

Impact Study on Design Issues of Cloud Computing in Education

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Abstract— Cloud Computing is an emerging paradigm in the advanced network arena that facilitates the users to access shared computing resources through internet-on-demand. Cloud Computing has been widely used since it brings tremendous improvements in business. Cloud users are expected to grow exponentially in the future. In order to meet the demands of future cloud users, a full-fledged survey analyzing the various issues is the need of the hour. The different classifications presently available do not present the issues at micro levels. Amongst the various issues, the ones at design and implementation levels are of utmost importance since they directly affect the performance of the applications. Hence the cloud issues at those levels are presented in this paper from the available literature. This paper also attempts to outline a few possible solutions for some of the issues. Innovation is necessary to ride the inevitable tide of change and one such hot recent area of research in Information Technology (IT) is cloud computing. Cloud computing is a distributed computing technology offering required software and hardware through Internet. It also provides storage, computational platform and infrastructure which are demanded by the user according to their requirement. Due to the growing need of infrastructure educational institutes, organizations have to spend a large amount on their infrastructure to fulfill the needs and demands of the users. Cloud computing is a next generation platform that allows institutions and organizations with a dynamic pools of resource and to reduce cost through improved utilization. In the present scenario, many education institutions are facing the problems with the growing need of IT and infrastructure. Cloud computing which is an emerging technology and which relies on existing technology such as Internet, virtualization, grid computing etc. can be a solution to such problems 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 the education to improve teaching, agility and have a cost-effective infrastructure which can bring a revolution in the field of education. It also tries to bring out its benefits and limitations.

Keywords –: Information technology, cloud computing, educational institutes and infrastructure

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I. INTRODUCTION

Cloud Computing (CC) has become one of the frontier research areas of this decade. The National Institute of Standards and Technology (NIST) defines the cloud computing as, A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. “Cloud” is used as a metaphor for Internet and its main objective is customization and user defined experience. In other words cloud computing provides shared resources, software and information through Internet as a PAYGO (Pay-as-you-go) basis. In the recent years, where educational institutes, universities, industries are giving their full contribution in transforming the society and entire world economy. Various researches are carried out to update the present IT infrastructure especially in the area of education.

Cloud computing can be a welcomed optioned in the universities and educational institutes for higher studies. It gives a better choice and flexibility 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. 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. Cost: Choose the subscription or PAYGO plan.

2. Flexibility: Cloud computing allows to dynamically scale the investment in infrastructure as demand fluctuate.

3. Accessibility: Making the data and services available publically without losing the sensitive information.

II. RELATED WORKS

A few related works exist that deal with the categorization of the cloud, the challenges faced, the benefits accrued and the shortcomings yet to be conquered. Yang et al. have classified the issues relating to cloud applications into the four categories namely, Technological Issues, Business Issues, Applications and General. The articles are presented in chronological order but the categorization of research presented does not cover the issues related to cloud at micro levels [5]. Tharam Dillon et al. [6] have identified a few challenges of CC such as security, costing model, charging model (for the profitability and sustainability of cloud providers) and Service Level Agreement (SLA).

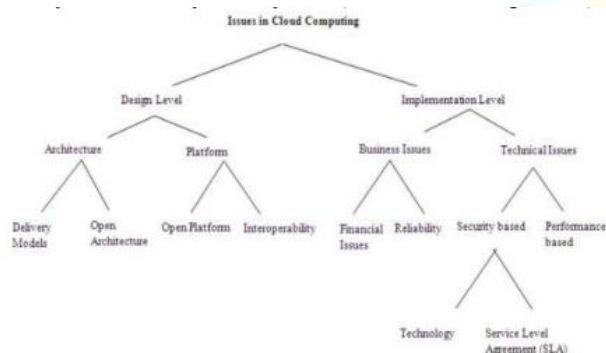


Figure 1: Classification of cloud computing highlighting design and implementation issues.

