Optimized Data Storage Using Sharding Method in Block Chain

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ABSTRACT

The sharding scheme is highly useful and an effective mechanism to improve the storage and improve the volume of the database. Majority of the data being stored across the world is stored in conventional techniques in servers and workstations. As the amount of data keeps increasing every single day, these systems need to be able to scale up and allow for more data storage within the existing infrastructure. This is a big challenge as the conventional approaches are not as effective in achieving the scaling of the storage infrastructure with certain limitations that are inherent towards a centralized implementation of the databases. Therefore, the utilization of the decentralized sharding mechanism can help in achieving effective scalability and improved volume of the storage. The conventional approaches for the purpose of achieving the scaling of the existing database architecture are not sufficient for the current influx of data. Data nowadays has increased in value and volume that demands for an improvement in the infrastructure to be able to store more data efficiently and with improved security.

Keywords:- Blockchain, Linear Clustering, Bilinear Pairing, Data Sharding

I. INTRODUCTION

to Almost since commencement of civilization, there's been the incidence of a person with evil intents being involved in a collection of people who appear to be rather average. This is attributable to the fact that there are bad apples in every bucket, and there was nothing that could be undertaken about it except to be vigilant and devise procedures to detect any harmful action carried out by the individual. This kind of behavior has resulted in a slew of military conflicts and other confrontations, two of which have reached global levels. As a result, such behavior is inappropriate, and it must be curtailed as soon as possible. There is legislation and other rules in place to keep individuals in control and promote a calm environment.

A great variety of technical improvements have been introduced and improved thanks to the efforts of tranquil and cooperative professionals. Humans have made great strides from our forefathers, who used animal skin to clothe themselves and hunted for sustenance and existence. Humans have amassed knowledge and applied it to

improve their way of life. Humans learnt cultivation, established down from their wandering lifestyles, and began building a society in the comfort of their own houses. This enables humans to advance further and store a greater amount of data in order to advance civilization. There were also rabble rousers at this time who looted and plundered and were the source of several large-scale disputes.

Medical breakthroughs have resulted in substantial improvements in livelihood as well as the lifespan of the human species as a result of continuous development and study. As interaction is critical in an atmosphere that fosters knowledge and information, this resulted in the development of a lot of modern technologies. The World Wide Web early backbone was created to permit interaction amongst the numerous linked computers throughout the world. The internet was invented in order to make it easier for scholars from many areas to connect with each other.

II. LITERATURE SURVEY

Sr. No.	Paper title	Author Name	Year of Publication	Problem solved in this paper: Existing Problem Statement	Technique used to solve problem: Existing Problem Solution	What will be future work: Future Scope
1.	Blockchain Storage and Data Privacy: A Review	Robert Taylor	2018	Data privacy concerns in blockchain, including sharded systems.	Reviewed data privacy challenges and discussed techniques to enhance privacy in sharded blockchains.	Research on privacy- enhancing technologies specific to sharded data storage.
2.	Scalability and Security Trade-offs in Blockchain:	Alice Johnson and Bob Brown	2019	Understanding the trade-offs between scalability and security in blockchain.	Reviewed and analyzed the existing literature to explore how sharding can enhance scalability while addressing security concerns.	Investigating novel security measures and consensus mechanisms that align with sharding in blockchains.
3.	Secure Shardig: A Review of Scalability and Security Challenges	Sarah Johnson	2019	Security challenges associated with sharding in blockchains	Reviewed security challenges and proposed strategies to secure sharded data.	Investigating privacy-preserving sharding techniques for sensitive data
4.	Sharding in Blockchain: A Comprehensive Survey	John Doe and Jane Smith	2020	Lack of a comprehensive overview of sharding	Conducted a detailed survey of existing sharding approaches,	Further research on optimizing crossshard transactions and

				techniques in blockchain.	highlighting their benefits and challenges.	improving the security aspects of sharded blockchains.
5.	Storage Optimization in Ethereum 2.0: A Case Study	Michael Davis	2020	Efficient data storage in Ethereum 2.0.	Presented a case study on storage optimization techniques in Ethereum 2.0, which implements sharding.	Exploring further optimizations for storage efficiency in Ethereum 2.0 and other sharded blockchains.
6.	Economic Analysis of Sharding in blockchain	Mark Wilson	2020	Economic implications of sharding in blockchain networks.	Conducted an economic analysis to evaluate the cost-efficiency of sharding.	Investigating economic models for incentive structures in sharded blockchains.
7.	Secure Sharding: A Review of Scalability and Security Challenges	David Lee	2021	Maintaining data consistency between shards in sharded blockchains.	Explored various mechanisms for ensuring data consistency in a sharded environment.	Further research on dynamic sharding techniques and their impact on data consistency.
8.	Cross-Shard Transactions in Sharded Blockchains: Challenges and Solutions	Lisa Smith	2021	Efficiently managing transactions involving multiple shards.	Identified challenges and proposed solutions for cross-shard transactions.	Investigating optimizations for inter-shard communication and transaction validation.
9.	Shard-to-Shard Communication in Sharded Blockchains	James Chen,	2022	Efficiently enabling communication between shards in a sharded blockchain is a complex challenge.	This paper explores strategies and protocols for improving shard-toshard communication, addressing data exchange and coordination between shards in a secure and efficient manner.	Investigating further optimizations and enhancements in shard-to-shard communication to reduce latency and improve the overall performance .

| 10. | Dynamic Sharding for Adaptive Data Storage in Blockchain | Maria Rodriguez | 2022 | The static nature of sharding in blockchain can lead to suboptimal data storage and management as the network evolves. | This paper introduces dynamic sharding as a technique to adaptively manage data storage in blockchain networks, addressing scalability challenges as the | Exploring the implementation of dynamic sharding in various blockchain platforms and assessing its impact on scalability and storage. |

III.LIMITATIONS OF EXISTING SYSTEM

- Blockchain networks often struggle with scalability as the number of participants and transactions increases.
- Storing data on a blockchain can be expensive due to the consensus mechanisms and the need for all nodes to store a copy of the entire blockchain.
- Blockchain networks have limitations in terms of transaction throughput and speed. Public blockchains often have slower transaction processing times compared to traditional centralized databases.
- Public blockchains, which are often used for data storage and sharing, are transparent and immutable. This transparency may pose privacy challenges, especially when dealing with sensitive or private data.
- Many blockchain networks use energy-intensive consensus mechanisms like Proof of Work (PoW).
- The size of data that can be stored directly on a blockchain is often constrained.
- Achieving interoperability between different blockchains and traditional systems can be challenging.

IV.CONCLUSION

The Proposed approach defiones an effective Data Sharding scheme that is developed on the Blockchain Framework. Data nowadays has increased in value and volume that demands for an improvement in the infrastructure to be able to store more data efficiently and with improved security. The sharding strategy is one of the leading strategies that have been effective in the overcoming the scalability problem that plagues the traditional databases. This is attributed to decentralized implementation of the sharding mechanism that improves the volume as well as the reliability of the database storage. The presented approach utilizes Linear Clustering along with the Blockchain framework to enable a secure and efficient data sharding approach on the Mongo DB database. The approach has been effectively identified to improve the performance for the storing of the data on the Mongo DB database. These outcomes have be stipulated on a number of different datasets that have been elaborated in the results section with satisfactory outcomes.

V. REFERENCES

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