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RELIABLE CLOUD STORAGE SERVICES WITH DATA INTEGRITY

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ABSTRACT

Cloud computing is now days emerging field because of its performance, high availability, low cost. In the cloud many services are provided to the client by cloud. Data store is main future that cloud service provides to the companies to store huge amount of storage capacity. But still many companies are not ready to implement cloud computing technology due to lack of proper security control policy and weakness in protection which lead to many challenge in cloud computing. In this article, we focus on cloud data storage security, which has always been an important aspect of quality of service. To ensure the correctness of users' data in the cloud, we propose an effective and flexible distributed scheme with two salient features, opposing to its predecessors. The main objectives of this paper are, 1) To prevent Data access from unauthorized access, it propose a distributed scheme to provide security of the data in cloud. 2) And also performs some of the tasks like data updating, deleting, appending.

KEYWORDS

Cloud Computing, Architecture, Data, Integrity, Services.

1. INTRODUCTION

Cloud typically contains a virtualized significant pool of computing resources, which could be reallocated to different purposes within short time frames. The entire process of requesting and receiving resources is typically automated and is completed in minutes. The cloud in cloud computing is the set of hardware, software, networks, storage, services and interfaces that combines to deliver aspects of computing as a service. Share resources, software and information are provided to computers and other devices on demand. It allows people to do things they want to do on a computer without the need for them to buy and build an IT infrastructure or to understand the underlying technology. Through cloud computing clients can access standardized IT resources to deploy new applications, services or computing resources quickly without reengineering their entire infrastructure, hence making it dynamic.

The core concept of cloud computing is reducing the processing burden on the users terminal by constantly improving the handling ability of the cloud. All of this is available through a simple internet connection using a standard browser.

However there still exist many problems in cloud computing today, a recent survey shows that data security and privacy risks have become the primary concern for people to shift to cloud computing.

2. RELATED CONCEPT ABOUT CLOUD

Cloud computing is the most demanding and emerging technology throughout the world. Cloud computing is an Internet based computer technology.

2.1 DEPLOYMENT CLOUD MODELS

- Public cloud: the cloud infrastructure is made available to the general public people or a large industry group and provided by single service provider selling cloud services.
- Private cloud: the cloud infrastructure is operated solely for an organization. The main advantage of this model is the security, compliance and QoS.
- Community cloud: the cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns like security requirements, policy, and compliance considerations.
- Hybrid cloud: the cloud infrastructure is a combination of two or more clouds. It enables data application portability through load balancing between clouds.

2.2 CLOUD CHARACTERISTICS

- On demand service: cloud is large resource and service pool that you can get service or resource whenever you need by paying amount that you used.
- Ubiquitous network access: cloud provides services everywhere though standard terminal like mobile phones, laptops and personal digital assistants.
- Easy use: the most cloud provider's offers internet based interfaces which are simpler than application program interfaces so user can easily use cloud services.
- Business model: cloud is a business model because it is pay per use of service or resource.
- Location independent resource pooling: the providers computing resources are pooled to serve multiple customers using multitenant model with different physical and virtual resources dynamically assigned and reassigned according to demand.

2.3 CLOUD SOLUTIONS

- Infrastructure as a service: it delivers a platform virtualization environment as a service rather than purchasing servers, software, data centers.
- Software as a service: it is software that is deployed over internet and or is deployed to run behind a firewall in your LAN or PC.
- Platform as a service: this kind of cloud computing provide development environment as a service. You can use the middleman's equipment to develop your own program and deliver it to the users through internet and servers.
- Storage as a service: this is database like services billed on a utility computing basis, e.g., gigabyte per month.
- Desktop as a service: this is the provisioning of the desktop environment either within a browser or as a terminal server.

3. CLOUD ARCHITECTURE

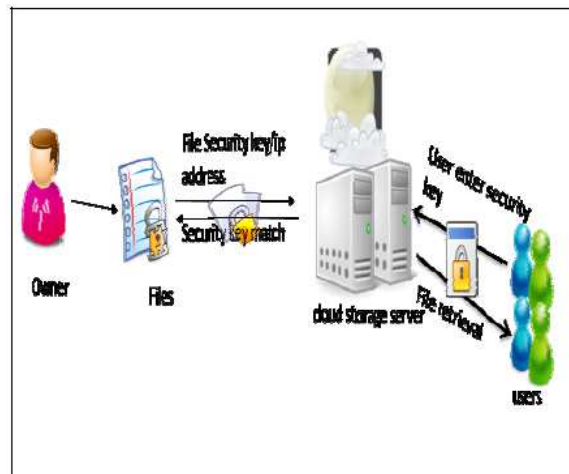
From the perspective of data security in cloud, this has always been an important aspect of quality of service. The data stored in the cloud may be frequently updated by the users, including insertion, deletion, modification, appending, reordering, etc. To ensure storage correctness under dynamic data update is hence of paramount importance. In [1], as cloud based services continues to grow, it has become clear that one of the key barriers to rapid adoption of enterprise cloud services is customer concern over data security (confidentiality, integrity, and availability).

