Cloud Computing Database Security and Prevention for Service Users

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ABSTRACT

To support the maximum number of users and effective services with minimum resources, internet service providers created cloud computing. Service delivery by cloud service providers in terms of databases is important, because Cloud environments provide access to hardware, software, and information centralized. The database service provider is responsible for installation and maintenance database, application owners are charged according to service usage. Environment Cloud computing provides a platform for sharing computing resources and provides different services such as SaaS, PaaS and IaaS to be used by organizations as private, public or hybrid. Cloud computing is basically known as everything as-a-service. Security is a major concern for databases and providers The cloud requires confidentiality to store data in the database. This article shows attention to security and prevention of database as a service in the cloud by searching from several selected articles that already exist as knowledge for users who wish The database is managed by a third party. The method used is CIA (Confidentiality, Integrity and Availability) to secure the cloud, both users and service providers.

Keyword : Database; Internet; Cloud Service Provider

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1. INTRODUCTION

One of the main challenges for IT companies today is how manage increasingly large data volumes and to produce device products quality software to ensure optimal resource utilization with minimum costs. To support the maximum number of users and services effective with minimum resources, internet service providers create cloud computing. In a few years, the emerging cloud computing has become warm technology. Delivery of services by cloud service providers in terms of Databases are important because cloud environments provide access to hardware, software, and other centralized information.

With database as model service, the application owner does not need to install and maintain the database itself. Instead, the database service provider is responsible for installing and maintains the database, and application owners are charged according to usage their services (Marliana Mella, 2019). A cloud database management system is a distributed database that delivering computing as a service, not a product. This is resource sharing power, software, and information between multiple devices over a network most of it is the internet. Cloud computing environment provides platform for sharing computing resources and providing services different things like SaaS, PaaS, and IaaS that organizations will use as private, public or hybrid. Cloud computing is basically known as Everything as-a-service. Because cloud computing is shared resources distributed throughout a wide network (e.g. the internet) in an open environment, so it will cause various security problems in the cloud environment and the application. On a personal computer, having complete control over data and processes but in a cloud environment using data and application services provided by several other cloud service providers . Security is a primary concern for database and cloud providers require confidentiality to store data in database (Marliana Mella, 2019).

Cloud computing is an information system that makes it possible ease of access to resource components such as servers, applications, and databases via the internet network (Linknet, 2023).

2. RESEARCH METHOD/MATERIAL AND METHOD/LETERATURE REVIEW

Cloud computing is an information system that makes it possible ease of access to resource components such as servers, applications, and database via the internet network. By using this system, sources power will be stored and managed in data centers connected to the internet (Linknet, 2023).

Fig 1. Cloud Computing

A. Cloud Computing Services

The following are several cloud computing services , including:

1) Platform as a service (PaaS) is a development environment and Complete deployment in the cloud, with the resources that allow you provides a variety of things, from simple cloud- based applications to advanced, cloud-powered enterprise applications . PaaS includes infrastructure, servers, storage and networking but also middleware, tools development, business intelligence (BI) services, database management systems, and others. PaaS is designed to support the entire lifecycle web applications such as development, testing, deployment, management, and update. An example of a PaaS service is Google (elitery).
2) Software as a service (SaaS) is software that can be used and accessed via the internet without having to purchase programs or system, as well as hardware. Because it is on a cloud-based server , you don't need to download the software if you want to use it or perform system updates. To access and use saas, all you need is internet. The service provider has also guaranteed it availability and reliability of the application, so that as a user, you can use it immediately without having to pay investment costs or buying a license is relatively expensive. An example of a SaaS service is Force.com (elitery).
3) Infrastructure as a Service (IaaS) is an infrastructure service cloud computing in the form of a package of virtual computer hardware devices , along with internet network, bandwidth, and IP address support. There are online guarantees in real time and security within the 'scope' One units service IaaS. Usual service provider So-called IaaS vendors or providers usually provide various specifications infrastructure, both CPU, RAM and Data Storage in virtual form without an operating system. Examples of IaaS services such as Google Compute Engine, Google Cloud Storage, Google Virtual Private Cloud and Google Persistent Desk (elitery).
4) Data-Storage as a Service (DaaS) is a cloud service model Providing remote and capable data storage system facilities access it anytime and from anywhere. In essence, users only need pay fees according to the amount of resources used. Example the commercial industry that provides DaaS services is Google Cloud Datastore (elitery).

