Critical Analysis of Cloud Computing Issue

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***Abstract*— Cloud computing has revolutionized the management of data and applications over the Internet, providing flexibility and cost savings. However, security concerns remain a critical issue in technology. Data theft, data loss or leakage, system vulnerabilities, and privacy and regulatory compliance are important security issues in the context of cloud computing. This study aims to conduct a critical analysis of these security issues through a literature review, identify security issues that arise in cloud computing and explore security measures to prevent data theft in a cloud computing environment. The research method used is a literature review, which involves searching, analyzing, and synthesizing relevant literature on security issues in cloud computing. The findings show that data theft, which includes theft of sensitive information stored in cloud applications, is a significant security issue. In addition, data loss or leakage, system vulnerabilities, and privacy and regulatory compliance are also significant challenges. Mitigating these risks requires strong authentication, data encryption, threat monitoring and detection, physical and network security, access management, and disaster recovery strategies. Collaboration between cloud computing service providers and users is critical in ensuring a secure computing environment.**

Keywords*— *Cloud computing, security issues, data theft, system vulnerabilities

I. INTRODUCTION

1.1 Background

In the perspective of information technology, cloud computing has become an innovation that provides benefits and ease in the management of data and applications over the Internet. Cloud computing services allow users to access computing resources flexibly and cost-effectively through a network-connected virtual server center. This has changed the way companies store and manage their data, with many companies turning to cloud computing to leverage the potential offered by this technology. (Rittinghouse & Ransome, 2016; Mell & Grance, 2011).

However, although cloud computing offers many advantages, security issues are one of the main concerns in the use of this technology. Theft of information or theft of data is one of the security issues that often arise in the context of cloud computing. Theft of sensitive data stored in storage applications using cloud computing technology can have serious consequences for users, especially companies. The stolen data can be confidential company information, critical customer data, or highly valuable personal information. Therefore, preventing data theft and other cybercrime is a top priority in cloud computing security (Almorsy, Grundy, & Müller, 2016; Wang, Liu, & Ren, 2010).

In an effort to prevent data theft, there are several steps you can take, such as avoiding data loss or leakage, securing accounts and services, and managing identity and access control properly. One method used in data security aspects, especially authentication and authorization on cloud computing applications or services, is single-sign-on technology. (SSO). SSO technology allows users to access various services in the network using only one user account, thus reducing complexity and simplifying the authentication process. (Torkura, Abdullah, & Saeed, 2016).

Despite many efforts being made to improve cloud computing security, concerns about data security and privacy remain critical. Essential services relayed to third parties in cloud computing make it harder to maintain data security and privacy, support data and services availability, and ensure compliance with applicable regulations. (Buyya, Yeo, Venugopal, Broberg, & Brandic, 2009; Subashini & Kavitha, 2011). Therefore, critical analysis of security issues in cloud computing is necessary through a literature review to gain a better understanding of existing vulnerabilities and threats, as well as solutions that may be implemented to enhance security in a cloud-computing environment..

1.2 Core Problems

The study aims to conduct a critical analysis of security issues in cloud computing through a literature review. With a problem:

- What are the security issues that arise in the context of cloud computing?
- What security measures can be taken to prevent data theft in cloud computing environments on various platforms?

II. METHOD

In this study, the method used is the method of library study. study library is the activity of studying various reference books as well as previous research results that are similar that are useful to obtain the theoretical foundation on the problems to be studied. This method is carried out by searching, analyzing, and synthesizing relevant literature on security issues in cloud computing. The security methods worked against this cloud computing system are done in a number of ways, which each performance is done on each part.

III. RESULT AND DISCUSSIONS

In the above description, the research background discusses the role of cloud computing in the management of data and applications over the Internet as well as security issues that arise in this context. Data theft is a major concern as it can have serious consequences for users, especially companies. Therefore, effective security measures are needed to prevent data theft and other cybercrime acts. The problem formulation in this study is to identify security issues that arise in the context of cloud computing and find out what security measures can be taken to prevent data theft in a cloud-computing environment. The method used in this study is the library study method. In this method, researchers perform search, analysis, and synthesis of relevant literature on security issues in cloud computing. Here are the results and description of the above description:

3.1 Most Used Platform For Cloud Computing

Amazon Web Services (AWS), Alibaba Cloud, and Google Cloud are the three leading players in the cloud computing industry. Each of these cloud computing service providers offers a range of services and features to meet business and individual needs.

A. Amazon Web Service

AWS, Amazon's subsidiary, is the largest and most widely used cloud computing platform. AWS provides a comprehensive range of cloud computing services, including power computing, storage, databases, analytics, machine learning, and more. AWS offers a global infrastructure with data centers located in different regions around the world, allowing to deploy their applications closer to their target audience.

AWS has a strong focus on security and provides a range of security features and tools to protect customer data. AWS provides identity and access management (IAM) for secure user authentication and access control, encryption services for data protection, and network security features such as firewalls and virtual private clouds. (VPC). AWS also complies with a range of industry standards and regulations to ensure data privacy and security.

B. Alibaba Cloud

Alibaba Cloud, also known as Aliyun, is a cloud computing division of Alibba Group, one of the world's largest e-commerce companies. Alibaba Cloud is the leading provider of cloud computing services in China and has expanded its presence globally. Alibaba Cloud offers a range of cloud computing services, including computing, storage, networking, databases, artificial intelligence (AI), and more.

