Block Chain Based Framework for Data Storage Management with Deduplication in Cloud Computing

Kirti Deshpande[1], Prof.A.A.Junnarkar[2]
[1]*PG Student*
[2]*Faculty*
[3]*P.E.S.Modern College Of Engineering, Shivajinagar, Pune.*

Abstract– SAAS (Storage as a service) as one of the most important cloud computing services helps cloud users overcome the bottleneck of limited resources and expand storage without upgrading their devices. To ensure the safety and security of cloud users, data is always outsourced in encrypted format. However, encrypted data could generate a lot of storage waste in the cloud and complicate the exchange of data between authorized users. We are still facing challenges in storage and management encrypted data with deduplication. Traditional deduplication schemes always focus on particular application scenarios, where deduplication is completely controlled by data owners or servers in the cloud. They cannot flexibly satisfy the different requests from data owners based on the level of sensitivity of the data. In this paper, scheme that flexibly offers both deduplication scheme management and data security using blockchain at the same time through cloud service providers (CSPs). Author evaluate your performance with security analysis, comparison and implementation.

Keywords- Blockchain, Cloud Computing, Data deduplication, Access Control, Storage Management.

I. Introduction

Although the storage system in the cloud has been adopted mostly does not meet some important emerging needs, such as the ability to verify the integrity of files in the cloud by customers in the cloud and the detection of duplicate files on servers in the cloud. Author report both problems below. These servers in the cloud can free customers from the heavy burden of storage management and maintenance. The biggest difference between cloud storage and traditional internal storage is that data is transferred over the Internet and stored in an uncertain domain, which is not under the control of customers, which inevitably raises major concerns about your data integrity. These concerns stem from the fact that cloud storage is affected by security threats both outside and inside the cloud, and servers in the uncontrolled cloud can passively hide some episodes of customer data loss to maintain its reputation What is more serious is that to save money and space, cloud servers can even exclude an active and deliberate data file that we only have access to and belong to a common customer. Given the large size of outsourced data files and the limited capacity of customer resources, the first problem is widespread so the customer can perform integrity checks effectively, even without a local copy of the data file. Cloud computing is computing in which large groups of remote servers are networked to allow centralized data storage and online access to services or IT resources.

With cloud computing, large groups of resources can be connected via a private or public network. In the public cloud, services (that is, applications and storage space) are available for general use on the Internet. A private cloud is a virtualized data center that operates within a firewall. Cloud computing provides computing and storage resources on the Internet. The increasing amount of data is stored in the cloud, and users with specific privileges share it, which defines special rights to access stored data. Managing the exponential growth of a growing volume of data has become a critical challenge. According to the IDC 2014 cloud report, companies in India are gradually moving from the legacy of premise to different forms of cloud. As the process is gradual, it began during the migration of some cloud application workloads. To perform scalable management of data stored in cloud computing, deduplication has been a well-known technique that has become more popular recently. Deduplication is a specialized data compression technique that reduces storage space and charges bandwidth in cloud storage. In deduplication, only a single instance of data is actually on the server and the redundant data is replaced with a pointer to the copy of the unique data. Deduplication can occur at the file or block level. From the user's point of view, security and privacy issues arise, as data is susceptible to internal and external attacks. Solve this security issues using block chain technology.We must properly apply the confidentiality, integrity verification and access control mechanisms of both attacks. Deduplication does not work with traditional cryptography. The user encrypts their files with their own individual encryption key, a different encryption text may also appear for identical files. Therefore, traditional cryptography is incompatible with data duplication. Converged encryption is a widely used technique for combining storage savings with deduplication to ensure confidentiality. In converged encryption, data copy is encrypted with a key derived from the data hash. This converging key is used to encrypt and decrypt a copy of data. After key generation and data encryption, users keep keys and send encrypted text to the cloud. Because cryptography is deterministic, copies of identical data will generate the same convergent key and the same encrypted text. This allows the cloud to duplicate encrypted texts. Cryptographic texts can only be decrypted by the owners of the corresponding data with their converging keys. Differential authorization duplication control is an authorized duplication elimination technique in which each user is granted a set of privileges during system initialization. This privilege set specifies what types of users can perform duplicate checks and access files.

A. *Motivation*

India is transferring into digital data for that reason; all sectors have to enhance the security of data which is stored on data center and cloud. Because in last few years there are lots of incidents happened where the data are stolen from data center and cloud. Thinking on these issues, there is a need to enhance the security of data using Blockchain technology.

II. Related Work

In this section, Author briefly review the related work on Data Deduplication and their different techniques.