B. Characteristics of Cloud Computing

Some characteristics of cloud computing include:

1) On-Demand Self-Service (self-service on demand). It means, Cloud computing has a self service portal, that is, users can do it configure and manage a service without having to interact with it cloud computing provider or vendor . Vendors only provide services cloud computing automatically, then the company orders the service the. After getting cloud computing services, the company configure according to needs. During its management, The

company does not communicate with vendors, unless a problem occurs (CLOUDMATIKA, 2022).

2) Broad network access (wide network access). Cloud computing services must be accessible anytime and anywhere with just a device or platform connected to the internet. The device used can in the form of a thin client or other media such as a smartphone. Server average The cloud is built using a website as a base so it can be accessed extensively. Despite its high level of accessibility, the cloud must be accessible with the help of the internet. That's the importance of having cloud services with characteristics of broad network access (CLOUDMATIKA, 2022).
3) Elasticity in this context means cloud computing services must be can be provided quickly to meet user needs. Cloud computing must be available in an unlimited capacity so that it can adjusted to the desired specifications. For example, companies requires a larger cloud service than usual. Provider cloud services must immediately provide these services so that users can got it right then and there. The cloud must also be scalable so that The specifications can be increased or decreased as needed (CLOUDMATIKA, 2022).
4) Cloud computing (cloud computing) consists of several resources or resources that build it, starting from networks, servers, applications, services, and storage. These resources are used simultaneously by multiple users across multiple platforms. Cloud computing resources grouped in a data center. The data center consists of various servers that are multi-tenant so they can be accessed at any time the same one. Cloud computing resources are allocated dynamically in order can meet varying user needs or requests (CLOUDMATIKA, 2022).

C. Cloud Database Service

Cloud database is a database service that is built and accessed via cloud computing platform . This database serves many of the same functions as traditional databases with the added flexibility of cloud computing. User installing software on cloud infrastructure to implement database (IBM).

D. Information Security Principles

CIA Triad is a basic concept in cyber security (cyber security) which consists of three main aspects, namely:

1) Confidentiality , this aspect refers to policy and technology used to protect information from access or disclosure which is invalid. In the context of confidentiality, information should only be accessed by authorized parties, so that sensitive or confidential information remains protected from unwanted parties (Pesona Service Application, 2024).
2) Integrity , related to the authenticity and correctness of information. This means that the information must remain intact and not undergo any unnecessary changes valid during storage, shipping or processing. Efforts to maintain Information integrity involves taking action to prevent modification or unauthorized manipulation of data (Pesona Servicing Application, 2024).
3) Availability , indicating that the information must be available and can be accessed by authorized parties when needed. This means system and infrastructure must be designed and managed in such a way that it can respond to information access requests quickly and without interruption significant (Pesona Service Application, 2024).

The method used in this article is the CIA Triad (Confidentiality, Integrity, and Availability). These three terms are considered as three concepts most important in information security. With each letter representing a principle basics in cyber security as explained above. Considering these three principles can also help guide development security policies for the company. When conducting an evaluation to the needs and use cases of new products and technologies, CIA Triad too helps companies to focus on looking at the vulnerabilities (vulnerabilities) based on each Confidentiality, Integrity and Availability function.

3. RESULTS AND DISCUSSION

Cloud database services must pay attention to various threats and prevention seen from a comprehensive security aspect (CIA), can be seen in table 1.

Table 1. CIA Triad Security Threats and Countermeasures

Threat	Prevention	CIA Triad
Threats of Others	Employees can exploit sensitive data and secrets and chain management and assessment tight supply is required	Confidentiality
Proxy Architecture	Reduces the need for component use intermediary. Metadata is moved to the database. The encryption engine is run by each client. Scalability, security and data consistency.	Confidentiality
Integrity Check	Modify configuration, access and data files constitutes a threat to data integrity. Requires data accuracy and integrity.	Integrity
Data Storage	Client-side encryption quickly deploys, uses the SHA-512 algorithm for integrity control. Meanwhile, AES-256 is used for encryption and the user is not again have to manage the keys manually.	Integrity
Backup Approach	The backup server is stored in a remote location, traditional encryption and decryption methods used with two-step authentication and encryption is performed during the backup operation.	Availability
Resource Exhaustion	Modeling that does not suit needs customers cause resource exhaustion.	Availability

4. CONCLUSION

The conclusions from this research were several cloud database service security which has been grouped into CIA (Confidentiality, Integrity and Availability), with Such services will minimize some infrastructure and human resources by relatively cheap price. Because of several advantages of the cloud database services offered by the service provider, thus providing good knowledge to the intending customer moving a database to the cloud must pay attention to security. Suggestions from research results This can be done by searching journals with a long time limit, so you get more journal choices to group them into Confidentiality, Integrity and Availability (CIA).

