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Cloud Computing in Science and Technology: A Review

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Abstract: ***The research paper presenting an overview of the basic idea and historical view of cloud computing on theory basis. The aim of this review is to make attention about preceding studies of cloud computing that have common features with the theme of this research paper. By some discussed points , including the advantages of this technology, its subjects, security, and the influence or effect of having cloud computing in an organization.***

Keywords: Cloud computing, Technology, Security, Privacy

1. Introduction

There are various different definitions of the "cloud computing" based on technology difficulties. Cloud Computing is a technology that uses remote servers on the internet to store, manage, and access data online rather than local drives. The term cloud refers to a network or the internet. The data may as files, images, documents, audio, video.

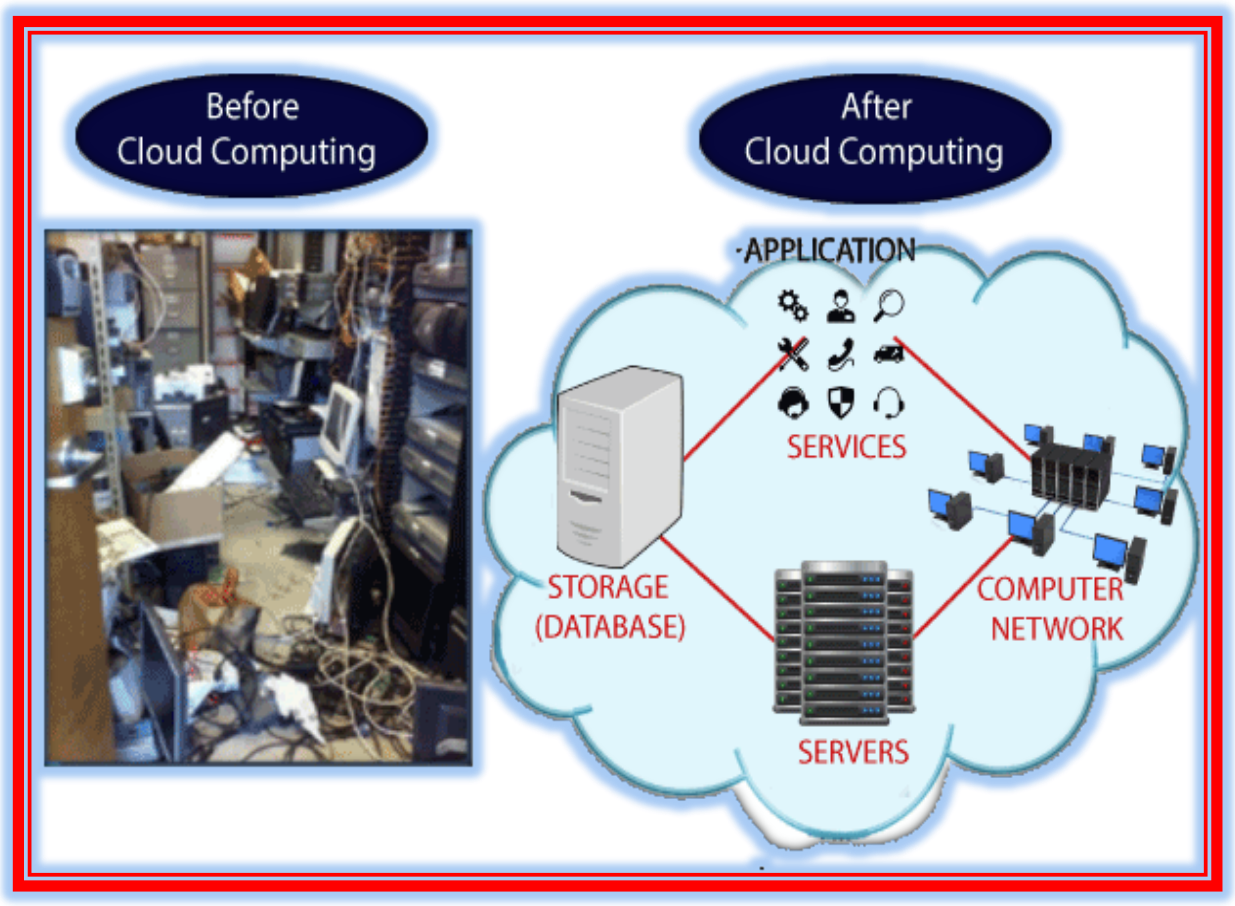

Figure 1: Cloud Computing

There are the following functions of cloud computing:

1) Developing new services and applications
2) Storage, back up, and recovery of data
3) Blogs and websites hosting
4) Provides software on demand
5) Data Analysis
6) Streaming videos and audios

This methodology is the most overvalued and effective strategy for dynamically increasing capabilities or capacity without requiring new infrastructure in all disciplines of engineering, business, and other sciences [1].