G. Wallace, F. Douglis, H. Qian, P. Shilane, S. Smaldone, M. Chamness, and W. Hsu has developed Characteristics of backup workloads in production systemsThe author presents a complete characterization of backup workloads by analyzing statistics and content metadata collected from a large set of EMC Data Domain backup systems in production use. This analysis is complete (it covers the statistics of over 10,000 systems) and in depth (it uses detailed traces of the metadata of different production systems that store almost 700TB of backup data). Author compared these systems with a detailed study of Microsoft's primary storage systems and demonstrated that back-up storage differs significantly from the primary storage workload in terms of data quantities and capacity requirements, as well as the amount of data storage capacity. Redundancy within the data. These properties offer unique challenges and opportunities when designing a disk-based file system for backup workloads
[1].

A. El-Shimi, R. Kalach, A. Kumar, A. Ottean, J. Li, and S. Sengupta have developed Primary data deduplication-large scale study and system designThe author presents a large-scale study of primary data deduplication and uses the results to guide the design of a new primary data deduplication system implemented in the Windows Server 2012 operating system. The file data were analyzed by 15 servers of globally distributed files that host data for over 2000 users in a large multinational company. The results are used to achieve a fragmentation and compression approach that maximizes deduplication savings by minimizing the metadata generated and producing a uniform distribution of the portion size. Deduplication processing resizing with data size is achieved by a frugal hash index of RAM and data partitioning, so that memory, CPU and disk search resources remain available to meet the main workload of the IO service.
[2].

P. Kulkarni, F. Douglis, J. D. LaVoie, and J. M. Tracey, "Redundancy elimination within large collections of files". Propose a new storage reduction scheme that reduces data size with comparable efficiency to the most expensive techniques, but at a cost comparable to the fastest but least effective. The scheme, called REBL (Block Level Redundancy Elimination), exploits the advantages of compression, deletion of duplicate blocks and delta encoding to eliminate a wide spectrum of redundant data in a scalable and efficient way. REBL generally encodes more compactly than compression (up to a factor of 14) and a combination of compression and suppression of duplicates (up to a factor of 6.7). REBL is also coded similarly to a technique based on delta encoding, which significantly reduces the overall space in a case. In addition, REBL uses super fingerprint, a technique that reduces the data needed to identify similar blocks by drastically reducing the computational requirements of the matching blocks: it converts the comparisons of O (n2) into searches of hash tables. As a result, the use of super fingerprints to avoid enumerating the corresponding data objects decreases the calculation in the REBL resemblance phase of a couple of orders of magnitude [3].

Shweta D. Pochhi, Prof. Pradnya V. Kasture have represents "Encrypted Data Storage with De-duplication Approach on Twin Cloud. The data and the private cloud where the token generation will be generated for each file. Before uploading the data or file to the public cloud, the client will send the file to the private cloud for token generation, which is unique to each file. Private clouds generate a hash and token and send the token to the client. The token and hashes are kept in the private cloud itself, so that whenever the next token generation file arrives, the private clone can refer to the same token. Once the client gets the token for a given file, the public cloud looks for the token similar if it exists or not. If the public cloud token exists, it will return a pointer to the existing file, otherwise it will send a message to load a file. A system that achieves confidentiality and allows block-level deduplication at the same time. Before uploading the data or file to the public cloud, the client will send the file to the private cloud for token generation, which is unique to each file. The private cloud generates a hash and token and sends them to the client. The token and the hash are kept in the private cloud itself so that whenever the next token generation file arrives, the private clone can refer to the same token.
[4].

Jin Li, Yan Kit Li, Xiaofeng Chen, Patrick P. C. Lee, Wenjing Lou have developed A Hybrid Cloud Approach for Secure Authorized De-duplication[9]. In the proposed system, we are getting data deduplication by providing data evidence from the data owner. This test is used when the file is uploaded. Each file uploaded to the cloud is also limited by a set of privileges to specify the type of users who can perform duplicate verification and access the files. New duplication constructs compatible with authorized duplicate verification in the cloud hybrid architecture where the private cloud server generates duplicate file verification keys. The proposed system includes a data owner test, so it will help implement better security issues in cloud computing [5].

M. Lillibridge, K. Eshghi, and D. Bhagwat represents the improvement in recovery speed for backup systems that use block-based online deduplication. The slow recovery due to the fragmentation of the parts is a serious problem faced by data deduplication systems in one piece: the recovery speeds for the most recent backup can eliminate orders of magnitude during the life cycle of a system. Author have studied three techniques: increase the size of the cache, limit the containers and use a direct assembly area to solve this problem. Limiting the container is a time-consuming task and reduces fragmentation of fragments at the cost of losing part of the deduplication, while using a direct assembly area is a new technique of recovery and caching in the recovery process which exploits the perfect knowledge of the future access to the fragments available during the restoration of a backup to reduce the amount of RAM needed for a certain level of caching in the recovery phase [6].

