A Review of the Problem with Cloud Data Security andthe Current Countermeasures in Cloud Computing

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Abstract

Cloud computing is the term used to describe the on-demand or pay-per-use provision of resources including servers, networks, and storage via the internet. while cloud computing means helping the IT sector, there is still a need for more satisfactory review and developing in this field. Our contribution to this work is an advanced survey that centers on the notion related to cloud computing and its state-of-the-art research issues. This work clarifies the idea behind cloud computing and highlights critical research questions in this rapidly developing field of computer science. Section 1 contains the introduction, in the section 2, we provide an outline of protection regarding cloud security, section 3 contains the security architecture and section 4 will focus of the cloud computing characteristics. We conclude the paper along with references.

Keywords: Cloud Computing; Security issue Virtualization; Data Center; Server Consolidation; cloud security.

I. INTRODUCTION

The word "cloud" in cloud computing refers to a collection of networks, much as actual clouds are made up of water molecules. The cloud computing capabilities are always available for the user to employ whenever needed. Users typically prefer a middleman provider for internet services in cloud computing over building up their own physical infrastructure. Users only need to pay for the services they really utilize . In cloud computing, workloads can be rearranged to minimize them. Because the networks that make up the cloud manage a load of services, running an application on local computers does not cause a significant load on them . As a result, there is a reduction in the amount of hardware and software that users require. . All we need to have a web browser to use cloud computing. All we need to have a web browser like chrome to use cloud computing.

II. PROTECTION REGARDING CLOUD SECURITY

• Data Confidentiality: This guarantees correctness and consistency with the data provided by the transmitter and shields client information from unauthorized parties.

• Data Integrity: Since data cannot be altered or replaced, it is crucial for safeguarding our privacy.

• Data accessibility: Users can upload, download, and modify data from the cloud at any moment with the help of data accessibility, access control, and full data deletion.

• Privacy protection: To safeguard data from malevolent actors and interested parties, cloud storage companies employ privacy security techniques. But as the information era develops, safety concerns will become a greater obstacle to digitization and existing data security solutions will become insufficient. Safe data storage is impacted by data loss, data breaches, data manipulation, denial of service attacks, and other security flaws.

III. CLOUD ARCHITECTURE

The general cloud architecture's typical structure is in below. There is a sizable server collection in this architecture. The cloud server's access process and culture are reflected in this architecture. Virtualization is the key mechanism; it can be used, for example, to better match the overall workload, to increase server utilization as much as the server's computing power permits. A front-end interface,

like a portal, is offered by the architecture, enabling a user to choose a service from a list.
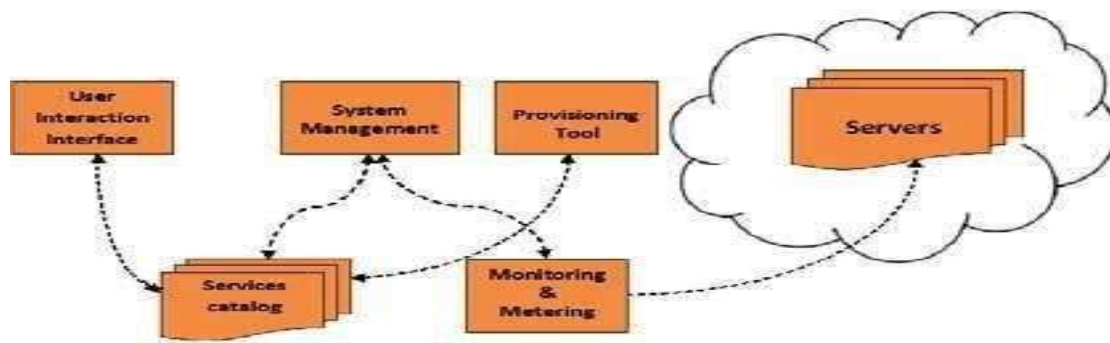
Classifications of Cloud Computing:
There are four primary models of cloud computing deployment based on the architecture, each with distinct qualities that support the needs of the services and cloud users in different ways.

