ROBUST DATA SHARING AND SEARCH MECHANISMS FOR EDGE COMPUTING IN CLOUD-DRIVEN IOT

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Abstract:

This paper addresses the critical need for secure data sharing and searching mechanisms within cloud-assisted Internet of Things (IoT) environments, particularly at the edge of networks. As IoT devices proliferate and generate vast amounts of data, efficient management of this data becomes paramount for ensuring privacy and security while enabling quick access and analysis. We propose a novel framework that integrates advanced encryption techniques and decentralized access control methods to safeguard sensitive data shared among IoT devices at the edge. Additionally, our framework incorporates intelligent search algorithms to facilitate rapid and secure retrieval of information, minimizing latency and enhancing overall system performance. Through extensive simulations and real-world case studies, we evaluate the effectiveness of our approach in terms of security, scalability, and efficiency. The results indicate that our solution not only mitigates risks associated with data breaches but also optimizes data accessibility and management in cloud-assisted IoT applications. This research contributes valuable insights into the development of secure and efficient data sharing and searching strategies, paving the way for more resilient and privacy-conscious IoT ecosystems.

Keywords: Servers,Smart devices,Cloud computing,Internet of Things,Encryption,Public key,edge computing,extreme edge.

1.INTRODUCTION

The rapid proliferation of Internet of Things (IoT) devices has transformed the landscape of data generation and management, particularly in cloud-assisted environments. These devices are capable of collecting vast amounts of real-time data, which, when processed and analyzed, can yield significant insights for various applications ranging from smart cities and healthcare to industrial automation. However, the exponential growth of data also presents critical challenges related to security, privacy, and efficient data retrieval. In this context, ensuring secure data sharing and searching mechanisms is essential to protect sensitive information while maintaining accessibility and usability.

Cloud-assisted IoT architectures leverage the capabilities of cloud computing to enhance the performance and scalability of IoT applications. By processing data at the edge of the network, close to where it is generated, these architectures can significantly reduce latency and bandwidth usage, leading to more responsive systems. However, this distributed nature of data storage and processing introduces vulnerabilities that can be exploited by malicious actors, highlighting the need for robust security measures.

This study aims to explore innovative strategies for secure data sharing and searching at the edge of cloud-assisted IoT systems. We will investigate the integration of advanced encryption techniques, decentralized access control mechanisms, and intelligent search algorithms to create a comprehensive framework that addresses security concerns while optimizing data accessibility. By analyzing existing methodologies and proposing novel solutions, this research seeks to contribute to the development of resilient IoT ecosystems that prioritize data security and user privacy. Ultimately, our findings will provide valuable insights for practitioners and researchers aiming to navigate the complexities of secure data management in the rapidly evolving IoT landscape.

2.LITERATURE SURVEY

The integration of secure data sharing and searching mechanisms in cloud-assisted Internet of Things (IoT) environments has garnered significant attention from researchers and practitioners. This literature survey reviews key studies that explore various approaches to ensuring data security, privacy, and efficient retrieval in the context of edge computing.

1. Security Challenges in Cloud-Assisted IoT: The proliferation of IoT devices has raised concerns regarding data security and privacy. Research by Zhang et al. (2017) outlines the security threats inherent in cloud-assisted IoT environments, including unauthorized access, data breaches, and denial-of-service attacks. The authors emphasize the necessity for robust security frameworks that address these vulnerabilities, particularly at the edge where data is generated and processed.

2. Data Encryption Techniques: Several studies have focused on employing encryption methods to secure data in transit and at rest. In their work, Kumar and Gupta (2019) proposed a hybrid encryption scheme that combines symmetric and asymmetric encryption algorithms to enhance data security during sharing. Their approach demonstrated significant improvements in both security and

computational efficiency, providing a viable solution for protecting sensitive information in IoT networks.

3. Access Control Mechanisms: Effective access control is vital for ensuring that only authorized users can access shared data. A study by Zhao et al. (2020) introduced a decentralized access control model utilizing blockchain technology to manage permissions dynamically in IoT environments. Their findings revealed that blockchain-based access control not only enhances data security but also increases transparency and trust among users, making it an appealing solution for cloud-assisted IoT applications.

4. Efficient Data Retrieval: The need for efficient data retrieval mechanisms is paramount in edge computing, where low latency is crucial. Research by Chen et al. (2021) explored the use of machine learning algorithms to optimize data searching processes in cloud-assisted IoT systems. Their proposed model leverages predictive analytics to anticipate user queries and streamline data retrieval, significantly reducing response times while maintaining security protocols.

5. Privacy-Preserving Techniques: Ensuring user privacy is a critical concern in IoT environments. In a comprehensive review, Yang et al. (2018) examined various privacy-preserving techniques, including data anonymization and secure multi-party computation. Their work highlighted the trade-offs between data utility and privacy, emphasizing the need for solutions that balance both aspects effectively, particularly in applications involving sensitive personal information.

