Journal of Inventive and Scientific Research Studies (JISRS)
www.jisrs.com Vol: II, Issue: 2 December 2024 ISSN: 2584-0630 (Online)

TECHNOLOGY OF CLOUD COMPUTING IN EDUCATION SYSTEM

V. JAMUNA RANI
Assistant Professor, Department of Computer Science
G. Venkataswamy Naidu College (Autonomous), Kovilpatti
E-mail: jamunarani.vjr@gmail.com

Received: July 31, 2024, **Accepted**: November 01, 2024, **Online Published**: December 15, 2024

ABSTRACT

Cloud computing technology has revolutionized various sectors, including education, by providing scalable, flexible, and cost-effective solutions for managing and delivering educational resources. In the context of the education system, cloud computing enables institutions to host data, applications, and services on remote servers, allowing students, teachers, and administrators to access resources from any location at any time. This paper explores the role of cloud computing in modern education, focusing on its impact on teaching, learning, and administrative processes. Cloud-based platforms facilitate collaboration, enhance communication, and support the integration of advanced technologies such as artificial intelligence and big data analytics. Furthermore, cloud solutions reduce the burden of maintaining expensive IT infrastructure, enabling institutions to allocate resources more effectively. This paper will go over the many benefits and drawbacks of cloud computing in education as well as the elements of this technology that are relevant to the field of education.

Keywords: Cloud computing, education system, scalability, flexible learning, collaboration, cloud-based platforms, cost-effective, IT infrastructure

INTRODUCTION

Cloud computing offers educational IT departments at institutions more options and flexibility. Depending on the requirements of the academic organization, the cloud service provider's platform and apps can be used offline, on-site, or in a combination of both. Since the service provider will provide all of these, an educational institution does not need to

set up computer resources or hardware for storage, nor does it need to install or pay for software programs separately. Similarly, mobile, tablet, iPad, and other device delivery of course content and other student services is made possible by cloud computing.Thus, cloud computing has a large and impact on how staff and students use projectors or tablets. Additionally, digital tools offer media-rich content that promotes interactive learning, online discussion boards that facilitate cooperative learning, and better student processes for turning in assignments and providing feedback, among other things. Due of cloud services' accessibility Around the world, virtual universities are becoming more and more common.

Present Education System in IT

The use of IT in the current educational system is limited to specific software applications, such as feedback systems, library automation, and attendance feeding software. Only Power Point slides, movies, and any file opened and shown on the projector may be used in courses. The majority of teaching is still done by hand, and the fewest schools with enough infrastructure can be said to offer interactive instruction. Without a doubt, we can replace traditional classroom instruction with interactive learning through the use of web-based technological solutions.

Types of Cloud Model

Public cloud: Referred to as an external cloud. In a public cloud, a service provider uses the Internet to make resources like storage and apps available to everyone. Public cloud services can be provided for free or on a pay-per-use basis, where clients only pay for the services they really utilize. It is shared and available to everyone, and it is readily scalable to meet consumer needs. Public cloud examples include Google App Engine, Sun Cloud, IBM Blue Cloud, Google Elastic Compute Cloud (EC2), and Windows Azure services platform.

Private Cloud: This cloud architecture is specifically designed to serve one company. It offers hosted services that are only accessible to a select group of authorized users connected to the company protected by a firewall. These services are provided over a private network, hosted either internally or outside, maintained either internally or by a third party.

Community Cloud: In this case, a number of organizations from a certain community that share concerns about security, compliance, jurisdiction, etc. share the infrastructure. It is hosted on a private cloud, has several tenants, and is either internally or externally managed by a third party.

Hybrid Cloud: A hybrid cloud is made up of two or more different types of

clouds, like community, private, or public clouds. It provides the benefits of various deployment models. An organization supplies and administers some resources internally in this cloud computing environment while obtaining external resources.

Choices in the Cloud

If we decide to use this technology, we have to decide whether to install it on our own property, use a software that can be installed as a service, or install both of them together. There is flexibility in this deployment architecture to adapt to changing service demands.

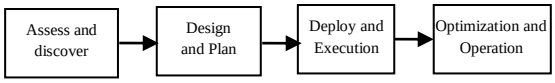
Infrastructure as a Service(IaaS): Here, the clients are given access to hardware assets (such as storage) and processing power.