•   **Private Cloud**: The private cloud can be used by different business divisions and constituent groups, or it can be owned by the company and hosted by a third party. Expense-wise, private clouds are more expensive than public ones. Two varieties exist of private clouds: those hosted off-site and those located on-site. One organization uses both types of clouds, but externally hosted private clouds are hosted by other organizations with sufficient expertise in cloud infrastructure. The cost of on-premise private clouds is higher than that of externally hosted private clouds.

•   **Public Cloud**: The cloud service provider companies own the public cloud. Although the virtualization of the cloud infrastructure gives the clients the impression that everything is operating smoothly on their own computer, they actually have no authority to control the cloud; instead, they simply use it to access services. Customers that use public cloud services do not need to purchase any hardware, software, or auxiliary infrastructure because these are owned and operated by the providers. In general, multiple organizations share cloud computing. Public cloud service providers include Google, Amazon, Yahoo, SUN, and others.

•   **Hybrid clouds**: These are composed clouds that have elements both private and public clouds. Each customer creates these clouds according to their own requirements. For instance, a business might choose to build the hybrid cloud to integrate an ERP system operating on their private cloud with a CRM system offered on a public cloud managed by Sales-Force.com.

•   **Community cloud**: This type of infrastructure is shared by a few organizations and serves a particular community with similar concerns (such as mission, security requirements, government, education, and compliance). It could exist on or off campus and be run by the organizations or by a third party.

IV. CLOUD COMPUTING CHARACTERISTICS
Following are the attributes of Cloud Computing:-
   •   On Demand Self-Service: Without requiring direct communication with each service provider, a client has the right to unilaterally supply computing resources, such as storage on a network and server time, as needed automatically.
   •   Wide Network Access: A variety of customer tools are available to enable access to the services offered through the Internet via a standard mechanism.
   •   Rapid Elasticity: - Cloud services will be provisioned quickly and elastically to scale out quickly, and released quickly to scale in, sometimes automatically.
   •   Resource Pooling: Using a multiple-tenant model the supplier aggregates its processing power to serve multiple customers, assigning and reassigning diverse real and digital resources based on demand. Economies of scale are created by combining resources.

- Measurable Service: - The services obtained from various clients are quantifiable. The utilization of the asset will be guided, approximated, and held accountable for the contributor and the asset.
- Multitenacity: This is the sixth cloud computing attribute that the Cloud Security Alliance supports. It alludes to the necessity of governance, isolation, segmentation, service levels, and models for various customer constituencies.

V. SERVICES OF CLOUD COMPUTING

Software Service (SaaS): Software as a service refers to the method of providing an online application as the service. The user only needs to access the program online rather than installing it on his computer. Its user is liberated from handling intricate software and hardware. Users of SaaS are spared from the need to purchase, maintain, and update hardware or software. All the user needs to do to access the application is have an internet connection, which is very simple.

Platform on Demand (PaaS): In PaaS, users get entry to a development environment or platform as a service, allowing them to install and utilize their own code. The client is free to create his own applications that work with the infrastructure of the provider. To obtain the application management capacity, product as a benefit providers offer a predefined combination of the application server and the operating system. As an illustration, consider J2EE, Ruby, and LAMP (Linux, Apache, MySQL, and PHP).

Infrastructure Service (IaaS): IaaS offers a variety of on-demand computing resources, including storage, networks, hardware, operating systems, and storage devices. A wide area network, like the internet, can be used by IaaS users to access the services . For instance, logging into the IaaS platform allows a user to create virtual machines.