III. PROPOSED SYSTEM

The schematic diagram shown in Fig.1 provides the classification of CC. The issues are depicted in two levels namely Design and Implementation.

3.1. Design Level Issues

In this level of research, the key issues in creating an open architecture and in the development of heterogeneous platforms have been discussed.

3.1.1 Architectural Issues

It is essential to construct a CC architecture with the important features such as unification, scalability and reusability. But the development of such architecture may face additional challenges because of the emerging technologies and industry practices. Irena Bojanova et al. [9] have discussed the cloud service model architectures of SaaS (Software as a Service), PaaS (Platform as a Service) and IaaS (Infrastructure as a Service) which have been implemented in a few familiar applications including Google, Microsoft and Oracle fusion middleware. In their work, a few set of metrics like hardware cost, software cost,

system administration cost and real-time provisioning cost are dealt with in order to determine the efficiency of different CC models. 3.1.2 Platform Related Issues Numerous platforms have emerged as an outcome of the increased demand in CC. Some literatures have addressed issues related to heterogeneous platforms. Eucalyptus is an open source software framework for CC proposed by Daniel et al. Though a number of cloud platforms are available, each one provides its own interface for customers to interact with underlying infrastructures. But it becomes a great challenge for one cloud user to access the services when interacting with other clouds, because of heterogeneous software.

3.2.2 Technical Issues

In the cloud environment, there are several technical issues to be solved. The proposed survey paper addresses the two major technical issues in CC related to security and performance based issues. CC has to effectively manage the security aspects of the cloud applications. Security consciousness and concerns arise as soon as one begins to run applications beyond the designated firewall and move closer towards the public domains. Survey is made on security perspective of CC. The aim is to highlight the security concerns that should be properly addressed and managed to realize the full potential

IV. CLOUD ARCHITECTURE FOR EDUCATION

Due to the higher accessibility, availability and efficiency of cloud services many universities, businesses are trying to make use of these services. Today's cloud computing providers are offering higher education, the opportunity to substitute their data and information in the „cloud“ for universities with existing data centers, servers and application replacing these traditional campus machines. Developing a cloud architecture for education can be distinct according to the purpose and infrastructure of the institution and can be challenging. The universities has to follow all the rules and regulation of the state and country for developing a cloud for education as many countries are very strict in cross broader transfer of information. Once the university establishes where their data will reside 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 complex issues and creates a relationship between the user and the service provider. It helps to specify the privacy, consistency and integrity. Privacy is one of the important 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 ensure the security and protection of sensitive data in the

cloud. These are; 1. Mask or de-identify of the data 2. Firewalls 3. Encryption and decryption

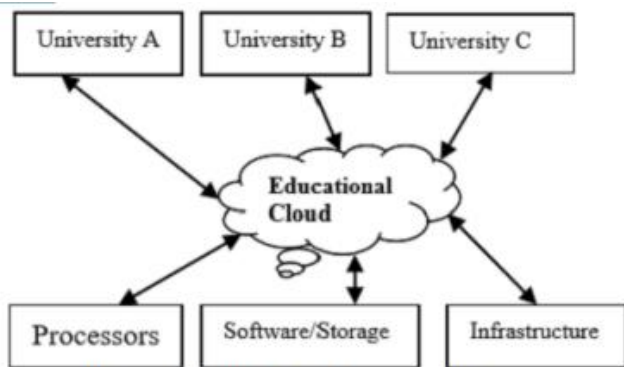


Figure 2: Educational Cloud Architecture

Following table shows the differences between private and educational cloud.