6. Edge Computing Architectures: The architecture of edge computing plays a significant role in data security and efficiency. A study by Shi et al. (2016) provided a detailed overview of edge computing architectures, emphasizing the benefits of processing data closer to the source to reduce latency and enhance security. They discussed various deployment strategies and their implications for data management, highlighting the necessity for tailored solutions that consider the unique characteristics of edge environments.

7. Challenges and Future Directions: Despite advancements in secure data sharing and searching at the edge, challenges remain. Research by Gubbi et al. (2013) identified issues related to interoperability, scalability, and the integration of security protocols within existing IoT frameworks. They advocated for standardized protocols and collaborative efforts among stakeholders to develop comprehensive security solutions that can be seamlessly implemented across diverse IoT environments.

8. Emerging Trends: The literature also indicates emerging trends in secure data management for cloud-assisted IoT. For instance, the use of artificial intelligence and machine learning for anomaly detection and predictive security has gained traction. Studies such as those by Alazab et al. (2020) demonstrated the effectiveness of AI-driven solutions in identifying security threats in real-time, providing a proactive approach to safeguarding IoT networks.

In summary, the literature illustrates a growing body of research focused on enhancing secure data sharing and searching mechanisms in cloud-assisted IoT environments. By employing advanced encryption techniques, decentralized access control, and efficient retrieval strategies, researchers are paving the way for more secure and resilient IoT ecosystems. However, addressing existing challenges and exploring emerging trends will be crucial for developing comprehensive solutions that ensure data security, privacy, and accessibility in the rapidly evolving landscape of cloud-assisted IoT.

3.PROPOSED SYSTEM

We propose a lightweight cryptographic scheme in this paper that allows IoT smart devices to share data with others at the edge of cloud-assisted IoT, where all security-oriented operations are offloaded to nearby edge servers, taking into account the aforementioned limitations of current solutions for resource-limited smart devices. Additionally, even though our initial focus is on the security of data-sharing, we also offer a data-searching scheme to enable authorised users to look for required data or shared data on storage where all data are in encrypted form.

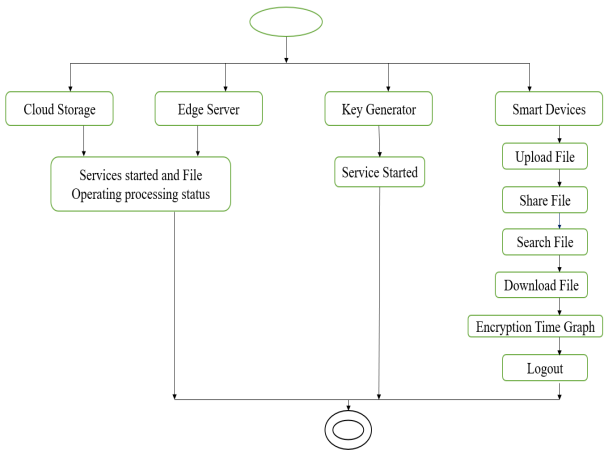

Fig 3.1 Block Diagram

4.SCREEN SHOTS:

