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Integration of Blockchain Technology and Cloud Systems applications and challenges: A review

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Abstract

In the real world with the help of blockchain technology is a very important role in business payments in digital usage, identity management, and supply chain management, blockchain technology is a leading solution that resolves the many challenges towards decentralization, data security, and privacy. The mixed fruit of blockchain technology and cloud computing is now recognized as a very important area to words digital security. This paper presents the review and evaluation, of applications and challenges of Blockchain and cloud computing.

Keywords: blockchain technology; Cloud Computing; digital security;

I. Introduction

Recent developments in Blockchain Technology and cloud computing made data processing, storage [10] is very important. A heigh security system has attached to the common users and business organizations for all the financial transactions and storage of data. In the digital world millions of transactions are made every day that consists of sensitive data. To maintain high security with the help of blockchain technology and cloud computing providing the security for online transactions with cryptographic hash functions.

II. General Introduction to Blockchain Technology

A Blockchain is an ever-expanding chain of interconnected electronic records. It is composed of blocks, each securely storing data through cryptographic methods. Every block contains the address of its preceding block and is timestamped. This ensures that transactions are recorded sequentially and cannot be tampered with. Due to this linked structure, earlier blocks remain immutable. Any attempt to modify data in a block would require altering all subsequent blocks, guaranteeing the security and transparency of this distributed electronic ledger system for recording transactions.[1]. It operates through a group of nodes that validates all the transactions and reach a consensus. The main advantage of this technology is a decentralized [9] method that removes the intermediaries and provides high security.

[8] Immutability: In this block chain Technology individuals are not possible to modify any transaction in publicly.

III. Introduction to Cloud Computing

Due to key traits including resource sharing and fewer operational and maintenance concerns, cloud computing is viewed as a substitute for traditional information technology [1]. One of the services[11][12]offered by cloud service providers that has gained popularity in the modern day is data storage. This is because a client can store his data in the cloud for less money.

[3] The advantages of cloud computing, such as data sharing of resources with low operational and maintenance costs, make it the most effective type of computing. Customers can store their data for less money. This makes it possible for groups of individuals to access and share data in a more reliable and secure manner.

[2]All computer systems connected to apps have become more adaptable in the current digital era. Cloud computing is a method that gives users instant access to a shared pool of computing resources.

[6] Although the cloud is incredibly adaptable, there are some security and data privacy concerns. It is more effective to address these concerns by integrating additional technology.

IV. How Blockchain System and cloud computing is different from each other.

As we have discussed, blockchain technology is distributed, unalterable electronic ledger that makes it easy to record transactions and track transactions also. This quality made blockchain technology allows to put in a novel and great position in technology. The frud detection and operational transparency are the fundamental pillars of Blockchain Technology.

V. Benefits of Blockchain in Cloud Computing

Decentralization mechanism the cloud Computing the major issue is managing the data through a centralized server for storing the data and searching the data that is to make all the decisions. The problems like failure of a centralized server may damage the system and loss of important data. It is very easy to hack the central server.

VI. Integration of Blockchain and Cloud solutions

1. Decentralisation: Using a centralised server to manage data and make decisions is a significant issue in IoT and cloud computing. A central server failure, for example, might disrupt the entire system and result in the loss of crucial data that was kept on the server. [13]The main server is also vulnerable to hacker attacks. The blockchain can offer a solution to this issue since it uses a decentralised architecture that prevents the failure of the entire system in the event that one server goes down by storing numerous copies of the same data on several computer nodes. Additionally, since

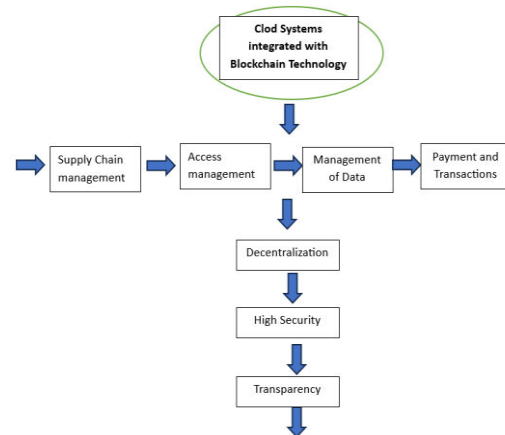there are several copies of the data on various nodes, data loss cannot be an issue.

