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Cloud Computing: Security with Educational Usage

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Abstract

Cloud computing is one of the latest patterns of computing, where virtualized and dynamically scalable methods are provided to the Internet as a resource. Many industrialists say that cloud computing will give a new shape to ICT companies as revolution. The security provided by cloud computing is the key concern among consumers with its beneficial widespread applications. In this paper, several latest technologies of cloud computing and security of cloud computing with its usage in education have been studied.

Keywords: Cloud computing, emerging technologies, security, SWOT

1. Introduction

Cloud computing is quickly becoming a buzzword in the shared computing industry. Many people believe cloud computing will transform the Information Technology (IT) industry. In today's domain of information technology, the term "cloud computing" has become a key concept [1]. Cloud computing is a powerful processing option that makes more use of virtualized resources that can be shared between multiple users. Consumers are not required to have any previous knowledge of the program. One of the most recent advancements (broadband internet, quick connectivity, and virtualization) is cloud computing, that will almost definitely have a major impact on learning. The benefits, standards, and security problems that come with cloud computing have also been discussed. The key cloud computing platforms are described, as well as their suppliers and capabilities. The difficulties of cloud computing are addressed, as well as the prospects of cloud technology. Cloud computing, according to several experts, will change IT processes and the IT industry. Owing to cloud computing services provided by cloud computing providers, users can access programs, data, and business applications via the Internet using a variety of

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devices such as PCs, laptops, cell phones, and PDAs. Financial advantages, availability, and scalability are all advantages of cloud computing technology [2].

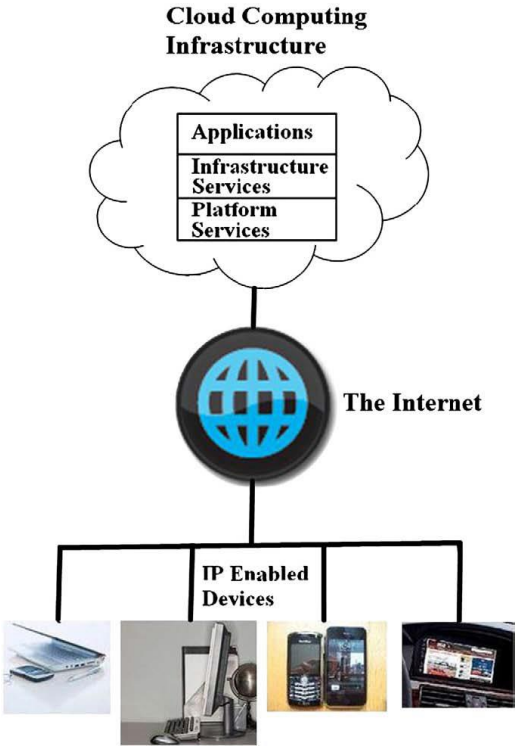

Figure 1. Cloud Computing Infrastructure

1.1 Advancement in Cloud Computing

Virtualisation, Web applications and service-oriented design, service flows and workflows, and Web 2.0 and mashup are just a few of the new advances that have enabled cloud computing feasibly [3].

1.1.1 Virtualization

The capacity to create a virtual and shared resource between different apps in order to optimize server utilization is a benefit of cloud technology. In non-cloud computing, there appear to be three distinct platforms for three distinct programs that run on their own servers [4]. The number of servers required for applications and operating systems can be decreased by sharing or using virtual machine in the internet (in specific- two servers). Virtual Machine (VM) technologies like VMware and Xen, as well as virtual networks like VPN, are illustrations of virtual machines. Virtual machines allow people to enter cloud services through a customised distributed system, whereas virtual networks offer on-demand virtualized IT infrastructure.

1.1.2 Web Services and Service Oriented Architecture (SOA)

Service Oriented Architecture (SOA) and Web Services are the foundations of cloud computing, despite the fact that they are not concepts. Web services, which follow industry standards like WSDL, SOAP, and UDDI, are frequently used to deliver cloud storage [5].

1.1.3 Web 2.0 and Mashup

Web 2.0 applies the principles of Web innovation to promote user creativity, information exchange, and engagement. Mashup, on the other hand, is a web-based application that integrates data from various sources into a central database. Both techniques are extremely useful in cloud technology [6].

