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IDENTITY-BASED ENCRYPTION TRANSFORMATION FOR FLEXIBLE SHARING OF ENCRYPTED DATA IN PUBLIC CLOUD.

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ABSTRACT

In modern cloud computing environments, data sharing and security have become crucial challenges, particularly when sensitive information is stored on public cloud servers. Traditional encryption methods require complex key management and lack flexibility in user access control. To address these issues, this paper presents an **Identity-Based Encryption (IBE) Transformation for Flexible Sharing of Encrypted Data in Public Cloud**. The proposed system leverages the concept of IBE, where a user's unique identity (such as an email ID) serves as the public key, simplifying key distribution and authentication processes. By introducing a proxy-based transformation mechanism, encrypted data can be securely shared with authorized users without decrypting it on the cloud server. This approach ensures data confidentiality, fine-grained access control, and reduced computational overhead on the data owner. The transformation also supports dynamic user revocation and re-encryption, making it highly adaptable for real-world cloud storage and data-sharing scenarios.

Keywords:

Identity-Based Encryption (IBE), Cloud Computing, Data Security, Proxy Re-Encryption, Access Control, Data Sharing, Public Cloud, Key Management, Encryption Transformation.

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1.INTRODUCTION

With the rapid adoption of cloud computing, users and organizations increasingly rely on public cloud platforms for storing and sharing large volumes of data. While cloud storage offers significant benefits such as scalability, cost efficiency, and remote accessibility, it also introduces serious concerns regarding data privacy and unauthorized access. Traditional encryption schemes often require a complex key management infrastructure and lack flexibility when data needs to be shared with multiple users dynamically.

To overcome these limitations, **Identity-Based Encryption (IBE)** has emerged as an efficient cryptographic technique that simplifies key management by using a user's unique identity (for example, an email address or username) as the public key. This eliminates the need for traditional Public Key Infrastructure (PKI) and makes encryption-based access control more practical in cloud environments. However, a major challenge in IBE systems lies in securely sharing encrypted data among users without revealing the underlying plaintext or re-encrypting data each time access rights change.

The proposed model, **Identity-Based Encryption Transformation for Flexible Sharing of Encrypted Data in Public Cloud**, introduces a proxy-based transformation mechanism that allows the cloud server to convert ciphertexts for authorized users without learning any information about the original data. This ensures that only users with valid private keys can access the decrypted content. The approach enhances data confidentiality, provides flexible sharing capabilities, and supports efficient user revocation,

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making it highly suitable for secure and scalable cloud-based data-sharing systems.

2.LITERATURE REVIEW

The integration of Identity-Based Encryption (IBE) and Proxy Re-Encryption (PRE) has been extensively explored to address the challenges of secure and flexible data sharing in cloud computing environments. IBE simplifies key management by using a user's identity as the public key, eliminating the need for traditional Public Key Infrastructure (PKI). However, IBE faces challenges related to identity revocation and key management overhead. To mitigate these issues, outsourcing computation has been proposed, offloading key management tasks to cloud service providers, thereby reducing the burden on the Key Generation Center (KGC) and enhancing scalability ResearchGate.

PRE allows a semi-trusted proxy to transform ciphertexts from one user's public key to another's without decrypting the data, facilitating secure data sharing among multiple users. This approach has been widely adopted to enable fine-grained access control and efficient data sharing in cloud environments ResearchGate. Recent advancements have focused on enhancing the security and efficiency of PRE schemes, including the introduction of identity-based proxy re-encryption, which combines the benefits of IBE and PRE to further streamline key management and access control ScienceDirect.

The combination of IBE and PRE, known as Identity-Based Encryption Transformation (IBET), has been proposed as a solution to facilitate flexible and secure data sharing in the cloud. IBET schemes leverage the strengths of both IBE and PRE to enable data owners to securely share encrypted data with authorized users, while maintaining control over access permissions and minimizing the risk of unauthorized access InK.

In summary, the integration of IBE and PRE offers a promising approach to secure and flexible data sharing in cloud computing environments. Ongoing research continues to address challenges related to key management, identity revocation, and access control to further enhance the practicality and security of these schemes in real-world applications.

3. EXISTING SYSTEM

In the existing systems for IoT management, the primary focus has been on **device connectivity, data collection, and basic monitoring** of networked devices. Many platforms rely on cloud services for storing and processing IoT data, providing scalability and remote accessibility. However, these systems often **lack robust security mechanisms**, making them vulnerable to unauthorized access, data breaches, and malicious attacks. Traditional security measures, such as basic password protection or simple authentication, are insufficient to prevent sophisticated cyber threats targeting cloud-stored IoT data. Some existing frameworks implement **role-based access control (RBAC) or attribute-based access control (ABAC)** to restrict user permissions, and encryption techniques like TLS or SSL are used for secure data transmission. Despite these measures, many systems still face challenges in **real-time threat detection, anomaly identification, and efficient management of large-scale IoT networks**. Consequently, the limitations of current solutions highlight the need for an integrated approach that combines **efficient IoT management with strong security protocols** to ensure resilience against unauthorized access and data compromise.