D. Meister, J. Kaiser, and A. Brinkmann represented caching of data deduplication locations. The author proposes a new approach, called Block Locality Cache (BLC), which captures the previous backup execution significantly better than existing approaches and always uses up-to-date information about the location and is therefore less prone to aging. Author evaluated the approach using a simulation based on the detection of multiple sets of real backup data. The simulation compares the Block Locality Cache with the approach of Zhu et al. and provides a detailed analysis of the behavior and the IO pattern. In addition, a prototype implementation is used to validate the simulation [7].

D. T. Meyer and W. J. Bolosky has represents A study of practical Deduplication. Author collect data from the file system content of 857 desktop computers in Microsoft for a period of 4 weeks. Author analyze the data to determine the relative efficiency of data deduplication, especially considering the elimination of complete file redundancy against blocks. Author have found that full file deduplication reaches about three quarters of the space savings of more aggressive block deduplication for live file system storage and 87% of backup image savings. Author also investigated file fragmentation and found that it does not prevail, and Author have updated previous studies on file system metadata, and Author have found that file size distribution continues to affect very large unstructured files [8].

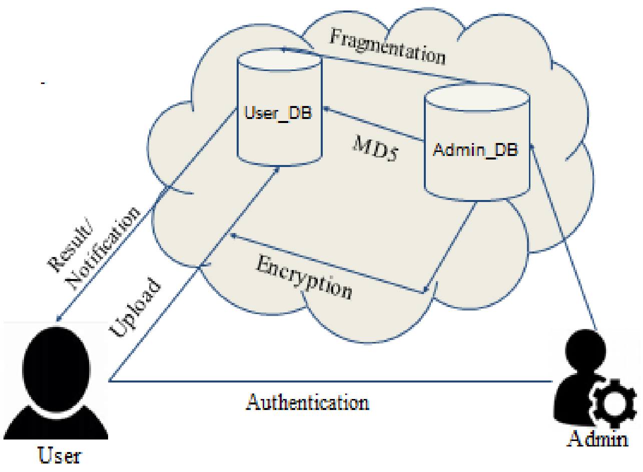
V. Tarasov, A. Mudrankit, W. Buik, P. Shilane, G. Kuenning, and E. Zadok having represents generating realistic datasets for the deduplication analysis. The author has developed a generic model of file system changes based on properties measured in terabytes of real and different storage systems. Our model connects to a generic framework to emulate changes in the file system. Based on observations from specific environments, the model can generate an initial file system followed by continuous changes that emulate the distribution of duplicates and file sizes, realistic changes to existing files and file system growth. [9].

P. Shilane, M. Huang, G. Wallace, and W. Hsu discovered the optimized WAN replication of backup data sets using delta compression reported by the stream. Offsite data replication is critical for disaster recovery reasons, but the current tape transfer approach is cumbersome and error prone. Replication in a wide area network (WAN) is a promising alternative, but fast network connections are expensive or impractical in many remote locations, so better compression is needed to make WAN replication very practical. Author present a new technique for replicating backup data sets through a WAN that not only removes duplicate file regions (deduplication) but also compresses similar file regions with delta compression, which is available as a feature of EMC Data Domain systems. [10].

III. PROPOSED SYSTEM:-

In this paper, Author propose a confidence scheme in the challenge of data ownership and cryptography to manage the storage of encrypted data with deduplication and try to solve security issues using block chain technology. Our goal is to solve the problem of deduplication and data security problems in the situation where the data owner is not available or it is difficult to get involved. Meanwhile, the data size does not affect the performance of data deduplication in our schema. Author are motivated to save space in the cloud and to preserve the privacy of data owners by proposing a scheme to manage the storage of encrypted data with deduplication. This work is designed using block chain concept and key-based cryptographic technique. Stores the hash tables of raw data and files on the block-chain, validates other copies by running a hashing technique, and then compares the data stored in the block-chain, any interfere with the data will be quickly found, because the original hash Tables are stored on millions of nodes.

System Architecture:



Algorithms:

1. AES Algorithm for Encryption.

AES (advanced encryption standard).It is symmetric algorithm. It used to convert plain text into cipher text .The need for coming with this algo is weakness in DES. The 56 bit key of des is no longer safe against attacks based on exhaustive key searches and 64-bit block also consider asweak.AES was to be used128-bit block with128-bit keys.