Like AWS, Alibaba Cloud also places a strong emphasis on security. Alibaba Cloud provides security services such as anti-DDoS protection, web application firewall (WAF), data encryption, and access control mechanisms. Alibaba Cloud also complies with a range of security standards and regulations, including China's cybersecurity laws and the General Data Protection Regulation. (GDPR).

C. Google Cloud

Google Cloud is a cloud computing platform offered by Google. Google Cloud provides a range of cloud computing services, including computing, storage, networking, big data, artificial intelligence (AI), and machine learning. Google Cloud focuses on providing scalable and high-quality infrastructure to support modern applications and data analytics.

Security is a top priority for Google Cloud. Google Cloud offers several layers of security controls, including IAM for access management, data encryption during rest and transit, DDoS protection, and advanced threat detection. Google Cloud also complies with international security and privacy standards, such as ISO 27001 and GDPR, and provides customers with tools for data compliance and protection.

3.2 Security Issues in Cloud Computing

In general cloud computing has some issues such as:

- Theft of sensitive data stored in the storage of cloud computing applications is one of the major security issues. The stolen data can be confidential company information, critical customer data, or highly valuable personal information.
- Loss or leakage of data: In addition to theft of data, loss or leaking of data is also a problem in cloud computing. This can occur as a result of system failure, network attack, or human error.

- System vulnerabilities: Cloud computing systems are vulnerable to cyber attacks such as DDoS (Distributed Denial of Service), phishing attacks, and malware attacks. These attacks can result in operational disruption, data leakage, or system abuse.
- Privacy and regulatory compliance: Data storage in a cloud computing environment by third parties can raise concerns about data privacy and compliance with applicable regulations.

3.3 Security measures to prevent data theft in cloud computing

By implementing appropriate security measures, companies and users can reduce the risk of data theft and other security threats in cloud computing environments. Here are the security measures of cloud computing:

- Implementing robust authentication mechanisms such as the use of complex passwords, two-factor authentics, or even biometric can help prevent unauthorized access to data and applications.
- Data encryption: Encrypting data stored in the cloud can provide an additional layer of security. With encryption, the data will be difficult to access and understand by unauthorized parties.
- Monitoring and threat detection: Using advanced threat monitoring and detection systems can help detect suspicious activity or attacks that are taking place in a cloud computing environment.
- Physical and network security: Securing the physical servers and network infrastructure used in cloud computing is also important. Measures such as using a firewall, monitoring network traffic, and using strict security policies can help protect data.
- Good access management: Managing user identities and access controls well through technologies such as single-sign-on (SSO) can help reduce the risk of unauthorized access and improve security.
- Disaster Recovery: Implementing effective disaster recovery strategies, such as regular data backups and quick recovery, can help reduce losses from data loss or system failure.

And here are the preventive measures that can be done on the three platforms mentioned:

A. Amazon Web Services (AWS)
   - AWS Identity and Access Management (IAM): This service is used to manage user identities and access, including access policy and role settings.
   - AWS CloudTrail: This service provides monitoring and logging of user activity and changes to AWS resources.
   - AWS Shield: This service is specifically designed to protect web applications from Distributed Denial of Service attacks (DDoS).
   - AWS Key Management Service (KMS): This service provides encryption and key management to protect data stored on AWS.
   - AWS WAF (Web Application Firewall): This service provides protection against web attacks by monitoring and regulating web traffic coming into your apps.

B. Alibaba Cloud:
   - Alibaba Cloud Identity and Access Management (RAM): This service is used to manage user identities and access with flexible access policy settings.
   - Alibaba Cloud Anti-DDoS: This service provides protection against DDoS attacks that can interfere with your application availability.
   - Alibaba Cloud Security Center: This service provides security monitoring, threat detection, and security management for your cloud environment.
   - Alibaba Cloud Key Management Service (KMS): This service is used to manage encryption and encrypting keys to protect data in Alibama Cloud.
   - Alibaba Cloud Web Application Firewall (WAF): This service provides protection against web attacks such as SQL injection, XSS attacks, and others.

C. Google Cloud:
   - Google Cloud Identity and Access Management (IAM): This service is used to manage user identities and access with detailed access policy settings.
   - Google Cloud Security Command Center: This service provides centralized security visibility and monitoring for your cloud environment.
   - Google Cloud DDoS Protection: This service provides protection against DDos attacks that can interfere with your application availability.
   - Google Cloud Key Management Service (KMS): This service is used to manage encryption and encrypting keys to protect data in Google Cloud.
   - Google Cloud Firewall: This service provides flexible network access controls to protect your cloud applications and resources.

IV. CONCLUSION

Cloud computing or cloud computing provides benefits and ease in managing data and applications over the Internet. However, security issues are a major concern in the use of this technology.

The theft of sensitive data stored in the storage of cloud computing applications is one of the major security issues. In addition, data loss or leakage, system vulnerabilities, and privacy and regulatory compliance are also issues in cloud computing.

Some security measures that can be taken to prevent data theft in cloud computing environments include the use of strong authentication, data encryption, threat surveillance and detection, physical and network security, good access management, and disaster recovery.

Security in cloud computing is a shared responsibility between cloud service providers and users. Collaboration and a good understanding of security are key in dealing with these security issues.

By understanding the security issues that arise in cloud computing and implementing appropriate security measures, users can enhance the security of data and applications stored in Cloud computing, thereby reducing the risk of data theft and other security threats.

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