1.1.4 Service Flows and Workflows

"Service flow and workflow" refers to the complete picture of cloud-based service providers. In the world of data management industries, procedures are one of the most significant areas of research [7-8].

1.2 Features of Cloud Computing

Cloud computing has a number of significant advantages over old PC paradigms. This section briefly describes them.

- **User Centric Interface:** Cloud interface can be maintained using well-known interface such as Web services and browser, regardless of location.
- **Guaranteed Quality of Service (QoS):** Users can expect a level of quality of service from the cloud, which is measured by hardware/CPU efficiency, throughput, and storage capabilities.
- **Pricing:** Cloud computing does not require a large upfront outlay. There isn't a good deal of need for capital spending. People merely pay for a service and energy that they need.
- **Autonomous System:** Cloud computing is a technology that is self-contained and controlled by the public. Cloud data and apps, on either hand, can be automatically reconfigured and merged into a simple platform based on the client's needs.
- **Scalability and on-demand services:** Cloud computing allows users to view information and services on demand. A number of information centres can be used to distribute the resources.

1.2.1 Cloud Computing Standard

Despite the fact that there are no fully developed cloud computing standards [9-10], the rise of cloud technology has been aided by a number of current, often lightweight, and established standards.

Table 1. Cloud Computing standards

Applications	Security: SSL/TLS ,OAuth, OpenID Communications: XMPP ,HTTP, Syndication: Atom
Implementations Platform Service	Service Data: XML, JSON Web services: REST Platform Solution stacks: LAMP Virtualization: OVF
Client	Browsers: AJAX Offline:' HTML5

1.3 Cloud Computing Security

Moving virtual machine instances holding specialized applications and sensitive data to public and shared public clouds is one of the most difficult aspects of cloud computing [11]. As a result, prospective cloud computing clients are concerned about security threats listed below. Peripheral firewalls, demilitarized zones, cellular production, intrusion prevention systems, and remote tools available are all basic security measures in datacentres. Cloud computing security uses the same techniques and tactics as data centres, such as a big network perimeter fence. Physical distance and equipment protection, on the other hand, are useless in the presence of attacks on virtual machines along the same system. Virtual computers use the very same operating systems, business applications, and Web applications as physical servers. As a result, a remote attacker could exploit this vulnerability flaws in these applications and services. Co-locating multiple virtual machines enhances the attack surface and the probability of MV-to-VM penetration. Virtual machine safety devices like firewalls, intrusion prevention systems, integrity monitoring, and log inspection can make

VM clouds easier and safer to implement. The obstacles to adoption have been depicted in Figure 2.

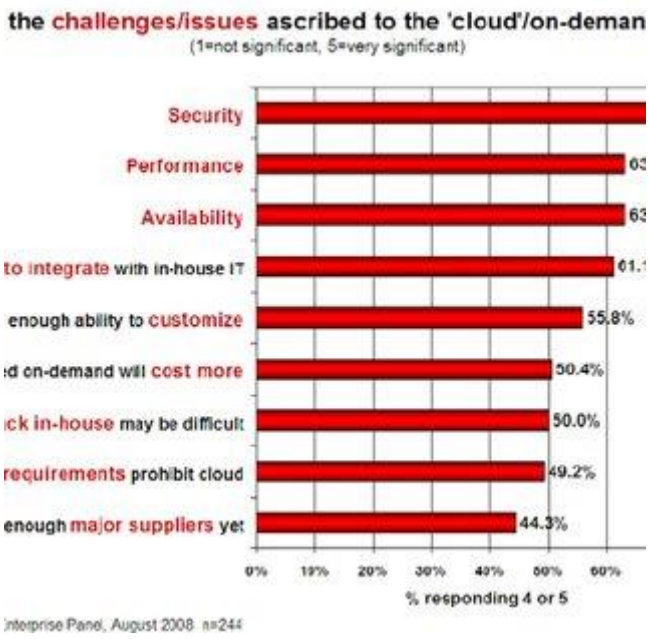

Figure 2. Adoption challenges (Source :- IDC Survey, 2021)

2. Educational Usage of Cloud Computing

Users and clients can use the Cloud to access computational and storage resources [12-13]. It works as a demand-driven service. Cloud computing is a new business model built on cutting-edge technologies like virtualization, software as a service, and high-speed internet access.