REFERENCES

Sari., I.P, Batubara., I.H, Al-Khowarizmi., A, & PP Hariani. (2022). Perancangan Sistem Informasi Pengelolaan Arsip Digital Berbasis Web untuk Mengatur Sistem Kearsipan di SMK Tri Karya. Wahana Jurnal Pengabdian kepada Masyarakat 1 (1), 18-24

Habibi., F, Qathrunada., I.F, & Anggraini., T. (2023). "Design and Build a Tourism Website Using Shopify Framework". Hanif Journal of Information Systems. Vol. 1 No. 1, 2023.

Sari., I.P, A Syahputra, N Zaky, RU Sibuea, & Z Zakhir. (2022). Perancangan sistem aplikasi penjualan dan layanan jasa laundry sepatu berbasis website. Blend sains jurnal teknik 1 (1), 31-37

Hariani.,P.P, Sari.,I.P, & Batubara., I.H. (2021). Implementasi e-Financial Report BUMDes. IHSAN: JURNAL PENGABDIAN MASYARAKAT 3 (2), 169-177

Sari., I.P, A Azzahrah, FQ Isnaini, L Nurkumala, & A Thamita. (2022). Perancangan sistem absensi pegawai kantoran secara online pada website berbasis HTML dan CSS. Blend sains jurnal teknik 1 (1), 8-15

Septiana., D. (2024). Forecasting Rice Prices with Holt-Winter Exponential Smoothing Model. Hanif Journal of Information Systems. Vol. 1 No. 2, 2024.

Sari.,I.P, & Ramadhani., F. (2021). Pengaruh Teknologi Informasi Terhadap Kewirausahaan Pada Aplikasi Perancangan Jual Beli Jamu Berbasis WEB. Prosiding Seminar Nasional Kewirausahaan 2 (1), 874-878.

Satria., A, Ramadhani., F, & Sari, I.P. (2023). Rancang Bangun Sistem Informasi Penerimaan Peserta Didik Baru (PPDB) Sekolah Menengah Kejuruan Telkom 2 Medan Menggunakan Codeigniter. Wahana Jurnal Pengabdian kepada Masyarakat 2 (1), 23-31

Sari., I.P, A Jannah, AM Meuraxa, A Syahfitri, & R Omar. (2022). Perancangan Sistem Informasi Penginputan Database Mahasiswa Berbasis Web. Hello World Jurnal Ilmu Komputer 1 (2), 106-110.

Mahardika., F, & Abdillah., M.L. (2024). Design of Unified Modeling Language Information System for Motorcycle Unit Selling and Buying Transactions using the Waterfall Method. Hanif Journal of Information Systems. Vol. 1 No. 2, 2024.

Sari., I.P, & Batubara., I.H. (2021). Perancangan Sistem Informasi Laporan Keuangan Pada Apotek Menggunakan Algoritma K-NN. Seminar Nasional Teknologi Edukasi dan Humaniora (SiNTESa) 1 (2021 - ke 1

Ramadhani., F, A Satria, & Sari., I.P. (2022). Aplikasi Internet Berbasis Website sebagai E-Commerce Penjualan Komponen Sport Car. Blend Sains Jurnal Teknik 1 (2), 69-75

Sari., I.P, & Batubara., I.H. (2021). User Interface Information System for Using Account Services (Joint Account) WEB-Based. International Journal of Economic, Technology and Social Sciences (Injects), 462-469

Batubara., I.H, Sari., I.P, EFS Siregar, & BS Lubis. (2021). Meningkatkan Kemampuan Penalaran Matematika Melalui Metode Penemuan Terpandu Berbantuan Software Autograph. Seminar Nasional Teknologi Edukasi Sosial dan Humaniora 1 (1), 699-705

Sari., I.P, Al-Khowarizmi., A, & Batubara., I.H. (2021). Implementasi Aplikasi Mobile Learning Sistem Manajemen Soal dan Ujian Berbasis Web Pada Platform Android. IHSAN: JURNAL PENGABDIAN MASYARAKAT 3 (2), 178-183

Mudafri., H.A. (2024). Design of a Web-Based Coffeeshop Ordering Information System. Hanif Journal of Information Systems. Vol. 1 No. 2, 2024.