Rijendeal was founder. In this drop we are using it to encrypt the data owner file.

Input:

128_bit /192 bit/256 bit input (0, 1)

Secret key (128_bit) +plain text (128_bit).

Process:

10/12/14-rounds for-128_bit /192 bit/256 bit input

Xor state block (i/p)

Final round:10,12,14

Each round consists: sub byte, shift byte, mix columns, add round key.

Output:

cipher text(128 bit)

2. FRAGMENTATION ALGORITHM

Input: File

Output: Chunks

Step1: To split the file

Step2: Input source path, destination path

Step3: Fs = Size/Nof

Where,

Size = size of source file

Fs = Fragment Size

NoF = number of fragments

Step4: fragments with merge option

Step5: End

3. MD5 (Message-Digest Algorithm)

The MD5 message-digest algorithm is a widely used cryptographic hash function producing a 128-bit (16-byte) hash value, typically expressed in text format as a 32 digit hexadecimal number. MD5 has been utilized in a wide variety of cryptographic applications, and is also commonly used to verify data integrity.

Steps:

1. A message digest algorithm is a hash function that takes a bit sequence of any length and produces a bit sequence of a fixed small length.

2. The output of a message digest is considered as a digital signature of the input data.

3. MD5 is a message digest algorithm producing 128 bits of data.

4. It uses constants derived to trigonometric Sine function.

5. It loops through the original message in blocks of 512 bits, with 4 rounds of operations for each block, and 16 operations in each round.

6. Most modern programming languages provides MD5 algorithm as built-in functions

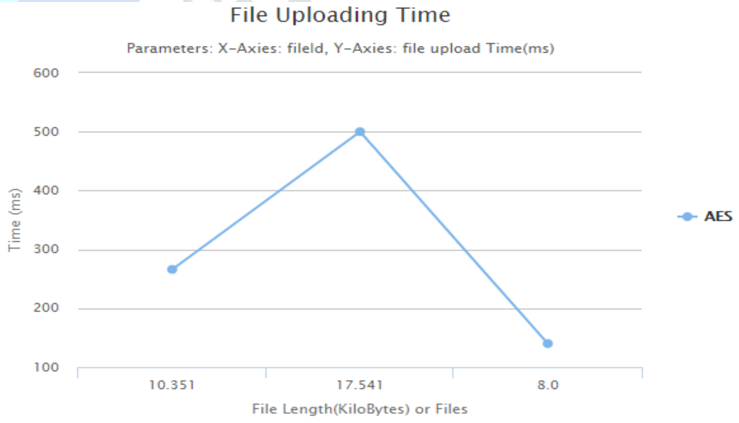
IV. Results and Discussion

In our experimental setup, in table 1, find out different file upload and time required for time for uploading that file. In our experimental setup, in our system first is uploading file size and time for that file.

Sr.No	File Size(Kb)	Time(ms)
1	10351	226
2	17541	500
3	8500	140

Table1: File Uploading Time and Size

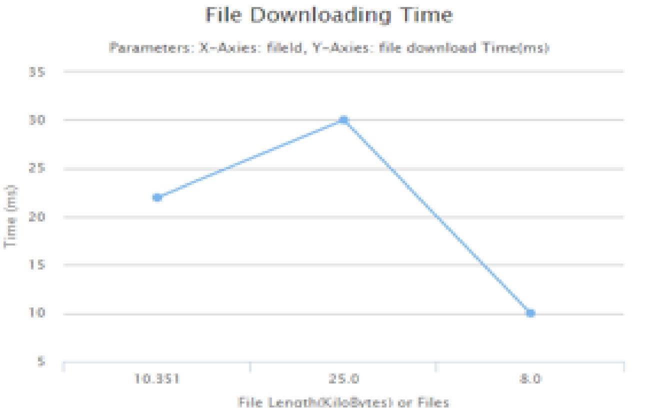
From above data, in graph 1, we can see file size of 1 is 10351 kb is required time uploading is 226 ms, and file size of 2 is 1751 kb is required time uploading is 500ms



In our experimental setup, in table 2, find out different file download and time required for time for uploading that file. In our experimental setup, in our system first is uploading file size and time for that file and so on.

Sr.No	File Size(Kb)	Time(ms)
1	10351	22
2	25000	30
3	8000	10

Table1: File downloading Time and Size



From above data, in graph 2, we can see file size of 1 is 10351 kb is required time uploading is 22 second, and file size of 2 is 25000 kb is required time uploading is 30 sec. and so on.

