

4.6 Individual Contributions

Indian government has a vision of the countries children, rich or poor, studying from tablets. Few self motivated entrepreneurs have also taken the tablets to classrooms in Mumbai and Aurangabad, like V. Subramanian.

4.7 Revolution

Amazingly, the low cost Indian tablet has reached in US to help dis-advantaged children. Such is the power of

technology. If implemented in an efficient and planned manner, open source software applications on cloud are going to revolutionize the way children learn and study.

4.8 Integration in Syllabus

Much work is being done in the higher education levels using open source software. E-learning tools using Moodle and many other software are being developed. [13] But amazingly school education is still almost untouched in this regard. The need of the hour is to expose the young minds to these software and then see how the learning of the students is increasing. CBSE has suggested the use of open source software in its curriculum to achieve the learning objectives. But, due to unavailability of adequate content, it is far from implementation. A comprehensive integration of open source software in primary and middle classes will open the minds of our young children and tomorrow give us a breed that is more creative, thinks out of the box and has a better understanding of concepts. This generation will not only be literate but also educated.

The following figure displays the inter-relation of the components for the implementation of this concept.

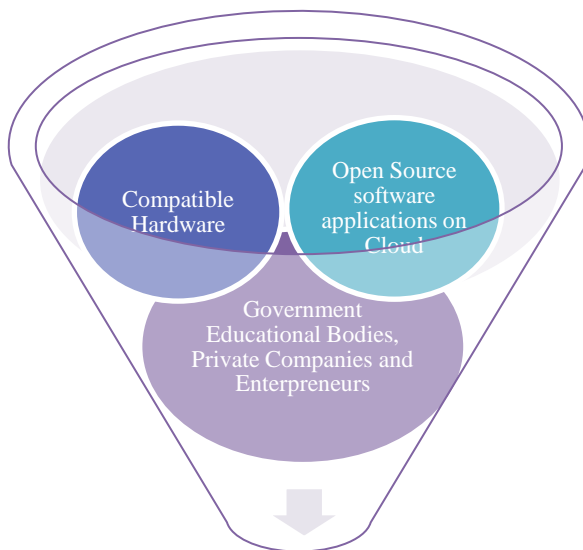


Fig 1: Revolutionize the way students learn and better learning outcomes.

5. FINDINGS

Free and open source software platform and applications in cloud computing environment merge the best of both the worlds. During research on this topic, the researchers found that the apex educational bodies in India are not only promoting it but also are creating applications for this merger to benefit students. The researchers also found that the Indian Government has accepted it and coming up with innovations like Aakash to speed up the education spread. Every coin has two (2) sides, similarly this concept also has its pros and cons. The need is to focus on the merits and work to eliminate the loopholes. The researchers also got evidences of this concept being promoted and worked upon practically in many parts of the world. Modern classrooms will be alive with the usage of such applications. The boring and mundane study patterns will give way to better teaching-learning environments and

methodologies at low cost. The education system will thus be revamped.

6. CONCLUSION

It's easier said than done. The platform and applications of open source software on cloud computing environment for education are still at experimentation stage. Though companies like Extramarks that deal with providing software and hardware solutions to schools are using it. But they are providing services to public schools which can bear their huge costs. This concept will be a success when widespread implementation is done by government educational bodies at little or no cost.

Secondly, to use these software, the students should be taught the software early on in their curriculum. Open source software education should be launched in primary and middle levels of school education. These students will then be equipped to only use applications but also create more of them. Such students will have a deeper understanding of the concepts of sciences, mathematics, social sciences and languages.

Moreover, such implementation will bring a level field in India at least in the education sector and parents will no longer have to worry about the quality of educations their wards are receiving and will not have to shell out large amounts of their income for branded schools and branded education.

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