Software as a Service(SaaS): Here, the client does not need to purchase software packages; instead, services are provided to them online for use in place of software programs.

Platform as a Service(PaaS): PaaS offers all the facilities needed to support the entire significant growth lifecycle of an internet-based application or service, including design, testing, debugging, operation, and maintenance.

Strategy for Implementation of Cloud System

Institutions must therefore approach the cloud transition in the following four stages, having a well-defined wish list:



Assess and discover

The IT decision makers will decide on the best cloud computing strategy, architecture, and security during this early stage. They will also decide on the goals. Organizations have to collaborate with specialists who possess knowledge in several technical domains, including automated provisioning, virtualization, service orchestration, and network architecture security.Evaluation of the costs, advantages, and operational adjustments—including the intended and current services management approach—is necessary before switching to a cloud computing structure. This phase will lead to the development of cloud architecture, tools, process integration, and implementation in the future. Security should also be a priority in strategic planning, with an emphasis on limiting access and giving consumers access to on-demand security solutions through a services catalog. Furthermore, post-deployment activities at every stage and the evolution of cloud computing should be considered.

Design and Plan

Expert coordination between the team members, partners, and external vendors is needed for this phase.

Comprehensive architecture planning, knowledge unique to data centers, and end-to-end security are also considered. A common control framework, an end-to-end architecture blueprint, a migration plan, and a security technology framework with physical safety and security are the outputs of this phase, and they serve as the cornerstone for further implementation and integration.

Deploy and Execution

Implementing the security technology architecture is the focus of this phase. Institutions need to have someone with experience delivering a virtualized architecture and integrated technologies in order to minimize risk during a cloud computing transition. A seamless transition from the current environment to a cloud utility computing architecture can be facilitated by tried-and-true methods, best practices, and an understanding of the essential systems within the cloud environment. This can also ensure that plans are followed and that a fully implemented cloud computing model is delivered on schedule. To provide operational trust to the internal experts during this implementation stage, live and concurrent knowledge transfer sessions should be scheduled.

Optimization and operation

We can optimize the true benefits of cloud computing—lower operating and capital expenses, better company agility and responsiveness, and scalability—by optimizing the cloud model, which may accelerate adoption. This is accomplished by means of initiatives like post-deployment tool modification, process enhancements, security assessments, and cost-reduction initiatives.

Benefits of Education Cloud

i. Cloud computing technologies can be used to overcome issues including poor graduation rates, inadequate infrastructure, small classroom sizes, and a shortage of teachers.
ii. The educational system won't be restricted by geographical distances.
iii. Since there is no need to buy hardware, software licenses, or implementation services, institutions with simple infrastructure can still offer high-quality instruction.
iv. Because organizations may quickly implement cloud computing, education can be made more accessible to everybody.
v. Upgrading and maintenance will be much simpler. Rapid acquisition, provisioning, and deployment of new IT platforms, services, apps, and test environments are made possible by the cloud model. Month-long IT hardware purchase processes can be reduced with

cloud capabilities, cutting down on the amount of time needed to do these operations to a few hours or minutes.

vi. Cost is decreased when organizations cut back on or do away with capital IT expenditures and continuing operating costs by only paying for the services they use (a subscription or pay-as-you-go plan), as well as maybe by reassigning or cutting IT staff.

vii. Users utilizing education clouds can use the services whenever they choose, around-the-clock.

viii. viii. Since data and services are openly available, accessibility is good.

ix. Education Cloud will undoubtedly reduce its carbon footprint, allowing us to advance our green initiatives.

x. Education Cloud is easy to use and has a high data handling capacity.

PROBLEMS WITH EDUCATION CLOUD

i. One issue with this cloud is connectivity, which is also becoming better every day and will soon be accompanied by 4G.

ii. Interoperability is another obstacle to adoption since there is a considerable possibility of vendor lock-in in the absence of widely accepted standards and/or defined interfaces.

iii. Since educational institutions no longer have as much control over personal data, data security is another concern. Since the institutions are completely dependent on the cloud computing provider, the provider should have the right procedures and guidelines in place to guarantee that data is managed, preserved, utilized, and disclosed in an appropriate manner. Data can be obtained by hackers with ease due to this educational cloud.