Cloud Feature	Private Cloud	Educational Cloud
Owned and managed by	Single university	Service provider (many universities)
Access	Limited to employees and students of single university	By subscription
Control and customization	Yes (By university)	None

Table I: Differences between Private and Educational Cloud

Due to the recent development in IT technologies, infrastructure and continuous upgrades in software and hardware has put a great deal of pressure on the budgets and expenses of universities and educational institutes. Cloud computing development provides many universities with an opportunity to take advantage of new IT technologies at an affordable cost. Following are the benefits;

A. Cloud Computing

To Prepare Lecture With the development of private and educational cloud, new web applications such as Lecture Tools, Slideshare etc allows the lecturer to get their work done in their web browsers rather storing and carrying it on the hard drive.

Its gives the benefits such as;

1. Access the files from anywhere
2. Create a backup of your data
3. Stop worrying about additional software licenses
4. Share content more easily
5. Get things done without software hassles

B. Other Benefits

1. Access to applications from anywhere
2. Support for teaching and learning
3. Software free or PAYGO
4. 24 X 7 access to infrastructure and content
5. Opening to various universities and advanced researches

C. Limitations

Cloud computing has the potential for improving the efficiency, cost and convenience for the universities and educational sectors, but it has few limitations such as; 1. Not all application run on cloud 2. Risk related to data protection and security and its integrity 3. Organizational support 4. Dissemination politics, intellectual property 5. Security and protection of sensitive data 6. Maturity of solutions 7. Lack of confidence

V. CONCLUSION

Cloud computing is an emerging computing paradigm and next generation platform that can provide tremendous value of information of any size. The shift towards cloud computing would enable the universities and educational institutions to save money and take benefit of the developing technology. Both private and educational cloud can provide the necessary computational facility on demand of the user without any expense and can create a common platform for sharing the various resources from the various institutions. In spite of limitations of cloud computing and keeping in mind the present scenario of economic crisis many universities, educational intuitions, organizations etc are trying to adopt cloud computing as a solution to the developing technologies and try to reduce their expenses

REFERENCES

- [1]. P. Nirmala, T. Manimegalai, J. R. Arunkumar, S. Vimala, G. Vinoth Rajkumar, Raja Raju, "A Mechanism for Detecting the Intruder in the Network through a Stacking Dilated CNN Model", *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 1955009, 13 pages, 2022. <https://doi.org/10.1155/2022/1955009>.
- [2]. J.R.Arunkumar, Dr.E.Muthukumar,"A Novel Method to Improve AODV Protocol for WSN" *Journal of Engineering Sciences*" Volume 3, Issue 1, Jul 2012. ISSN NO: 0377-9254
- [3]. J. R. Arunkumar, S. Velmurugan, B. Chinnaiah, G. Charulatha, M. Ramkumar Prabhu et al., "Logistic regression with elliptical curve cryptography to establish secure iot," *Computer Systems Science and Engineering*, vol. 45, no.3, pp. 2635–2645, 2023.
- [4]. P. K. Devi, D. Arulanantham, C. Kalaivanan, N. Gomathi, J. R. Arunkumar and G. Ramkumar, "An Secure and Low Energy Consumption based Intelligent Street Light Managing System using LoRa Network," 2022 6th International Conference on Electronics, Communication and Aerospace Technology, Coimbatore, India, 2022, pp. 638-645, doi: 10.1109/ICECA55336.2022.10009408.
- [5]. Prathima Chilukuri , J.R. Arun Kumar , R. Anusuya , M. Ramkumar Prabhu. "Auto Encoders and Decoders Techniques of Convolutional Neural Network Approach for Image Denoising In Deep Learning" *Journal of Pharmaceutical Negative Results*, 13(4), 1036–1040. <https://doi.org/10.47750/pnr.2022.13.04.142> ,November 4, 2022.
- [6]. R. Yugha, V. Vinodhini, J. R. Arunkumar, K. Varalakshmi, G. Karthikeyan and G. Ramkumar, "An Automated Glaucoma Detection from Fundus Images based on Deep Learning Network," 2022 Sixth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), Dharan, Nepal, 2022, pp. 757-763, doi: 10.1109/I-SMAC55078.2022.9987254.