VI. SECURITY ISSUE

As Cloud computing highly scalable, it can offer limitless processing power on demand, negating the requirement that cloud service providers make lengthy hardware provisioning plans. Numerous businesses, including Amazon, Google, Microsoft, and others, are moving more quickly to develop cloud computing systems and improve the services they offer to a wider user base. In this paper, we examine the security flaws in the Cloud computing systems which are currently offered by several businesses. Since cloud computing encompasses both the infrastructures (i.e., The system software and hardware in data centers) and applications that are provided as services on the Internet. According to the investigation, security measures offered by businesses these days are insufficient, which makes it difficult for users to adjust to cloud computing systems. As a result, greater attention should be paid to security-related issues like availability, confidentiality, data integrity, control, audit, and so forth. These consist of:

- Availability: Ensuring that cloud computing systems, including applications and infrastructures, are accessible to users at all times and locations is the aim of availability. Because cloud computing systems are web-native, users can access the system (including apps and services) from any location. All cloud computing systems—SaaS, PaaS, IaaS, and so forth—have this feature. The primary methods for improving the availability of the cloud system or the apps hosted on it are hardening and redundancy.
- Confidentiality: This refers to protecting user data in cloud systems from prying eyes. The two primary strategies for reaching this kind of secrecy—physical isolation and cryptography—are widely used by cloud computing providers.
- Data integrity: refers to maintaining information integrity in a cloud system (i.e., not lost or altered by unauthorized users). Maintaining data integrity is essential since it forms the foundation for cloud computing services like Platform as a Service, Software as a Service, and Data as a Service.

- Locations of Data: - Users most likely won't be aware of the precise location their data will be stored and hosted when they use. It is necessary to inquire of service providers about their plans for data storage and alteration in specific arbitration cases, as well as their willingness to fairly abide with local regulations regarding privacy based on customer needs.
- Trust Issue: - Another significant concern with cloud computing is trust. Humans and machines, as humans and machines, can all have trust in one another. A sense of assurance and confidence is central to trust.
- The process of recovering data that has been inadvertently erased, misplaced, or corrupted is known as data recovery..

VII. ADVANTAGES & DISADVANTAGES OF CLOUD

Advantages of Cloud:

•   Cost Saving: Users of cloud computing only pay for the services they actually use. Because the user does not have to buy the infrastructure, maintenance costs are minimal.

•   Flexibility: Scalability is a feature of cloud computing. Your company's operations may need to quickly scale up or down, requiring quick adjustments to hardware and resources. To handle these variations, cloud computing offers flexibility.

•   Enhanced Performance: Generally, cloud computing applications operate on cloud servers. It is not necessary for users to install complex software on their slower computers. This will result in an improvement in the client-side computer's performance.

•   Make information backups and restores It is easier to retrieve and restore data derived from cloud once it has been placed there.

•   The Data's Universal Availability: Through the application of cloud computing services, data may be accessed whenever and wherever needed. All the client has to do is log in to their cloud account, which houses their data.

•   Unlimited Storage Capacity: The client can utilize the cloud service provider's unlimited storage capacity with the aid of cloud services. When the client's storage capacity rises, he or she will only have to pay a little bit more to utilize the cloud server's large storage because installing large storage is more expensive than leasing it.

Disadvantages of Cloud:

•   Internet connection required Continuously: We need an internet connection in order to the cloud's various services on a continuous basis. No one can use the cloud's offline services when the internet is unavailable.

•   Web Accessibility Every piece of information (picture, audio, video, etc.) is stored within cloud computing, on the cloud, and we can access it through a connection to the internet.

•   Inadequate Supervisor the provision source owns, manages, and oversees the entire cloud organization, giving cloud manipulators less control on the intent and execution of services within a cloud framework.

•   Lesser Security: Using public cloud often results in less security because data can be misused or damaged by hackers who may be involved in the public and it is available to the general public.

VIII. CONCLUSION

The newest technologies that are in use extensively worldwide is cloud computing. The organization forfeits authority over the data once it decides to migrate to the cloud. As a result, the significance of data directly correlates with the level of protection required to secure it. Cryptography and trusted computing are essential to cloud security. There are now plenty of cloud platforms accessible for both businesses and education. A brief discussion of the cloud computing's privacy and concerns on security has also been included. We have covered the topics of data recovery, location, security, availability, and integrity in this paper. The solution to these security problems is to build trust since it allows entities to interact securely and swiftly. The cloud computing research hotspot will be these previously mentioned issues.

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