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An Efficient Public Auditing Mechanism with Preserving Identity Privacy and Supporting Traceability

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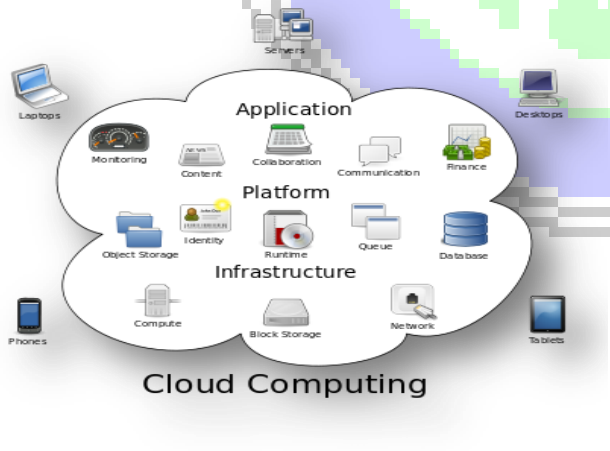
ABSTRACT:

As future enhancement, we enhance the Oruta system in two interesting problems we will continue to study for our future work. One of them is traceability, which means the ability for the group manager (i.e., the original user) to reveal the identity of the signer based on verification metadata in some special situations. Since Oruta is based on ring signatures, where the identity of the signer is unconditionally protected, the current design of ours does not support traceability. To the best of our knowledge, designing an efficient public auditing mechanism with the capabilities of preserving identity privacy and supporting traceability is still open. Another problem for our future work is how to prove data freshness (prove the cloud possesses the latest version of shared data) while still preserving identity privacy.

INTRODUCTION:

Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the common use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's data, software and computation. Cloud computing consists of hardware and software resources made available on the Internet as managed third-party services. These services typically provide access to advanced software applications and high-end networks of server computers.



Structure of cloud computing

How Cloud Computing Works?

The goal of cloud computing is to apply traditional supercomputing, or high-performance computing power, normally used by military and research facilities, to perform tens of trillions of computations per second, in consumer-oriented applications such as financial portfolios, to deliver personalized information, to provide data storage or to power large, immersive computer games.
The cloud computing uses networks of large groups of servers typically running low-cost consumer PC technology with specialized connections to spread data-processing chores across them. This shared IT infrastructure contains large pools of systems that are linked together. Often, virtualization techniques are used to maximize the power of cloud computing.

Characteristics and Services Models:

The salient characteristics of cloud computing based on the definitions provided by the National Institute of Standards and Terminology (NIST) are outlined below:

- **On-demand self-service**: A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service's provider.
- **Broad network access**: Capabilities are available over the network and accessed through standard mechanisms that promote

use by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and PDAs).

- **Resource pooling**: The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location-independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or data center). Examples of resources include storage, processing, memory, network bandwidth, and virtual machines.
- **Rapid elasticity**: Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.

Measured service: Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be managed, controlled, and reported providing transparency for both the provider and consumer of the utilized service.

IMPLEMENTATION

MODULES:

- Cloud server
- Group of users
- Public verifier
- Auditing Module

MODULES DESCRIPTION:

Cloud server

- ✓ In the first module, we design our system with Cloud Server, where the datas are stored globally. Our mechanism, Oruta, should be designed to achieve following properties:
- ✓ (1) Public Auditing: A public verifier is able to publicly verify the integrity of shared data without retrieving the entire data from the cloud.
- ✓ (2) Correctness: A public verifier is able to correctly verify shared data integrity.
- ✓ (3) Unforgeability: Only a user in the group can generate valid verification metadata (i.e., signatures) on shared data.
- ✓ (4) Identity Privacy: A public verifier cannot distinguish the identity of the signer on each block in shared data during the process of auditing.

Group of users

- ✓ There are two types of users in a group: the original user and a number of group users. The original user initially creates shared data in the cloud, and shares it with group users. Both the original user and group users are members of the group. Every member of the group is allowed to access and modify shared data. Shared data and its verification metadata (i.e., signatures) are both stored in the cloud server. A public verifier, such as a third party auditor providing expert data auditing services or a data user outside the group intending to utilize shared data, is able to publicly verify the integrity of shared data stored in the cloud server.
- ✓ Owner Registration: In this module an owner has to upload its files in a cloud server, he/she should register first. Then only he/she can be able to do it. For that he needs to fill the details in the registration form. These details are maintained in a database.
- ✓ Owner Login: In this module, owners have to login, they should login by giving their email id and password.
- ✓ User Registration: In this module if a user wants to access the data which is stored in a cloud, he/she should register their details first. These details are maintained in a Database.
- ✓ User Login: If the user is an authorized user, he/she can download the file by using file id which has been stored by data owner when it was uploading.