According to sun micro systems, the concept of transparent security makes the case that the intelligent disclosure of security design, practices, and procedures can help to improve customer confidence. According to

K Ren, C.Wang and Q.Wang, cloud storage allows data owners to outsource their data to cloud.

However owners no longer have physical possession of the outsourced data raises big security concerns on the storage correctness. Hence, enabling secure storage auditing in the cloud environment with new approaches becomes imperative and challenging.

FIG 3.1: L CLOUD ARCHITECTURE



4. PROBLEM STATEMENT & PROPOSED WORK

The cloud services present many challenges to an organization. When an organization migrates to consuming cloud services, and especially public cloud services, much of the computing system infrastructure will now be under the control of cloud service provider. Many of these challenges should be addressed through management initiatives.

These management initiatives will require clearly delineating the ownership and responsibility roles of both the cloud provider and the organization functioning in the role of customer.

Security managers must be able to determine what detective and preventative controls exist to clearly define security posture of the organization. Although proper security controls must be implemented based on asset, threat, and vulnerability risk assessment matrices. Cloud computing security risk assessment reports mainly from the vendor's point of view about security capabilities analyzed security risks faced by the cloud. Here are security risks list.

- Regulatory compliance: cloud computing providers who refuse to external audits and security certifications.
- Privileged user access: sensitive data processed outside the organization brings with it an inherent level of risk.
- Data location: when you use cloud, you probably won't know exactly where your data is hosted.
- Data segregation: data in the cloud is shared environment alongside data from other customers.
- Recovery: even if you don't know where your data is, a cloud provider should tell you what will happen to your data and service in case of a disaster.
- Investigative support: investigating inappropriate or illegal activity may be impossible in cloud computing.
- Long term viability: you must be sure your data will remain available even after such an event.

4.1 PROPOSED WORK

The cloud computing is a virtual environment that requires transfer data throughout the cloud. Therefore, several data storage concerns can arise. Typically, users will know neither the exact location of their data nor the other sources of the data collectively stored with theirs. To preserve security of your cloud-based virtual infrastructure, perform security best practice at both the traditional IT and virtual cloud. To ensure data confidentiality, authentication, integrity, and availability, the provider should include the following:

- Encryption: the sensitivity of data may require that the network traffic to and from the virtual machine be encrypted, using encryption at the host OS software.
- Physical security: keep the virtual system and cloud management hosts safe and secure behind carded doors, and environmentally safe.
- Authentication and access control: the authentication capabilities within your virtual system should copy the way your other physical systems authenticate. One-time passwords and biometrics should all be implemented in the same manner. Also authentication requires while you are sending data or message from one cloud to another cloud. To provide message authentication we will use digital signatures.
- Separation of duties: as systems get more complex, misconfigurations take place, because of lack of expertise coupled with insufficient communication. Be sure to enforce least privileges with access controls and accountability.
- Configuration, change control, and patch management: this is very important and sometimes overlooked in smaller organizations. Configuration, change control, patch management, and updated processes need to be maintained in the virtual world as well as the physical world.
- Intrusion detection and prevention: what's coming into and going out of your network has to be known. A host-based intrusion prevention system coupled with a hypervisor-based solution could examine for virtual network traffic.

5. REED-MULLER CODING

TECHNIQUES

Reed-Muller codes are among the oldest known codes and have found widespread applications. They were discovered by Muller and provided with a decoding algorithm by Reed in 1954.

These codes were initially given as binary codes, but modern generalizations to q-ary codes exist. We will restrict our investigation to the binary case.

One of the interesting things about these codes is that there are several ways to describe them and we shall look at two of these. One reason for doing this is to see how to move to the generalization even though we will not do so. For each positive integer m and each integer r with $0 \leq r \leq m$, there is an r th order Reed-Muller Code $R(r, m)$. We start our definition by considering the 1st order case ($r = 1$).

Definition: The (first order) **Reed-Muller codes** $R(1, m)$ are binary codes defined for all integers $m \geq 1$, recursively by:

(i) $R(1, 1) = \{00, 01, 10, 11\} = \mathbb{Z}_2^2$.

(ii) for $m > 1$,

$R(1, m) = \{(u, u), (u, u+1) : u \in R(1, m-1) \text{ and } \mathbf{1} = \text{all } 1 \text{ vector}\}.$

One reason that Reed-Muller codes are useful is that there is a simple decoding algorithm for them.

