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Security in Cloud Computing Based on Third Party Auditor: A Survey

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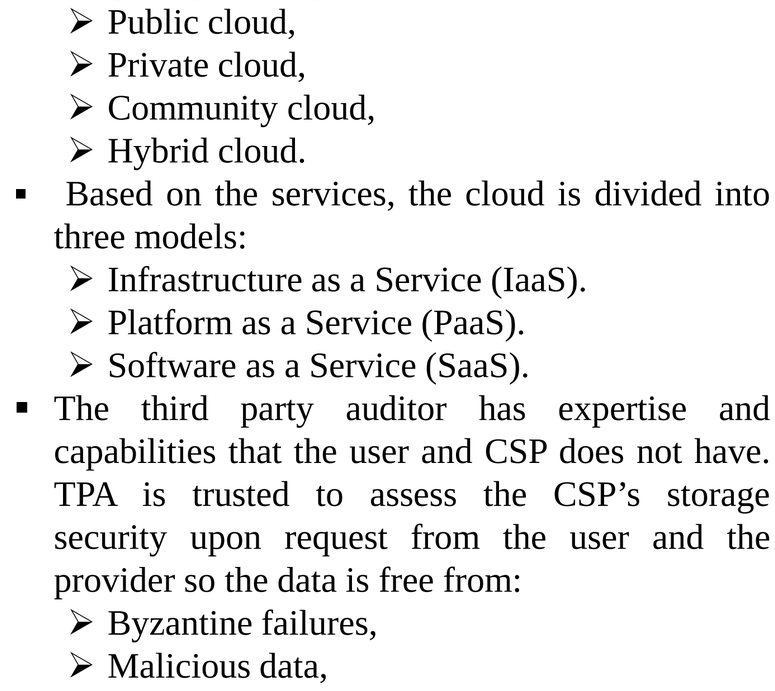
Abstract

This Paper surveys security in cloud computing based on Third Party Auditor (TPA) also known as Trusted Third Party (TTP). There are various security models for safeguarding the client's data in cloud. TPA provides secure connections between the user and the cloud server. Cloud Service Provider (CSP) Provides the clients with cloud storage and service. TPA has access to the client's cloud data and all the critical information. There are many security models for making the TPA more reliable so the clients can trust the third party for storing their data. In this paper, we survey mostly the types of security models based on Third Party Auditing in cloud. We also discuss how these security models enable the third parties to gain the clients trust. The classification has been based on the adopted security method as well as on the kind of threats they are addressing.

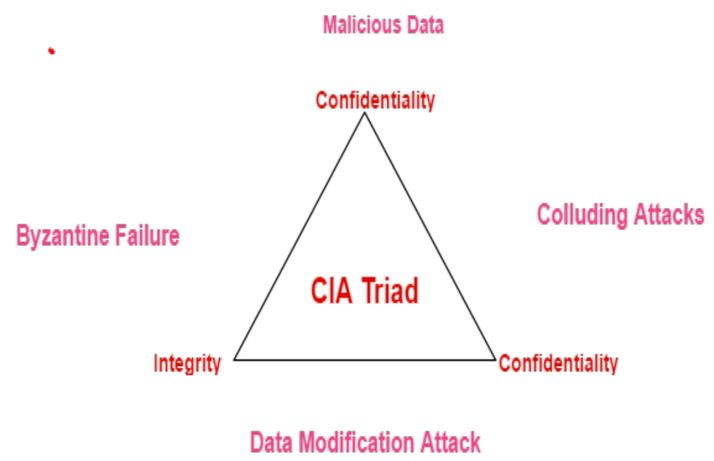
Introduction

- Cloud computing is based on pay as you use computing rather than having local servers or personal devices to handle applications.
- Computing services, such as database transactions, storage, software, computing, and applications, are delivered to local devices through Internet.
- There are four delivery models in cloud computing, namely:
  - Public cloud,
  - Private cloud,
  - Community cloud,
  - Hybrid cloud.
- Based on the services, the cloud is divided into three models:
  - Infrastructure as a Service (IaaS).
  - Platform as a Service (PaaS).
  - Software as a Service (SaaS).
- The third party auditor has expertise and capabilities that the user and CSP does not have. TPA is trusted to assess the CSP's storage security upon request from the user and the provider so the data is free from:
  - Byzantine failures,
  - Malicious data,
  - Data modification attack
  - Server colluding attacks



Cloud Computing Based on Trusted Third Party

Security Threats:



Cloud Computing Vulnerabilities

- *Confidentiality*: only authorized parties or systems having the ability to access protected data.
- *Integrity*: assets can be modified only by authorized parties or in authorized ways.
- *Availability*: the property of a system being accessible and usable upon demand by an authorized entity.
- *Access Control*: the data is illegally accessed due to astringent access control, Authentication and Identification that is due to multi-tenancy resulting into interoperability defects.
- *Cloud Vulnerabilities*: for the third party management models, most security problems stem from:
  - Loss of control
  - Lack of trust
  - Multi-tenancy

Methods for improving security in TPA

RECAPITULATION TABLE

Security Model	Security Requirements	Threats	Advantages
Novel Third Party Auditor Scheme	• RSA: used for encryption algorithm and Bilinear Diffie-Hellman: used to secure the keys while exchanging them. • Bilinear Diffie-Hellman being the proper method to exchange keys which allows two entities to share secret keys without any prior knowledge.	• Data storage security.	• Complexity in computing is reduced. • Confidentiality of users in cloud environment. • Authentication is secure.
Proof of Retrievability Scheme (OPoR)	• The different entities present in this scheme are Client, Cloud Storage Server and Cloud Audit Server. • Files which are remotely stored are audited by using a cloud server which is independent of the storage server.	• Reset attacks occur during upload phase against storage.	• Significantly reduced computation overhead. • Both dynamic data operation and public verifiability is supported.
Layered Interleaving Technique	• To tolerate multiple failures, erasure correcting code is used. • TPA delegates the task of verification in order to save time on user's side. • Challenge token verification, correctness verification and data recovery are the steps involved in this technique.	• During data auditing TPA should not learn the user's data content.	• Highly efficient in recovering the singleton losses. • Recovering the bursty data losses.
Privacy Negotiation Language (PNL) Mechanism	• PNL mechanism is based on description logic. • To guarantee the availability, erasure code in file distribution is used. • Public auditing is required for stored data; hence TPA is used.	• Does not guarantee the security of user privacy data.	• Protects the user data from being misused. • Protects against byzantine failures by dynamic data operation and server colluding attacks in cloud.
Privacy-preserving Public Auditing for Shared Cloud Data	• Proxy re-signature scheme is used for outsourcing the updated operations. • Encryption is done by dynamic broadcast in order to distribute securely the private key to the dynamic group members.	• TPA consumes more time and bandwidth to achieve high error detection probability.	• Highly efficient for dynamic groups. • Public auditability and data dynamic for remote data integrity check.
Securing the cloud storage audit service	• It's based on feedback based audit scheme. • It's a light weight protocol and for the computational audit it adopts multi-TPAs. • Three phases: Setup, release and execute phase • User executes the final verification task.	• Processing proofs is required. • Running time analysis should be done.	• Frame and colluding attacks are prevented.

Conclusion

In this paper, we have surveyed the main security models and the techniques they are using to overcome the security issues. The focus is centered based on Third Party Auditor in cloud computing which does the auditing process on behalf of the client, establishes the secure connection and guarantees the integrity of the data. The classification has been based on:

- The adopted security methods
- The kind of threats these methods are addressing.

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