Comparative Analysis:

In this subsection, our System evaluates the performance of the proposed scheme by several experiments. System runs these experiments on a window machine with an Intel Pentium 2.30GHz processor and 8GB memory. All these experiments use Java programming language with the various encryption algorithms such as AES, RSA. In our experiments, System first Install required Software.

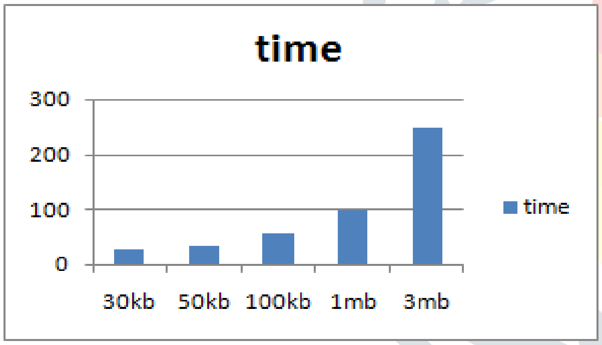


Figure 1: Shows file size on x axis and time (MS) to upload on Y-axis

Sr No	File Size	Time in ms(RSA)	Time in ms (AES)
1	30KB	30	28
2	50KB	35	31
3	100KB	60	58
4	1 MB	100	93
5	3 MB	250	245

Table 1: Show File Size and Time

Here, In Table 1 entity Analysis of person such as Admin, Cloud which performances different role. In Our System Data Owner Upload the Data in Dynamic Group which are show to Admin Side after show the Data "Click to Encryption" when User Request to Data access of Owner than System first Check Fault Tolerances Value and Then access To User.

Conclusion

Data deduplication is important and significant in the practice of data storage in the cloud, in particular for the management of big data filing. In this paper, Author proposed a heterogeneous data storage management scheme, which offers flexible data deduplication in the cloud and data security using blockchain. Our schema can be adapted to different scenarios and application requests and offers cost-effective management of big data storage across multiple CSPs. Data deduplication and data security can be achieved with different security requirements. Security analysis, comparison with existing work and implementation-based performance evaluation have shown that our scheme is safe, advanced and efficient.

References

[1] D. Meister, J. Kaiser, and A. Brinkmann, "Block locality caching for data deduplication," in Proc. 6th Int. Syst. Storage Conf., 2013, pp. 1–12.

[2] M. Lillibridge, K. Eshghi, and D. Bhagwat, "Improving restore speed for backup systems that use inline chunk-based deduplication," in Proc. 11th USENIX Conf. File Storage Technol, Feb. 2013, pp. 183–197.

[3] V. Tarasov, A. Mudrankit, W. Buik, P. Shilane, G. Kuenning, and E. Zadok, "Generating realistic datasets for deduplication analysis," in Proc. USENIX Conf. Annu. Tech. Conf., Jun. 2012, pp. 261–272.

[4] D. T. Meyer and W. J. Bolosky, "A study of practical deduplication," ACM Trans. Storage, vol. 7, no. 4, p. 14, 2012.

[5] G. Wallace, F. Douglis, H. Qian, P. Shilane, S. Smaldone, M. Chamness, and W. Hsu, "Characteristics of backup workloads in production systems," in Proc. 10th USENIX Conf. File Storage Technol., Feb.2012,pp.33–48.

[6] El-Shimi, R. Kalach, A. Kumar, A. Ottean, J. Li, and S. Sengupta, "Primary data deduplication-large scale study and system design," in Proc. Conf. USENIX Annu. Tech. Conf., Jun. 2012, pp.285–296.

[7] P. Shilane, M. Huang, G. Wallace, and W. Hsu, "WAN optimized replication of backup datasets using stream-informed delta compression," in Proc. 10th USENIX Conf. File Storage Technol.,Feb.2012,pp.49–64.

[8] P. Kulkarni, F. Douglis, J. D. LaVoie, and J. M. Tracey, "Redundancy elimination within large collections of files," in Proc.USENIXAnnu.Tech.Conf. Jun.2012, pp.59–72.

[9] Jin Li, Yan Kit Li, Xiaofeng Chen, Patrick P. C. Lee, Wenjing Lou "A Hybrid Cloud Approach for Secure Authorized De-duplication" IEEE Transactions on Parallel and Distributed Systems: PP Year 2014.

[10] Shweta D. Pochhi, Prof. Pradnya V. Kasture "Encrypted Data Storage with De-duplication Approach on Twin Cloud " International Journal of Innovative Research in Computer and Communication Engineering