We illustrate the method known as Reed Decoding with an example. Consider the code $\mathcal{R}(1,3)$ with generator matrix:

$$\begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 \end{pmatrix}$$

The rows of this matrix are basis vectors for the code; label them v_0, v_1, v_2 and v_3 . Any vector v of the code is a linear combination of these, i.e., $v = a_0 v_0 + a_1 v_1 + a_2 v_2 + a_3 v_3$. Written as a vector, we have $v = (a_0, a_0 + a_1, a_0 + a_2, a_0 + a_1 + a_2, a_0 + a_3, a_0 + a_1 + a_3, a_0 + a_2 + a_3, a_0 + a_1 + a_2 + a_3)$.
 $v = (a_0, a_0 + a_1, a_0 + a_2, a_0 + a_1 + a_2, a_0 + a_3, a_0 + a_1 + a_3, a_0 + a_2 + a_3, a_0 + a_1 + a_2 + a_3)$
 If no errors occur, a received vector $r = (y_0, y_1, y_2, y_3, y_4, y_5, y_6, y_7)$ can be used to solve for the a_i other than a_0 in several ways (4 ways for each) namely:

$$a_1 = y_0 + y_1 = y_2 + y_3 = y_4 + y_5 = y_6 + y_7$$

$$a_2 = y_0 + y_2 = y_1 + y_3 = y_4 + y_6 = y_5 + y_7$$

$$a_3 = y_0 + y_4 = y_1 + y_5 = y_2 + y_6 = y_3 + y_7$$

If one error has occurred in r , then when all the calculations above are made, 3 of the 4 values will agree for each a_i , so the correct value will be obtained by majority decoding. Finally, a_0 can be determined as the majority of the components of $r + a_1 v_1 + a_2 v_2 + a_3 v_3$ (why?).

6. IMPLEMENTATION

The Security Development Lifecycle (SDL) is a software development security assurance process consisting of security practices grouped by seven phases Investigation, Analysis, Logical design, Physical design, Implementation, Maintenance.

Phase1. Investigation: Define project processes and goals, and document them in the program security policy.

Phase2. Analysis: Analyze existing security policies and programs, analyze current threats and controls, examine legal issues, and perform risk analysis.

Phase3. Logical design: Develop a security blueprint, plan incident response actions, plan business responses to disaster, and determine the feasibility of continuing and/or outsourcing the project.

Phase4. Physical design: Select technologies to support the security blueprint, develop a definition of a successful solution, design physical security measures to support technological solutions, and review and approve plans.

Phase5. Implementation: Buy or develop security solutions. At the end of this phase, present a tested package to management for approval.

Phase6. Maintenance: Constantly monitor, test, modify, update, and repair to respond to changing threats.

6.1 MAIN MODULES

6.1.1 Client Module

The client sends the query to the server. Based on the query the server sends the corresponding file to the client. Before this process, the client authorization step is involved. In the server side, it checks the client name and its password for security process. If it is satisfied and then received the queries from the client and search the corresponding files in the database. Finally, find that file and send to the client.

If the server finds the intruder means, it set the alternative Path to that intruder.

6.1.2 System Module

i) User

Users, who have data to be stored in the cloud and rely on the cloud for data computation, consist of both individual consumers and organizations.

ii) Cloud Service Provider (CSP)

A CSP, who has significant resources and expertise in building and managing distributed cloud storage servers, owns and operates live Cloud Computing systems.

iii) Third Party Auditor (TPA)

An optional TPA, who has expertise and capabilities that users may not have, is trusted to assess and expose risk of cloud storage services on behalf of the users upon request.

6.1.3 Cloud Data Storage Module

Cloud data storage, a user stores his data through a CSP into a set of cloud servers, which are running in a simultaneous, the user interacts with the cloud servers via CSP to access or retrieve his data. In some cases, the user may need to perform block level operations on his data. Users should be equipped with security means so that they can make continuous correctness assurance of their stored data even without the existence of local copies. In case that users do not necessarily have the time, feasibility or resources to monitor their data, they can delegate the tasks to an optional trusted TPA of their respective choices. In our

model, we assume that the point-to-point communication channels between each cloud server and the user is authenticated and reliable, which can be achieved in practice with little overhead.

6.1.4 Cloud Authentication Server

The Authentication Server (AS) functions as any AS would with a few additional behaviors added to the typical client-authentication protocol. The first addition is the sending of the client authentication information to the masquerading router. The AS in this model also functions as a ticketing authority, controlling permissions on the application network.

The other optional function that should be supported by the AS is the updating of client lists, causing a reduction in authentication time or even the removal of the client as a valid client depending upon the request.

6.1.5 Misbehaving server model

When the user enters into cloud server and the user will start to access the file, but at the same time an unauthorized user enters into the cloud server without the proper authentication to the cloud server the particular IP address will be noticed and it makes some attention to the cloud owner.

7. CONCLUSION

This paper briefly explained the problems of data security in cloud data storage. And also provided a way out to ensure user correctness.

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