Cloud Security Checklist

The main concerns for many educational IT institutions are security and the implications for data privacy. Institutions now need to provide at least some level of on-campus protection because security has become more difficult in recent years. To maximize the security of cloud implementation, have a look at this list of security considerations and capabilities.

S.no	Features	Check/ Uncheck
1.	Data safety	·
2.	Data confidentiality	·
3.	Data Privacy	·
4.	XML signature	·
5.	Browser security	·
6.	Cloud integrity and binding	·
7.	Network security	·

8.	Flooding and denial-of-service attacks	·
9.	Data centre location	·
10.	Dedicated security team to ease transition	·
11.	Regulatory compliance	·

Table1: Checklist

Conclusion

This study focuses on the education cloud's promising aspects that best meet the demands of educational IT departments right now. Some of the typical issues that educational institutions confront can be resolved with the use of cloud computing's benefits. Through cloud computing, users can operate independently of platforms and operate on a layer above virtualization. The education cloud initially piqued the interest of private education providers, but as time went on, governments began to show an interest in learning why and how to effectively and safely implement cloud platforms. To put it another way, cloud computing has the potential to democratize education, and this new system will distribute high-quality education throughout the entire planet.

References

[1] Khan, M. N., & Jain, S. (2022). "Cloud Computing in Education: A Review of Recent Trends and Future Directions." *International Journal of Advanced Research in Computer Science*, 13(5), 19-26.

[2] Tariq, S., & Raza, S. A. (2021). "The Impact of Cloud Computing on Online Education in the Post-COVID Era." *International Conference on Computing and Information Technology (ICCIT)*, 89-98

[3] Patrick Wolfschwenger, Barbara Sabitzer, Zsolt Lavicza, "Cloud Adoption and Digital Transformation in the Context of Education: A Phenomenological Study", *2022 IEEE Frontiers in Education Conference (FIE)*, pp.1-9, 2022

[4] Sharma, R., & Sood, S. (2021). "Impact of Cloud Computing in Education: Opportunities, Challenges, and Future Directions." *Proceedings of the International Conference on Information and Communication Technology for Education (ICTE), 112-118.*

[5] Liu, M., & Zhang, Y. (2022). "The Future of Cloud Computing in Education: Trends and Innovations." *International Journal of Educational Technology*, 21(2), 90-100.

[6] Liang, H., & Liu, Z. (2019). "Cloud Computing for Education: A New Era of Learning." Springer.

[7] Patel, V., & Kumar, P. (2023). "The Integration of Cloud Computing and

Artificial Intelligence in Educational Systems." In *Cloud Computing for Education: Technologies and Innovations* (pp. 125-146). Springer.

[8] Singh, R., & Yadav, P. (2022). "Impact of Cloud Computing on Remote and Hybrid Education during the COVID-19 Pandemic." *International Journal of Educational Technology in Higher Education*, 19(3), 58-74.

[9] Patel, D., & Sharma, M. (2023). "Security and Privacy Challenges in Cloud Computing for Educational Systems: A Systematic Review." *Journal of Cyber Security and Privacy*, 3(1), 1-19.

[10] Ghosh, S., & Sinha, R. (2022). "Cloud-Based Learning Management Systems (LMS) and Collaboration Tools in Higher Education: A Comparative Study." *Proceedings of the International Conference on Education Technology and Applications (ICETA), 55-63.*

[11] Hassan, M. K., & Ali, Z. (2023). "Cloud Computing in Education: Future Trends and Innovations." *Education and Technology International Journal*, 12(2), 45-62.

[12] Baker, W. H., & Smith, D. T. (2022). *Cloud Computing and the Future of Education: Trends and Opportunities*. Journal of Educational Technology Development and Exchange, 15(3), 145-159.

[13] Brown, K., & Lee, S. (2023). *Security and Privacy Challenges in Cloud-Based Learning Management Systems*. International Journal of Cloud Computing and Services Science, 12(1), 45-59.

[14] Gonzalez, A., & Ramos, L. (2022). *Cloud Computing for Education: Transforming the Classroom and Beyond*. Springer Nature.

[15] Riddhi Thavi, Rujuta Jhaveri. (2021) Role of cloud computing technology in the education sector. Journal of Engineering, Design and Technology ISSN: 1726-0531 Article publication date: 27 December 2021