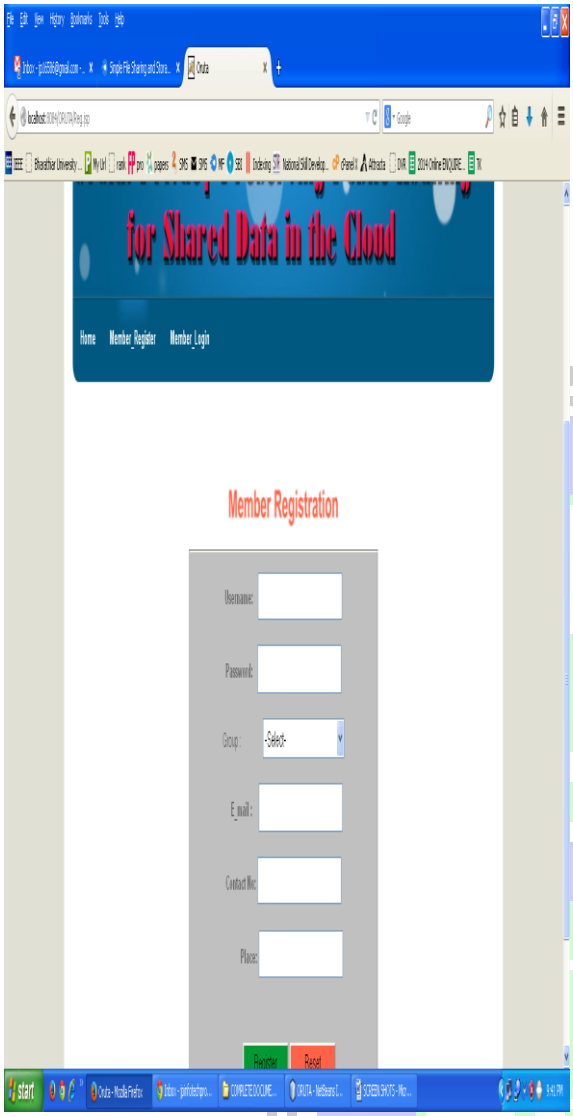
Public verifier

- ✓ When a public verifier wishes to check the integrity of shared data, it first sends an auditing challenge to the cloud server. After receiving the auditing challenge, the Cloud server responds to the public verifier with an auditing proof of the possession of shared data.
- ✓ Then, this public verifier checks the correctness of the entire data by verifying the correctness of the auditing proof. Essentially, the process of public auditing is a challenge and- response protocol between a public verifier and the cloud server

Auditing Module

- ✓ In this module, if a third party auditor TPA (maintainer of clouds) should register first. This system allows only cloud service providers. After third party auditor gets logged in, He/ She can see how many data owners have uploaded their files into the cloud. Here we are providing TPA for maintaining clouds.
- ✓ We only consider how to audit the integrity of shared data in the cloud with static groups. It means the group is pre-defined before shared data is created in the cloud and the membership of users in the group is not changed during data sharing.
- ✓ The original user is responsible for deciding who is able to share her data before outsourcing data to the cloud. Another interesting problem is how to audit the integrity of shared data in the cloud with dynamic groups — a new user can be added into the group and an existing group member can be revoked during data sharing — while still preserving identity privacy.

RESULTS:



CONCLUSION

In this paper, we propose Oruta, a privacy-preserving public auditing mechanism for shared data in the cloud. We utilize ring signatures to construct homomorphic authenticators, so that a public verifier is able to audit shared data integrity without retrieving the entire data, yet it cannot distinguish who is the signer on each block. To improve the efficiency of verifying multiple auditing tasks, we further extend our mechanism to support batch auditing. There are two interesting problems we will continue to study for our future work. One of them is traceability, which means the ability for the group manager (i.e., the original user) to reveal the identity of the signer based on verification metadata in some special situations. Since Oruta is based on ring signatures, where the identity of the signer is unconditionally protected [21], the current design of ours does not support traceability. To the best of our knowledge, designing an efficient public auditing mechanism with the capabilities of preserving identity privacy and supporting traceability is still open. Another problem for our future work is how to prove data freshness (prove the cloud possesses the latest version of shared data) while still preserving identity privacy.

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