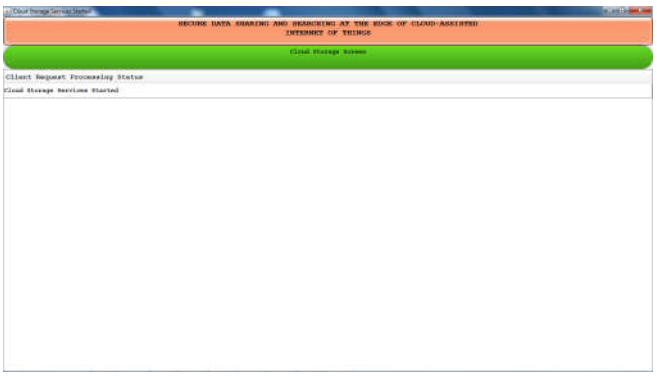

Fig 4.1 Cloud Server

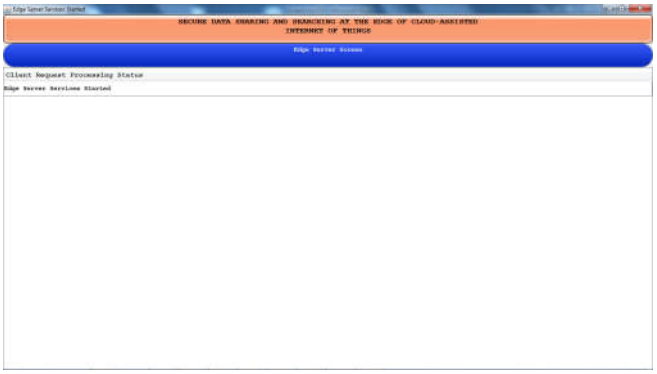

Fig 4.2 Edge Server

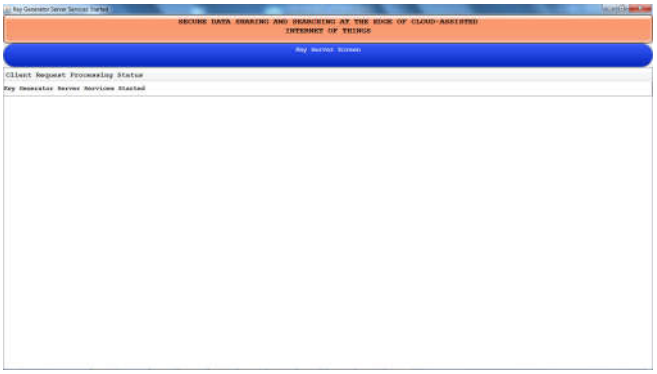

Fig 4.3 Key Generator Server

Fig 4.4 Smart Device Application

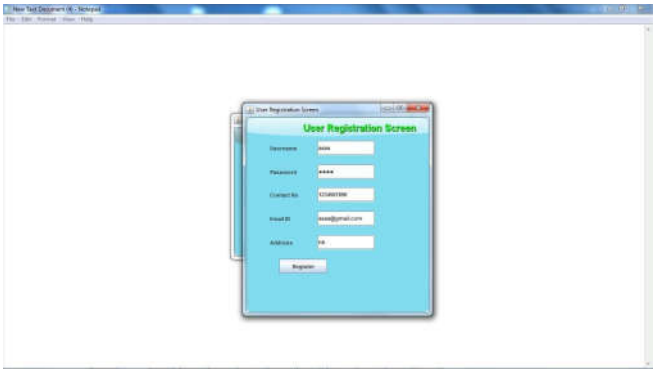

Fig 4.5 Click On Register for User Registration

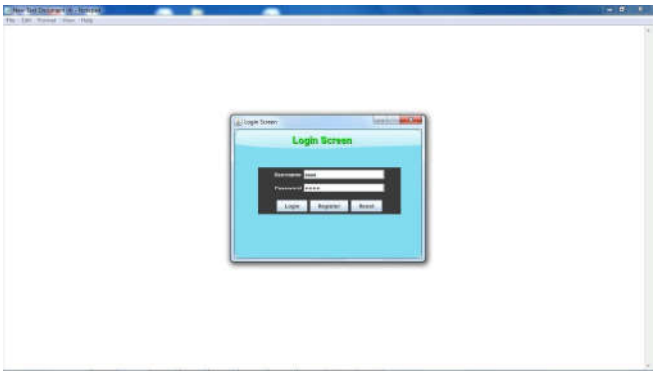

Fig 4.6 Login as Registered User

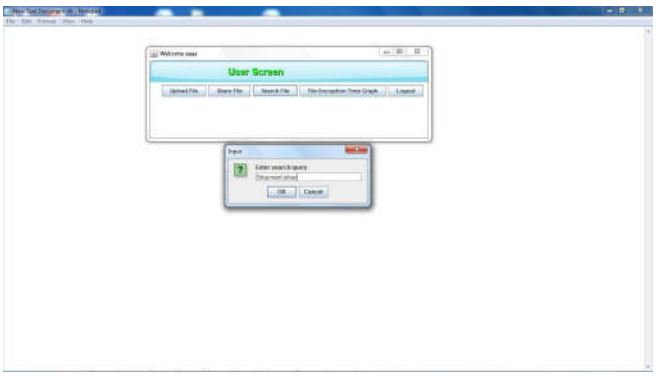

Fig 4.7 User Search Query Screen

5.CONCLUSION:

In conclusion, ensuring secure data sharing and searching in cloud-assisted Internet of Things (IoT) environments is essential for fostering trust and enhancing the overall functionality of smart applications. This study has highlighted the importance of integrating robust encryption techniques, decentralized access control mechanisms, and efficient retrieval methods to address the multifaceted security challenges associated with IoT systems. By leveraging advancements in edge computing and machine learning, it is possible to optimize both the security and performance of data management practices, ensuring that sensitive information remains protected while maintaining accessibility for authorized users. However, ongoing research is necessary to tackle the evolving threats in this domain, including interoperability and scalability issues. As IoT continues to grow, the development of standardized

security frameworks and collaborative approaches among stakeholders will be crucial in creating resilient ecosystems that safeguard user privacy and data integrity. Ultimately, this research contributes valuable insights for practitioners and researchers aiming to implement secure data management strategies in the dynamic landscape of cloud-assisted IoT.

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