U.S. National Institute of Standards and Technology defines cloud computing as a way to provide users with instantaneous on-demand access to a shared pool of

reconfigurable computing resources (such as servers and storage), which can arrive on-time with no disturbance or scalability. Cloud computing as a concept emerged between 2004 and 2005. Prior to 1994, the cloud icon symbolized the Internet concept. When Amazon Web service (AWS) was founded in 2006 with the primary objective of providing utility computing, it developed the industry's fundamental concept of cloud computing. J.C.R. Licklider proposed the concept of an "intergalactic computer network" in the 1960s, while he was accountable with ARPANET (Advanced Research Projects Agency Network) promotion in 1969 [2].

Cloud services' virtualization, quick elasticity, widespread network connectivity, and better performance are the primary drivers of this technology's exponential growth. Typically, with ordinary "off-the-shelf" software packages, an application is installed on the organization's primary server and subsequently on each office computer [3].

2. Architecture of Cloud Computing

Cloud computing technology is applied in both small and big organizations for storage of information in cloud and access it from anywhere by using the internet connection. Cloud computing architecture is a combination of service-oriented architecture and event-driven architecture.

When it comes to architecture, it's hard to tell how cloud computing is equivalent to or different from traditional accessible computing models, or how these equivalences or differences influence the management, functioning, and practical aspects of network and information security procedures. Fig. 1 depicts the many types of cloud employment models. Despite this, some cloud-based services, such as Community cloud and mobile cloud, are commercially viable [3, 4].

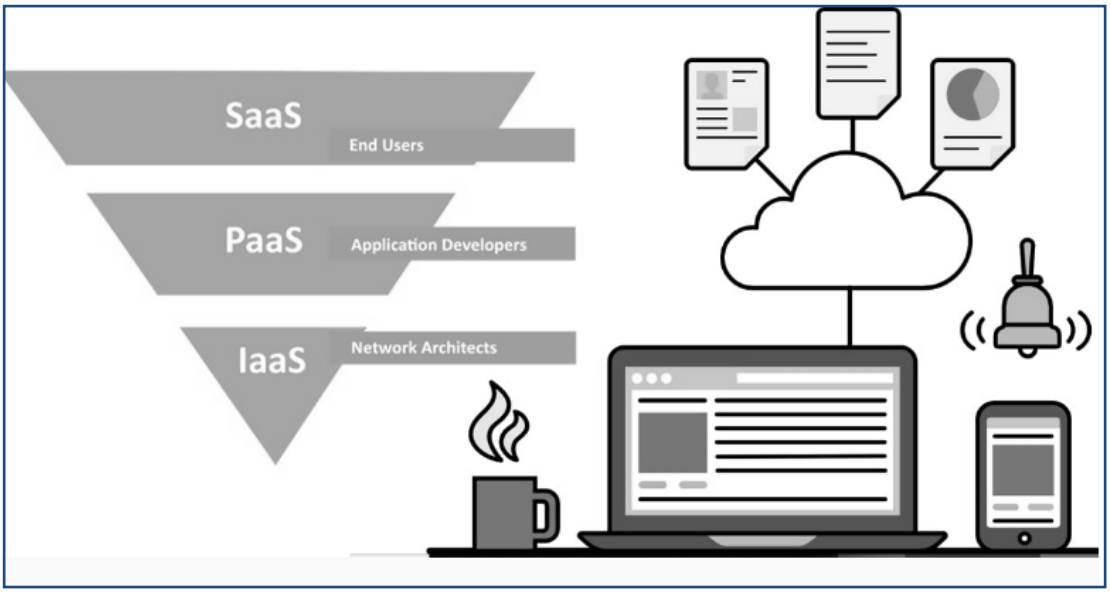

Figure 3: Delivery models of cloud services

In most cases, cloud computing consists of three fundamental components: servers, data centers, and clients [11]. They are all connected via the internet and are accessible as network setups.