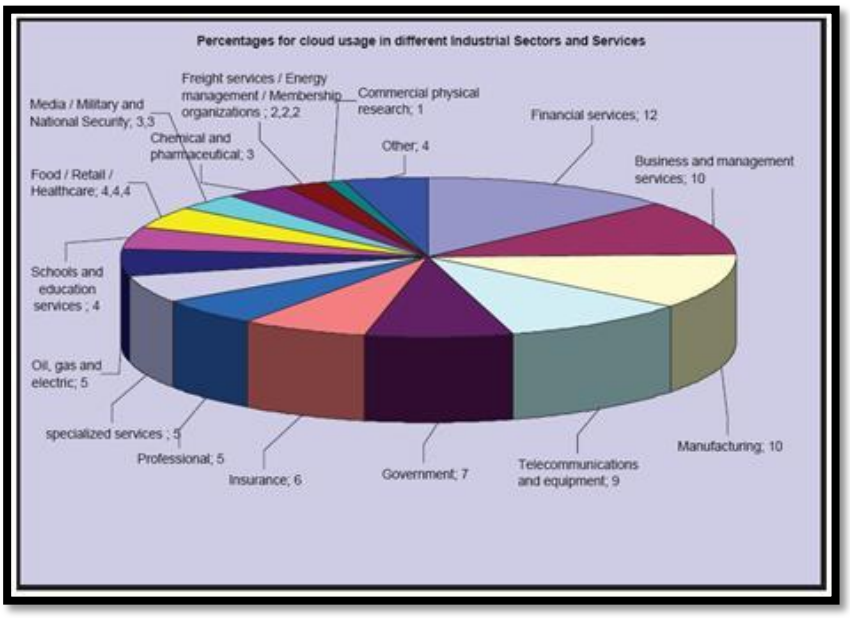

Figure 3. Usage of Cloud

People's interests' parameters have recently been stimulated by new applications and elastic scalability with increased computing power. As a result, these beneficial effects have extended to outsource not just to tools provided, but also to the ongoing IT strategic planning. According to the findings of a 2009 survey on IT trends conducted by Gartner analysts, it has been used more in banking and commerce than in other sectors. The results are shown as a pie chart, with labels indicating various industrial sectors and activities on each slice. The "/" symbol is used to divide fraction of a percent sectors. Fig.3. shows the cloud usage measures.

3. A SWOT Analysis of Cloud Computing

3.1 Strengths

In the event of an increase in demand, the ability to scale up services on demand eliminates the need for underutilized servers. An organization can immediately request more computing resources if its computing needs unexpectedly exceed its installed capacity [14]. Utilizing time-distributed computer resources more effectively is made possible by cloud computing for organizations. One illustration is Smugmug, a photo-sharing platform on the internet. The company's computing demands are rather stable throughout the year; nevertheless, the work in November and December requires five times the usual number of resources. The organization can handle the growing demands for next 2 months while paying the costs of operating a conventional infrastructure for the rest of the year due to cloud computing. One of the elements of maintenance costs is the management of maintenance costs. Technologies can be done much simpler by using a cloud computing solution. Programs, authentication, and information which were on servers and virtualization software can all remain.

3.2 Weakness

Cloud computing must solve a number of problems before it can be considered a successful business computing option. As covered in the last section, businesses will be apprehensive about losing direct control over data stored in the cloud. Until this point, suppliers were unable to guarantee that a firm's data would be kept on a specific server in a specific location. Cloud computing providers work hard to discover answers to this issue as soon as possible. For instance, Amazon Web Services has created the Virtual Private Cloud, which enables companies to use a virtual machine to connect their current facilities to a variety of different AWS compute resources. Huge companies will be leery of entrusting

mission-critical programs to a cloud computing paradigm where providers will be unable to provide the higher service levels and dependability that such circumstances require. For example, the Amazon web applications Service Level Agreement presently pledges to a 99.95 percent yearly availability rate for the last 365 days, which may be suitable for most small and medium-sized businesses but insufficient for mission-critical services in huge companies.

