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Efficient Storage-Reducing System in Blockchain System: A Review

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Abstract **- Exponential growth in blockchain size has become a key factor It hinders the decentralization of blockchain and its potential for implementation in big data applications S(large amounts of data). A detailed discussion regarding the various techniques of block storage in the cloud along with their advantages and disadvantages is presented in this paper. Finally, the paper suggests some reasonable approaches to achieve better results.**

Keywords **- Blockchain, Cloud computing, Segment blockchain, efficient storage.**

I.INTRODUCTION

In an anonymous and free society like the blockchain system, all data must be traceable. This feature is key to the trust of the blockchain and accompanies the blockchain; Therefore, it is very important to keep all the work history. However, in the decade from January 2009 to June 2019, the size of the Satoshi Nakamoto blockchain has grown from zero to over 226 GB; The size has doubled since February 21017(just over 100GB). If growth continues we expect 1:5- 1:6 TByte in January 2021 and 3 ,3:2 TByte in January 2022. The Bitcoin network (the node that stores all the blocks of the main chain) has also grown exponentially and prevents blockchain from being decentralized and from being used in big data applications. blockchain technology has had applications beyond cryptocurrencies and has gained enormous influence in many industries.

II.LITERATURE SURVEY

In this section, various authors have presented various block storagemechanisms and techniques in the cloud.

In [1], a secure distributed data storage for IoT in blockchain-enabled edge computing with a low false positive rate. Here data processing and storage are more secure compared to traditional edge computing. Enhanced security and less computational cost is the major highlight.

In [2] a block data storage model based on the double-layer blockchain network (DLBN) contains two types of blockchain nodes, which form the storage and consensus layers of the system, respectively implementing block storage allocation algorithm, and transaction query optimization algorithmrespectively.

In [3] an identity-based proxy aggregate signature (IBPAS) scheme to improve the efficiency of signature verification as well as compress the storage space and reduce the communication bandwidth, and the data storage model in smart homes is based on blockchains under multiple cloud providers.

In [4] the data owner will lose physical control of big spatiotemporal data while the big spatiotemporal data is stored on the cloud hence the on-chain and off-chain secure authentication protocols provide consistency by batch processing.

In [5] they dive into a decentralized system design, along with an equitable compensation model for all the storage space contributing users also preventing digital data explosion.

In [6] a scheme to prevent unauthorized re-selling of big data is introduced. Specifically, this scheme uses smart contracts and watermarks, where the smart contract template is designed and adopted robust watermarks for data trading. By using smart contracts to automate the entire process, efficiency is significantly improved.

In the current scenario patients` medical report is stored digitally in the medical industry and problems such as illegal access to private data and their medical reports are found. As a solution for this in [7] a hash value of the report is stored in IPFS. In IPFS the file is stored as hash value of the file.

The full-replication data storage mechanism, in [8] as commonly utilized in existing blockchains, is the barrier to the system`s scalability since it retains a copy of the entire blockchain at each node, so the overall storage consumption per block is O(n) with n participants.

With the augmenting popularity of blockchains, the scalability of blockchain is hindering it from attaining the meteoric transaction rate present in the existing solutions like MasterCard and VISA. Presently, in [9] the scalability solutions of blockchains use several off-chain and on-chain mechanisms.

In [10] the use of Blockchain in cryptocurrency introduces a technology called FaircoinBD which focuses on reducing energy consumption by limiting participation, increasing propagation speed, and fair reward distribution.

In [11] a blockchain innovation encompassing a biological system of instruments that utilizes cloud data and assumes a vital job in security for authenticating and preventing access depending on the user`s requirements by recording the histories of data access.

In [12] Ethereum blockchain and ciphertext-policy attribute-based encryption (CP-ABE) a decentralized schema, the Ethereum blockchain technology is used, here the data owner can store ciphertext of data through smart contracts in a blockchain network.

In [13] a blockchain-based trusted data management scheme(called BlockTDM) is a user-defined sensitive data encryption approach that stores the data in a blockchain system with conditional access and decryption query of the protected blockchain data and transactions from the blockchain system.

To solve the blockchain security problem, the mechanism of combing blockchain with regeneration coding in [14] and hence the improvisation of security and reliability of stored data under edge computing is done.

In [15] interpretation of the existing centralized platform for data storage and for its shortcomings, from which it is possible to give building decentralized data storage on the basis of Blockchain technology is given.

In [16] by creating decentralized data storage on the basis of Blockchain technology, it is feasible to address the inadequacies found in the current centralized infrastructure for data storage.

In [17] a Storage provider performs a data integrity certificate to the user, and after verifying that the verification is passed, the user pays the storage fee to the storage provider through the lightning network

In [18] for processing the Bigdata. and performance improvement techniques for MapReduce with ETL workflows arediscussed.