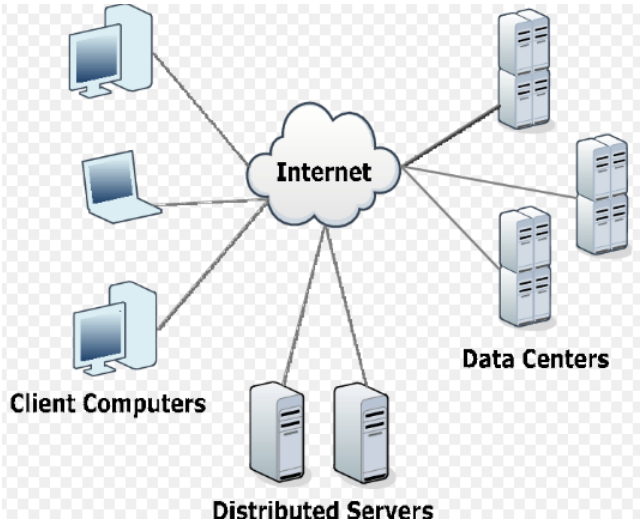

Figure 4: Direct cloud computing network

2.1 Data centers and distributed servers

Typically, data centers house the services that buyers desire at any time. Basically these are big room contains all servers that provide above services and support to their functionality. It is as well potential to incorporate virtual servers that reduce the overall number of physical servers and the resulting gap. Distributed servers refers to groups of servers that are not connected in the same location. There is no issue if these servers are compromised; as a user, you will perceive note no difference. Distributed servers gives better elasticity because their irrelevant location and direct connectivity to the internet . But, we have an option to create a other servers's backup. Additionally, there are no constraints on the intensification of cloud service settings [11, 12].

2.2 Clients

Clients are mostly represented by laptops or desktop PCs. Some of clients are at the moment, includes mobile phones (PDA). PDAs when it comes to cloud computing represent a significant amount of weight. They offer significant mobility

to anyone attempting to reach the cloud.By general rule, there are three different types of clients for differentiating thin, mobile and thick. Mobile clients are always accompanied by mobile phones. Thin clients are run on separate software and hardware. User views may whatever, the server recognizes it, not his personal hard disk and operating system. comparatively thick clients use their hard disks and access the cloud from internet of web browser on a mostly [11, 13].

2.3 Users

Users will come after the clients, naturally. Without users, there will no cloud to be existent. Four distinct types of users can be classified using cloud technology [3,11].The developers of cloud should ensure the development and integrity of the connected services [14].

Developers's responsibility to provide an easy interface to end customers without any intricacy issues. Service authors or makers are quite distinct from developers, despite the fact that their tasks sometimes overlap. Where all developers focus on providing services, writers focus on services of entity that can used directly. But, if developers have no requirement to understand patterns of cloud technology, they can provide only accepted flexibility to employ services [14].

Integration and provisioning specialists are now fully concentrated on end-user solutions. Responsibilities of them are interacting with end users and attempting to meet their requirements. As previously said, the ultimate relevance is placed on the end user. They believe that their cloud services would have simple and uncomplicated interfaces, as well as sustainable and informational terms. On the other hand, children should be far away from all potential hazards. Because, it is difficult to provide secure cloud computing environment, will be discussed more in particular paper. These type of limits do not result in any divergence for users. Number of customers can sign up for cloud services for hours, or for years. Additionally, the service is governed by a Service Level Agreement (SLA) [11].

The SLA incorporates between the two parties's service agreement. This demonstrates that only one party is obliged to provide these types of services to the other party. For example, it describes not just performance conformance but also security and safety compatibility. Cloud computing consists of three layers that are SaaS (software), PaaS (Platform), and IaaS (Infrastructure). All of these conclude with the Service implying that all three provide a various of services to end consumers [5].Definition

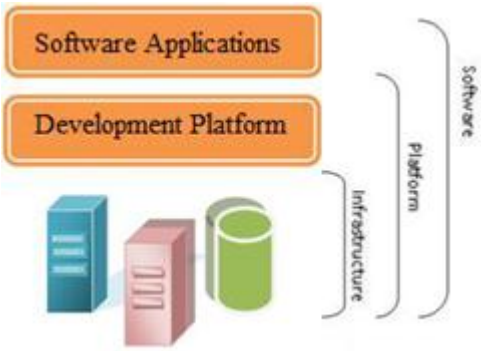

Figure 5: Cloud computing layers of SaaS, PaaS in addition to IaaS

3. Cloud Computing in Comparison with Other Technologies

Definition of cloud computing may be overlap with that of other technologies. This part discusses the importance of appropriately defining cloud computing and its distinctions from other comparable technologies. Basically, these technologies predate cloud computing and are more well-known to the general public. It is critical to distinguish it from cloud computing as such.

Autonomic computing systems are extremely likely to be involved in cloud computing. This computer structure is unique in terms of its operation mechanism. The goal of automatic computing is to make systems available for autonomous work [15].

The difference between grid and cloud computing is complicated although it is direct to understand. Grid computing based on large-scale computation, while cloud computing provides services for large and small sizes. Grid computing maintains a best or continuous level of performance, but cloud computing's primary feature is that it provides performance as needed [16].

With a mainframe, there is also an difference, but there are also some matches. A mainframe can be represented visually as a cloud. Nonetheless, it's logical that a mainframe grants access to staff employees in large organizations where the mainframe is completely central. That is where cloud computing, in addition to its performance, differs. But mainframes always provides best performance, cloud computing delivers it on demand [7].