- [7]. E. Thenmozhi, A. Karunakaran, J. R. Arunkumar, V. Chinnammal, C. Kalaivanan and G. Anitha, "An Efficient Object Detection and Classification from Restored Thermal Images based on Mask RCNN," 2022 Sixth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), Dharan, Nepal, 2022, pp. 639-645, doi: 10.1109/I-SMAC55078.2022.9987422.
- [8]. L. Saravanan, W. Nancy, K. P. Chandran, D. Vijayanandh, J. R. Arunkumar and R. T. Prabhu, "A Novel Approach for a Smart Early Flood Detection and Awareness System using IoT," 2022 8th International Conference on Smart Structures and Systems (ICSSS), Chennai, India, 2022, pp. 1-4, doi: 10.1109/ICSSS54381.2022.9782286.
- [9]. S. Bharathi, A. Balaji, D. Irene, J. C. Kalaivanan and R. Anusuya, "An Efficient Liver Disease Prediction based on Deep Convolutional Neural Network using Biopsy Images," 2022 3rd International Conference on Smart Electronics and Communication (ICOSEC), Trichy, India, 2022, pp. 1141-1147, doi: 10.1109/ICOSEC54921.2022.9951870.
- [10]. Prathima, C. H., Anusuya, R., & Prabhu, M. R. K. (2022). Comprehensive Design Analysis of Digital Marketing in Agriculture Sector. *International Journal of Early Childhood Special Education*, 14(5), 2022.
- [11]. Atul Kumar Dwivedi, Deepali Virmani, Anusuya Ramasamy, Purnendu Bikash Acharjee, Mohit Tiwari "Modelling And Analysis Of Artificial Intelligence Approaches In Enhancing The Speech Recognition For Effective Multi-Functional Machine Learning Platform – A Multi Regression Modelling Approach " *Journal of Engineering Research - ICMET Special Issue*, 2022-04-06.
- [12]. M. Ramkumar Prabhu, A. Rajalingam, J. R. Arunkumar, Dr. R. Anusuya "Microstrip Patch Antenna Using Combined Slots for Bandwidth Enhancement and Size", *Journal of Engineering Sciences*, Vol 11, Issue 1, Jan, 2020, ISSN NO: 0377-9254.
- [13]. Anusuya Ramasamy, Abel Adane Changare "Hybrid Fuzzy Knowledge Based Prediction Model for the Software Development and Maintenance Quality in Software Engineering Approach" *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, ISSN: 2278-3075, Volume-9 Issue-10, August 2020.
- [14]. J. R. Arunkumar, "Chaotic African Buffalo Optimization Based Efficient Key Mechanism in Categorized Sensor Networks", *International Journal of Engineering and Advanced Technology (IJEAT)*, ISSN: 2249 – 8958, Volume-9 Issue-3, February, 2020.
- [15]. R. Anusuya, M. Ramkumar Prabhu, Ch. Prathima, J. R. Arun Kumar "Detection of TCP, UDP and ICMP DDOS attacks in SDN Using Machine Learning approach" *Journal of Survey in Fisheries Sciences*, Vol. 10 No. 4S (2023): Special Issue 4.
- [16]. M. Ramkumar Prabhu, A. Rajalingam, J. R. Arunkumar, R. Anusuya, "Microstrip Patch Antenna Using Combined Slots For Bandwidth Enhancement And Size" *Journal of Engineering Sciences (JES)*, Vol 11, Issue 1, Jan / 2020, ISSN NO: 0377-9254.
- [17]. M. Ramkumar Prabhu, J. R. Arunkumar, A. Rajalingam, R. Anusuya "A Modified Square Patch Antenna with Rhombus slot for High bandwidth" *International Journal of Innovative Technology and Exploring Engineering (IJITEE)* ISSN: 2278-3075, Volume-8 Issue-9, July 2019.
