

# Cloud Storage

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# What is cloud storage?

Cloud storage is a cloud computing model that enables storing data and files on the internet through a cloud computing provider that you access either through the public internet or a dedicated private network connection.

- The provider securely stores, manages, and maintains the storage servers, infrastructure, and network to ensure you have access to the data when you need it at virtually unlimited scale, and with elastic capacity.
- Cloud storage removes the need to buy and manage your own data storage infrastructure, giving you agility, scalability, and durability, with any time, anywhere data access.

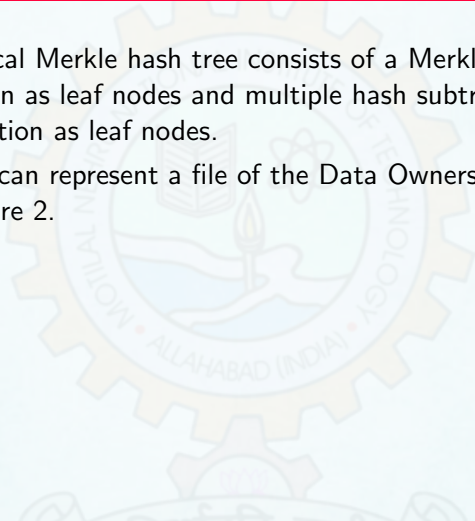
# Use of Merkel tree in it

- In cloud storage mode, users lose physical control over their data.
- To enhance the security of outsourced data, it is vital to audit the data integrity of the data owners.
- However, most of the current audit protocols have a single application scenario and cannot accommodate the actual needs of individuals and enterprises.
- In this research, a safe and efficient auditing scheme is proposed that is based on a hierarchical Merkle tree.
- In addition, we achieve incomplete data recovery through log analysis, which greatly reduces the number of replicas of files under the premise of multi-copy auditing, reduces the burden on cloud service providers, and improves the fairness of audit protocols

# Hierarchical Merkle Hash tree (1/3)

## HMHT

- The hierarchical Merkle hash tree consists of a Merkle hash tree with file information as leaf nodes and multiple hash subtrees with data block information as leaf nodes.
- Each subtree can represent a file of the Data Owners; its structure is shown in Figure 2.



# Hierarchical Merkle Hash tree (2/3)

## HMHT

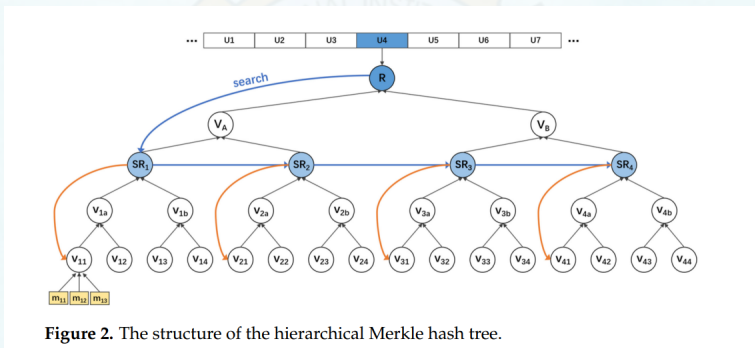


Figure 2. The structure of the hierarchical Merkle hash tree.

file:Figure2.png

- In the construction process of the HMHT:

# Hierarchical Merkle Hash tree (3/3)

## HMHT

- The aggregate hash is first calculated for all copies of every block in all files.
- We construct the leaf nodes of all subtrees with these aggregated hashes, then the hash concatenation operation is performed upward to obtain the subtrees corresponding to all files.
- The root nodes of the subtrees (such as SR1, SR2, SR3, and SR4) are the authoritative nodes of the HMHT.
- Finally, the root nodes of all the subtrees are used as the leaf nodes of the HMHT to perform the hash concatenation operation in turn, to obtain the root node (R) of the entire HMHT.
- We set different attributes for the nodes of different levels in the HMHT to reduce redundant information storage.