3.3 Opportunities

One of the most exciting aspects of cloud computing is its capacity to assist poor countries in obtaining maximum advantages without incurring the huge upfront costs that have hampered previous ventures. Technology has the ability to do for computation what cell phones did for communication in developing nations: allowing local governments and companies to benefit from the deployment of smart information systems. According to a recent Forrester group study, for 74 percent of Chinese organizations, SaaS is a major priority, with 29 percent planning to launch SaaS projects in the coming year. Ethiopia's government has hired Full Armor, a cloud technology company, to remotely manage 250,000 PCs used by educators across the country, demonstrating the cloud's promise in impoverished countries [15].

3.4 Threats

The risk of a counterattack from entrenched incumbents is one of the most serious worries for cloud servers. While many forward-thinking organizations will see cloud computing as a chance to transform to current innovations that provide interesting possibilities in IT, it is believed that the other IT departments will see it as a danger to their firm's IT culture (in terms of data security, IT audit policies, and so on) or merely job security. Despite the fact that smaller companies have indeed been fast to adapt and even accept cloud computing, larger business clients have voiced concerns about exporting their activities [16].

4. Conclusion

Cloud Computing is a fast growing and developing platform. It provides very keen services to its consumers. Development of Cloud Computing is significantly good in terms of security in educational usage. It gives many ways to access various resources’ platform applications through on-demand web pages. This paper demonstrates the various trending

technologies, features of cloud computing, and security of cloud computing, with their usage in education.

References

[1] Che, Jianhua, et al. "Study on the security models and strategies of cloud computing." Procedia Engineering 23 (2011): 586-593.

[2] Dillon, Tharam, Chen Wu, and Elizabeth Chang. "Cloud computing: issues and challenges." 2010 24th IEEE international conference on advanced information networking and applications. Ieee, 2010.

[3] Ercan, Tuncay. "Effective use of cloud computing in educational institutions." Procedia-Social and Behavioral Sciences 2.2 (2010): 938-942.

[4] Kundra, Vivek. "Federal cloud computing strategy." (2011): 10-46.

[5] Furht, Borko. "Cloud computing fundamentals." Handbook of cloud computing. Springer, Boston, MA, 2010. 3-19.

[6] Research on Cloud Computing Security Problem and Strategy.

[7] Marston, Sean, et al. "Cloud computing—The business perspective." Decision support systems 51.1 (2011): 176-189.

[8] Pallis, George. "Cloud computing: the new frontier of internet computing." IEEE internet computing 14.5 (2010): 70-73.

[9] Wang, Lizhe, et al. "Cloud computing: a perspective study." New generation computing 28.2 (2010): 137-146.

[10] Dikaiakos, Marios D., et al. "Cloud computing: Distributed internet computing for IT and scientific research." IEEE Internet computing 13.5 (2009): 10-13.

[11] Kumar, Anuj, Vinod Jain, and Anupam Yadav. "A new approach for security in cloud data storage for IOT applications using hybrid cryptography technique." 2020 international conference on power electronics & IoT applications in renewable energy and its control (PARC). IEEE, 2020.

[12] Mishra, Rahul, Manish Gupta, and Vikram Rajpoot. "Identifing the Future Security Issues Methods for Secure Data in the Cloud Computing." 2021 5th International Conference on Information Systems and Computer Networks (ISCON). IEEE, 2021.

[13] athor, Sandeep, and Shalini Kumari. "Smart Agriculture System Using IoT and Cloud Computing." 2021 5th International Conference on Information Systems and Computer Networks (ISCON). IEEE, 2021.

[14] Agrawal, Sonal, and Prakhar Maheshwari. "Controlling of Smart Movable Road Divider and Clearance Ambulance Path Using IOT Cloud." 2021 International Conference on Computer Communication and Informatics (ICCCI). IEEE, 2021.

[15] Sunyaev, Ali. "Cloud computing." Internet computing. Springer, Cham, 2020. 195-236.

[16] Gai, Keke, et al. "Blockchain meets cloud computing: a survey." IEEE Communications Surveys & Tutorials 22.3 (2020): 2009-2030.