4.PROPOSED SYSTEM

The proposed system introduces an **integrated framework for efficient IoT management with enhanced cloud security** to address the limitations of existing solutions. Unlike traditional systems, this approach combines **secure authentication, advanced encryption, access control, and real-time anomaly detection** to ensure resilience against unauthorized access. IoT devices are managed through a centralized platform that monitors device status, performance, and data flow, enabling **efficient network management**. Data transmitted to cloud storage is protected using strong encryption protocols such as **AES and TLS**, while **role-based and attribute-based access controls** ensure that only authorized users and devices can access sensitive

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information. Additionally, the system employs **real-time monitoring and anomaly detection algorithms** to identify unusual activities or potential security breaches, allowing proactive responses to threats. By integrating these features, the proposed system provides a **scalable, reliable, and secure solution** for managing large-scale IoT networks while maintaining data integrity, confidentiality, and operational efficiency.

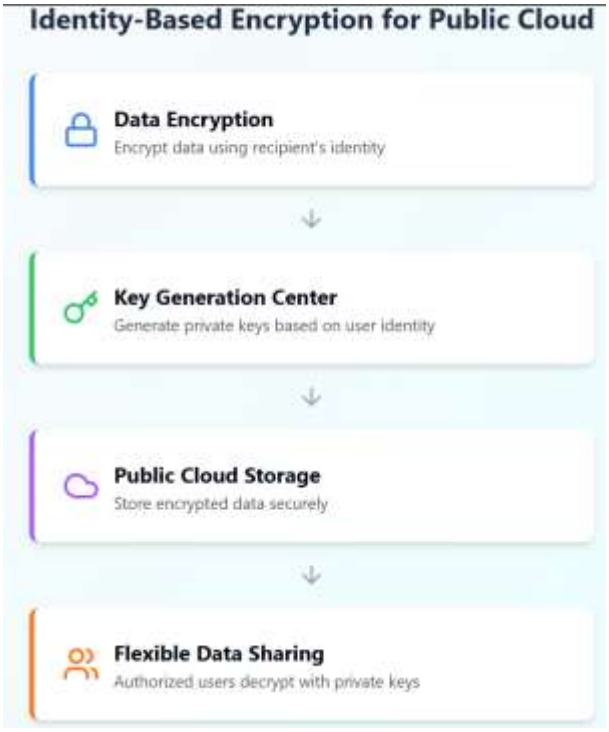
5.METHODOLOGY

The proposed system, **Identity-Based Encryption Transformation (IBET) for Flexible Sharing of Encrypted Data in Public Cloud**, follows a structured methodology to ensure secure, flexible, and efficient data sharing among users. The methodology consists of the following phases:

1. **System Initialization:**
   - The **Key Generation Center (KGC)** initializes the system by generating a master secret key and the corresponding public parameters.
   - These public parameters are shared with all users and the cloud server, while the master secret key is kept confidential within the KGC.
2. **User Key Generation:**
   - Each user registers with the KGC using their unique identity (e.g., email ID).
   - The KGC generates a private key corresponding to the user's identity, enabling the user to decrypt data encrypted under their identity.
3. **Data Encryption:**
   - The data owner encrypts the sensitive data using the recipient's identity as the public key.
   - The encryption process ensures that only the intended recipient(s) with the correct private key can decrypt the data.
4. **Proxy-Based Ciphertext Transformation:**
   - To enable flexible sharing, the cloud server acts as a **semi-trusted proxy**.
   - When the data owner wants to share data with additional users, the proxy transforms the ciphertext from being encrypted under the original recipient's identity to the new recipient's identity **without decrypting the content**.
5. **Data Sharing and Access Control:**
   - The transformed ciphertext is shared with the new authorized user.
   - The system supports **dynamic access control**, allowing users to be added or revoked without re-encrypting the entire dataset.
6. **Data Decryption:**
   - Authorized users use their private keys (provided by the KGC) to decrypt the received ciphertext and access the plaintext data.
7. **Security and Efficiency Measures:**
   - The methodology ensures **confidentiality**, as the cloud server cannot access plaintext data.
   - Proxy transformation reduces computational overhead for the data owner, making the system scalable.
   - Supports **fine-grained access control** and **user revocation**, enhancing security in multi-user cloud environments.

6.System Model

SYSTEM ARCHITECTURE



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7.Results and Discussions

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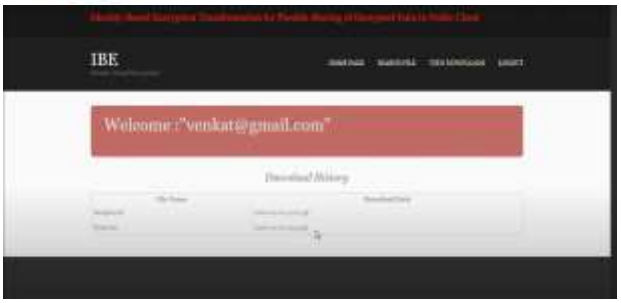

8. CONCLUSION

The proposed **Identity-Based Encryption Transformation (IBET) for Flexible Sharing of Encrypted Data in Public Cloud** provides a robust and practical solution for secure and flexible data sharing in cloud environments. By integrating **Identity-Based Encryption (IBE)** with a **proxy-based ciphertext transformation mechanism**, the system eliminates the complexities of traditional key management while enabling dynamic access control and efficient user revocation.

This approach ensures that sensitive data remains confidential, even when stored on semi-trusted public cloud servers, as the proxy can transform ciphertexts without accessing the underlying plaintext. The methodology significantly reduces computational overhead on data owners, supports fine-grained access permissions, and enhances scalability for multi-user cloud systems.

In summary, the IBET framework addresses critical challenges in cloud data security, providing an efficient, secure, and flexible mechanism for real-world applications where data sharing among multiple users is required. Its adoption can improve trust in cloud services and empower organizations to manage and share sensitive data with confidence.

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