In [19] authors have identified three common properties in blockchain and forkable applications: data versioning, fork semantics, and tamper evidence. They have presented a new index class called SIRI that is effective at detecting duplicate content among multi-version data and even have designed POS-Tree.

In [20] a new low-storage node that stores a reduced amount of data generated from the blockchain by using erasure codes is proposed to overcome the performance and scalability limitations.

Table 1: Summarization of various Authors

Authors	Title	Research Focus	Remarks
Dengzhi Liu et al. [1], 2023	Toward secure distributed data storage with error locating in blockchain-enabled edge computing	Bilinear pairing and BLS-HLA, with the counting bloom filter (CBF).	Return false positives and cannot retrieve or delete the inserted elements
Yanqing Fan et al. [2],2022	DLBN: Group Storage Mechanism Based on Double-Layer Blockchain Network	Double-Layer Blockchain Network with multiple storage units (SUs).	Joint maintenance of the multiple storage units is difficult
Yongjun Ren et al.[3] ,2022	Multiple cloud storage mechanisms based on blockchain in smart homes	Blockchains under multiple cloud identity-based proxy aggregate signatures (IBPAS).	Require potentially lengthy additional information
Yongjun Ren et al.[4],2022	BSMD: A blockchain-based secure storage mechanism for big spatiotemporal data	Construction of on-chain and off-chain secure authentication protocol	Focusing on micro details, the broader strategic view can get lost
Vijay A. Kanade et al. [5],2021	A Blockchain-Based Distributed Storage Network to Manage Growing Data Storage Needs	A decentralized system design, along with an equitable compensation model for all the storage space	Decentralized sharing of computing power, or even memory
Yuexin Xiang et al.[6],2021	A multi-type and decentralized data transaction scheme based on smart contracts and digital watermarks	Prevention un authorized re-selling of big data using smart contracts and robust watermarks	Implementation of sophisticated prototypes is difficult
Pearl Alisha Lobo et al.[7],2021	Distributed file storage model using IPFS and blockchain	Interplanetary File System (IPFS) stores the file and the blockchain in their compressed sizes.	PFS installation has a lot of hassles and consumes a lot of bandwidth
Xiaodong Qi et al.[8],2020	A Reliable Storage Partition for Permissioned Blockchain	By combining the Byzantine Fault Tolerance (BFT) consensus system with erasure coding.	BFT mechanisms have scalability issues
Maruf Monem et al.[10],2020	Efficient Blockchain System based on Proof of Segmented Work	The transactions are in a secure, chronological, and immutable system removing the dependency on central financial services.	Quantum Supremacy creates imbalance within the system
Pratima Sharma et al.[11],2020	Blockchain Technology for Cloud Storage: A Systematic Literature Review	The cloud data discover a solution for managing and storing the information appropriately on a P2P network.	POW consensus causes risky regulatory issues

G. Abinaya, Preksha Kothari et al.[12],2019	Block Chain Based Decentralized Cloud Storage	A Blockchain-based decentralized data storage architecture designed to increase information security and secrecy.	CP-ABE mechanism is an escrow problem
Yanqing Fan et al.[13],2019	A Secure Cloud Storage Framework With Access Control Based on Blockchain,	Ciphertext-policy attribute-based encryption (CP-ABE) is used, to store the ciphertext of data through smart contracts	Reduced latency and centralized dependency
Yongjun Ren et al .[15],2018	Secure data storage based on blockchain and coding in edge computing	A new index class called SIRI detects duplicate content among multi-version data and even have designed POS-Tree, offering tamper evidence.	Edge computing's security of data storage has turned into a barrier to its broad deployment.
Yan Zhu et al .[17],	Blockchain-based Decentralized Storage Scheme	A decentralized storage network powered by blockchain technology that can utilize user personal hard disk space	Before implementation to the Ethereum network upgrade and optimize technologies have to be done.
Jisha S Manjaly et al .[18]	Various approaches to improve MapReduce performance in Hadoop	Union of homogeneous and heterogeneous data using Hadoop as a framework for processing Bigdata	Data storage, analytics, online processing, security and privacy.
Sheng Wang et al.[19]	ForkBase:An Efficient Storage Engine for Blockchain and Forkable Applications	A new index class called SIRI that is effective at detecting duplicate content among multi-version data	Scares at the security level and lesser projective.
Doriane Perard et al. [20], 2018	Erasure code-based low-storage blockchain node	Sharding can be used to distribute the costs associated with processing transactions among several, smaller groups of nodes.	System paves would only be managed by low-capacity nodes.

III. CONCLUSION

This paper outlined a survey of blockchain and its features along with cloud computing. Blockchain is a future with rapid development and it is a new emerging technology having various advantages like scalability, mobility, data security, less cost, disaster recovery, etc. So, this paper also outlined the various technologies of the blockchain and its storage by various authors by considering its advantages, and also some key challenges are discussed here. This survey effort will provide a better understanding of the storage design challenges of block storage in cloud computing, and help others for further research in this area.

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