Fig No1: Cloud system with Blockchain Technology

2. Enhanced Security: Storage of data on the cloud related to personal and business information is very important. Leakage of personal and organizational can harm security. In blockchain technology, each block is updated with previous block information.

3. Tracking of services and Goods: Logistics industry keeps track of all their vehicles and goods with their network tracking with the help of location tracking. This cannot be effective with a traditional centralized system. Blockchain technology has more strength for tracking goods and services.

4. Minimize the failures: Cloud computing with the help of a Blockchain System is integrated. This will minimize the failure risks which lead to the cloud giving uninterrupted and fast services.

Scalability in applications: Huge applications and transactions can be done through the blockchain system. The services and transactions are done for scalable blockchain services, which give on-demand services with highly scalable and integrated mechanisms.

VII. Blockchain in cloud computing Applications.

There are numerous advantages to cloud computing gives us highly secure data sharing, efficient resources, and hosting

decentralization applications. This combination of Blockchain with cloud computing enables trustworthy data storage and identity management.

VII. Major applications

Supply-chain management System: Blockchain system provides a transparent secure supply-chain management system. This system enables end-to-end tracking of services and reduces risks and enhances accountability with streamlining of all the transactions. This technology with the cloud helps highly efficient product management and reduces counterfeiting and improves customer belief. [4]It improves the services and efficacy and saves the operational costs.

Access Management: Black chain System uses the decentralized mechanism to access the data. This decentralization provides a transparent and efferent user identity verification process reduces third-party intervention, and leakage of data, and provides privacy of the user.[6]

Management of data storage: This technology enables efficient data sharing and storing of data by reducing third-party intervention and ensures data integrity with reduced cost. [4] The Blockchain technology boosts the desirable things of decentralization mechanism of data and accountability.

Payments and financial transactions: Blockchain technology integrated [8][10] with cloud computing provides transparent payments. It provides financial transparency for every payment, which allows for increasing payments with [5]security.

IX. Challenges in Blockchain with cloud Computing.

Integrating with clous computing and blockchain systems may under go challenges [10] and careful implementation is need in scalability and interoperability is need. It slso need regularity of applications and reducing the cost of the system.

1.Integration

Standardization of system with high security of data in blockchain and cloud computing needs proper planning, need of proper applications that suits for regular updating of strategies for necessary for successful implementation transactions.

2. Need of Technical skills

Implementing cloud and blockchain technology needs of skills of cryptography mechanism distributed systems and innovative knowledge in development of applications with project management are essential for successful integration of these technologies.

3. Obeying the policies, laws and regularity Challenges Data security and privacy, avoiding the money laundering issues and following the security regulations are very important in the blockchain systems.

4.Mantaintence and deployment of Systems Blockchain technology and its adoption depends on the project scope and complexity. These includes maintain and deployment of systems. It also needs training of the employees and infrastructure development.

Conclusion:

[Blockchain systems and cloud gives more profits and application-oriented issues. It encagrages the distributed electronic leger that ensuring high secure data storage and acess management with a great transparency of blockchain systems enhancing through data integrity with secure environment.

Blockchain and cloud services with updating with business environments, It provides new secure modes for business solutions.

X. Future of Blockchain and Cloud

These two technologies can give privacy of data with enhanced security and more reliability. It is no doubt that these will transforms the business models into a new era.

References

[1].Simanta Shekhar Sarmah(2019). Applications of Block chain in Cloud computing. International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN:2278-30\75, Volume-8 Issue-12.

[2]. Hazzaa N. Alshareef(2023) Current Development, Challenges and Future Trends in Cloud Computing: A Survey, (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 14, No. 3, 2023.

[3]. E.Poornima, Dr.N.Kasiviswanth and Dr.C.Shoba Bindu(2015) Secure Data Sharing for Multiple Dynamic Groups in Cloud, 2015 Conference on Power, Control, Communication and Computational Technologies for Sustainable Growth (PCCCTSG) December11-12, 2015, Kurnool, Andhra Pradesh, India

[4]. Dinh C. Nguyen, Ming Ding(2020) Integration of Blockchain and Cloud of Things: Architecture, Applications and Challenges, arXiv:1908.09058v2 [cs.CR].