Additionally, the comparison was conducted using peer-to-peer technologies. The reason for this is that a whole cloud of users consists of both "clients" and "servers" [17].

4. Advantages: Cloud computing

It is clear that cloud computing provides valued advantages to those who utilizing it. This section will explain what these benefits essentially are. The benefits we emphasize are for the collection of end users. As previously said, the primary benefit for any end user is unquestionably the ease with which cloud computing can be implemented at any moment. It operates on pay as you go . To begin, there is no much

space requirement for each installation. Additionally, no maintenance is required for any of the hardware [11, 18].

It is not the technology but the applications that enable the benefits to be realized. The cloud is poured with ready-to-use applications and better than that, the data deputed in these applications can accessible from everywhere on the world at any time. [19].

Quality evaluations are conducted prior to cloud access by SLA verification. In case an association obtains all software and infrastructure on its own then those SLAs are critical for users and can result in increased maintenance costs. Data centers are not only are regarded an indirect advantage, but they are also critical since they are often located in specially designated places to reduce maintenance costs, particularly in low-income countries [19].

Concentrating deeper on cloud users reveals more tangible benefits. Obviously, at the moment, scalability will be primary benefit. Like a company anticipates a tipping point in its IT use, they simply get additional IT services from the cloud. This exemplifies the allure of cloud computing. It's quite simple; as large organizations engage in cloud computing, individuals can also imagine a high level of security [11].

As a result, cloud computing enables the grouping of financial and performance benefits.

5. Cloud Computing: Concerns

Today Modern technologies may be accompanied by risks and unknown elements. Some are analogous to cloud computing. By definition, organizations that are heavily reliant on information technology outsource their operations. Several of them may be involved in their heart dealings. Those associations are launched to face as much threats in the events that their analytical data is exposed to the outside world under conditions of less security. Another problems regarding privacy and legal issues should be considered [3].

While legal difficulties vary by country, there is a general expectation that not every organization will be authorized to use public clouds. It is obvious that there will be an increase in the use of private clouds. In the further discussion privacy, technological, and security related issues will be briefly discussed that are relevant to users [3].

Cloud computing security can be classified into seven different categories. Customer's mentality is representated by these threats. The association does not handle data. Surely, creates a large risk, as there is an appearance of subcontracting. This results in the association communicate any type of security to the subcontracting association [21, 22].

Number of security subjects are likely to have incomplete privacy concerns. These concerns are highly logical since they are inextricably linked. The degrees of handled security resolve privacy in one way or another. As a result, it is not effective to totally reclassify these subjects. Privacy concerns exist since the infrastructure is partially owned by a provider. Probably vital information, such as personal information, is distributed in the cloud environment since it is outside association's screening range and is risky because they cannot identify who is accessing the cloud. They must obtain assurances from the provider that the right of entry is accessible and operated solely by authorized recruits.

Additionally, point of contention is how the cloud is basically operated; it is critical that not everyone has the same level of access to and visibility into all data in the cloud. The in chief administration requires information that is not required of a typical employee. Another , they should provide extra information terms. It is risky for any member of staff to be able to identify vital information from non-critical information, as this could be straightforwardly disclosed to the outside world [3, 11].

6. Security of cloud computing

There are no. of issues remain unresolved in the debate on this subject. Using a dialogue model of many security problems, illustrates methodically the limits that must be considered in order to protect users and customers, Pearson [23],

It is difficult that the cloud has a high degree of transparency. Each user requesting access to the cloud must provide a rationale for the data they wish to access, how they intend to use it, and why they intend to use it. Clearly, the complete cloud user's activity must be verified and clarified. Out of this level of control, data can simply be disclosed to competitors such as Pearson [23].

7. Conclusion

Word ‘cloud’ that is frequently used to refer to the internet. Cloud computing refers to the capability of the internet to supply high-demand computing services like storage and processing power. Have you ever wondered where your posts or emails are kept? To be sure, it is the cloud. Cloud computing has a valued effect on our lives in numerous ways that we are unaware of. It will effect on not only our personal lives, but also on how corporates manage their data and consumers. Cloud computing has significantly improved our healthcare infrastructure and is quietly altering the technical lexicon [25].

The disadvantage is that customizing choices will be restricted. Cloud computing is less expensive owing to economies of scale, and – as with any outsourced activity – you frequently get what you pay for. Reduced selection at a significantly reduced price: this is a feature, not a bug. A cloud provider may not match your legal necessities and that firms must consider the benefits and hazards of cloud computing. Cloud computing limits the cloud vendor's control over the back end infrastructure. Frequently, cloud providers determine management policies that restrict what cloud users can do with their setting out. Cloud users' ownership and managing their programs, data, and services are likewise limited [25].

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