- [18]. Revanesh, M., Gundal, S. S., Arunkumar, J. R. Arunkumar et al. Artificial neural networks-based improved Levenberg–Marquardt neural network for energy efficiency and anomaly detection in WSN. *Wireless Netw* (2023). <https://doi.org/10.1007/s11276-023-03297-6>.
- [19]. I. Chandra, K. V. Karthikeyan, R. V, S. K, M. Tamilselvi and J. R. Arunkumar, "A Robust and Efficient Computational Offloading and Task Scheduling Model in Mobile Cloud Computing," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-8, doi: 10.1109/ICECONF57129.2023.10084293.
- [20]. Jangam Raghunath, S Kiran, G Siva Nageswara Rao, JR Arun Kumar, R Anasuya, C Siva Kumar, "A MACHINE LEARNING TECHNIQUE TO DETECT BEHAVIOR BASED MALWARE", *Semiconductor Optoelectronics*, Vol. 42 No. 1 (2023), 1268-1278
- [21]. Dr. J. R. Arunkumar. "Enhanced Dynamic Authorized Secured Protocol for Wireless Sensor Networks," *Journal of Science, Computing and Engineering Research*, 1(1), 07-11, Mar-Apr 2020.
- [22]. Anitha Gopalan, O. Vignesh, R. Anusuya, K. P. Senthilkumar, V. S. Nishok, T. Helan Vidhya, Florin Wilfred, "Reconstructing the Photoacoustic Image with High Quality using the Deep Neural Network Model", *Contrast Media & Molecular Imaging*, Volume 2023 | Article ID 1172473 | <https://doi.org/10.1155/2023/1172473>.
- [23]. R. Anusuya, N. Anusha, V. Sujatha, R. Radhika and S. Iniyar, "Machine Learning based Landslide Detection System," 2023 7th International Conference on Computing Methodologies and Communication (ICCMC), Erode, India, 2023, pp. 319-323, doi: 10.1109/ICCMC56507.2023.10084226.
- [24]. S. Sivakumar, R. Anusuya, V. Nagaraju, L. P. Narendruni and R. Thamizhamuthu, "QoS Based Efficient Link and Consistent Routing in Wireless Sensor Network," 2023 International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE), Bengaluru, India, 2023, pp. 1241-1246, doi: 10.1109/IITCEE57236.2023.10091080.
- [25]. I. Chandra, G. Sowmiya, G. Charulatha, S. D, S. Gomathi and R. Anusuya, "An efficient Intelligent Systems for Low-Power Consumption Zigbee-Based Wearable Device for Voice Data Transmission," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ICECONF57129.2023.10083856.
- [26]. R. Meena, T. Kavitha, A. K. S, D. M. Mathew, R. Anusuya and G. Karthik, "Extracting Behavioral Characteristics of College Students Using Data Mining on Big Data," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ICECONF57129.2023.10084276.
- [27]. G. Karthikeyan, D. T. G, R. Anusuya, K. K. G, J. T and R. T. Prabhu, "Real-Time Sidewalk Crack Identification and Classification based on Convolutional Neural Network using Thermal Images," 2022 International Conference on Automation, Computing and Renewable Systems (ICACRS), Pudukkottai, India, 2022, pp. 1266-1274, doi: 10.1109/ICACRS55517.2022.10029202.
- [28]. S. Bharathi, A. Balaji, D. Irene, J. C. Kalaivanan and R. Anusuya, "An Efficient Liver Disease Prediction based on Deep Convolutional Neural Network using Biopsy Images," 2022 3rd International Conference on Smart Electronics and Communication (ICOSEC), Trichy, India, 2022, pp. 1141-1147, doi: 10.1109/ICOSEC54921.2022.9951870.
- [29]. Dr. R. Anusuya. —Stacking Dilated CNN Authorized Secured Protocol for IoT Security, —*Journal of Science, Computing and Engineering Research*, 1(1), 01-07, May- June 2022.