[5]. Muthi Reddy P, Manjula S. Hand Venugopal K. R.(2017) Secure Data Sharing in Cloud Computing: A Comprehensive Review, International Journal of Computer (IJC) Volume 25, No 1, pp 80-115

[6]. CH. V. N. U. BHARATHI MURTHY, M. LAWANYA SHRI, SEIFEDINE KADRY and SANGSOON LIM(2020) Blockchain Based Cloud Computing: Architecture and Research Challenges, IEEE Access.

[7]. Jin Ho Park and Jong Hyuk Park(2017) , Blockchain Security in Cloud Computing: Use Cases, Challenges, and Solutions Symmetry,9,164;doi:10.3390/sym9080164

[8].Achampet Harshavardhan, Dr.T.Vijayakumar , Dr.S.R.Mugunthan (2018) Blockchain Technology in Cloud Computing to Overcome Security Vulnerabilities, IEEE Xplore Part Number:CFP18OZV-ART; ISBN:978-1-5386-1442-6

[9].Asma Jhari, Sonia Fernandes(2017),Techniques for Secure Multi-Owner Data Sharing in Cloud, International Journal of Engineering Science and Computing, Volume 7 Issue No.4.

[10]. Jiujiang Han 1,† , Ziyuan Li 2,† , Jian Liu 1,*, Huimei Wang 1 , Ming Xian 1 , Yuxiang Zhang 1 and Yu Chen (2022). Attribute-Based Access Control Meets Blockchain-Enabled Searchable Encryption: A Flexible and Privacy-Preserving Framework for Multi-User Search, Electronics 2022, 11, 2536. https://doi.org/10.3390/electronics1116253 6

[11]. Badugu Ranjith Kumar ,Dr.M. Victor Jose(2023), International Conference on Networking and Computer Applications (ICNCA 2023,Conference Proceedings ISBN No. 978-81-945891-3-6

[12]. Wang, J., Ma, H., Tang, Q., Li, J., Zhu, H., Ma, S., & Chen, X. (2013). Efficient verifiable fuzzy keyword search over encrypted data in cloud computing. Computer Science and Information Systems, 10(2), 667–684.

[13]. Shazia Tabassam (2017), Security and Privacy Issues in Cloud Computing Environment. Journal of Information Technology & Software Engineering. 7 (5), p1-6.

[14].Pratibha Tripathi and Mohammad Suaib. (2014). Security Issues On Cloud Computing. International Journal of Engineering Technology, Management and Applied Sciences. 2 (6), p1-9.

[15].Pradeep Kumar Tiwari and Dr. Bharat Mishra. (2012). Cloud Computing Security Issues, Challenges and Solution. International Journal of Emerging Technology and Advanced Engineering. 2 (8), p306-310.

[16].K. Sasikala and Mr. M. Annamalai. (2018). Challenges in Cloud Computing on Security Issues and Solutions. IOSR Journal of Computer Engineering. 20 (5), p46-52.

[17].Rajarshi Roy Chowdhury. (2014). Security in Cloud Computing. International

Journal of Computer Applications. 96 (15), p24-30.

[18].Monjur Ahmed and Mohammad Ashraf Hossain. (2014). Cloud Computing and Security Issues in the Cloud. International Journal of Network Security & Its Applications. 6 (15), p25-36.

[19]. Mazhar Ali, Samee U. Khan, Athanasios V. Vasilakos. (2015). Security in cloud computing Opportunities and challenges. Information Sciences. p357–383.

[20]. Randy Marchany. (2010). Cloud Computing Security Issues. p1-40.

[21].(2017). Security for Cloud Computing Ten Steps to Ensure Success. Cloud Standards Customer Council, p1-48.

[22]. Jerry Archer, Dave Cullinane, Nils Puhlmann, Alan Boehme, Paul Kurtz and Jim Reavis. (2011). Security Guidance For Critical Areas of Focus in Cloud Computing. Cloud Security Alliance. p1-177.