Sari., I.P, Hariani., P.P, Satria., A, & Manurung., A.A. (2023). Rancang Bangun Sistem Informasi Pengelolaan Arsip Materi Ajar Berbasis Web untuk Guru MAS Darul Falah. Wahana Jurnal Pengabdian kepada Masyarakat 2 (2), 59-65

Ramadhani., F, & Sari., I.P. (2021). Pemanfaatan Aplikasi Online dalam Digitalisasi Pasar Tradisional di Medan. Prosiding Seminar Nasional Kewirausahaan 2 (1), 806-811

Sari., I.P, Sulaiman., O.K, & Apdillah, D. (2024). Rancang Bangun Game Zombie Menggunakan Kodular Berbasis Android. Jurnal Minfo Polgan 13 (1), 293-302

Ichsan., A, Siambaton., M.Z, & Nasution., K. (2023). "Android-Based Practical Work Student Registration Form Application System Design". Hanif Journal of Information Systems. Vol. 1 No. 1, 2023.

Sari., I.P, Batubara., I.H, & M Basri. (2022). Implementasi Internet of Things Berbasis Website dalam Pemesanan Jasa Rumah Service Teknisi Komputer dan Jaringan Komputer. Blend Sains Jurnal Teknik 1 (2), 157-163

PP Hariani, Sari., I.P, & Batubara., I.H. (2021). Android-Based Financial Statement Presentation Model. JURNAL TARBIYAH 28 (2), 1-16

Ramadhani., F, Sari., I.P, & Satria., A. (2024). Perancangan UI/UX Surat Keterangan Waris dalam Pengembalian Dana Haji Berbasis Web. Blend Sains Jurnal Teknik 2 (3), 198-203.

Sari., I.P, Sulaiman., O.K, Ramadhani., F, & Satria., A. (2023). Perancangan Sistem Manajemen Surat Berbasis Web Pada Kantor Camat Tano Tombangan Angkola. INCODING: Journal of Informatics and Computer Science Engineering 3 (2), 61-76.

Jannah., A, Meuraxa., A.M, & Azzahrah., A. 2023. "Web Based E-Commerce System Design at EXO Shop Using The Waterfall Method". Hanif Journal of Information Systems. Vol. 1 No. 1, 2023.

Sari., I.P, Al-Khowarizmi., A, , Jannah., A, Meuraxa., A.M, & Tanjung., M.I. (2023). Web-Based Offline Game Suit Design: A Model Overview. Journal of Computer Science, Information Technology and Telecommunication Engineering 4 (2), 389-394.

Guntur., S, Ichsan., A, & Sari., I.P. (2024). Designing a Web-Based Mail Management System at the Beringin Helvetia Sub-district Office. Altafani: Jurnal Pengabdian Masyarakat 1 (1)

Sari., I.P, Sulaiman., O.K, Al-Khowarizmi., A, & Azhari., M. (2023). Perancangan Sistem Informasi Pelayanan Masyarakat pada Kelurahan Sipagimbar dengan Metode Prototype Berbasis Web. Blend Sains Jurnal Teknik 2 (2), 125-134.

Hutasuhut., B.K, Sari., I.P, & Al-Khowarizmi, A.K. (2023). Analysis the Effect of Digitalization and Technology on Web-Based Entrepreneurship. Journal of Computer Science, Information Technology and Telecommunication Engineering

Sari., I.P, Ramadhani., F, Satria., A, Apdillah., D, & Basri, M. (2023). Rancangan UI/UX Aplikasi Analytics pada Toko Online Wao Sneakers Menggunakan Figma Berbasis Mobile. Factory Jurnal Industri, Manajemen dan Rekayasa Sistem Industri 1 (3), 93-101

Sari., I.P, Al-Khowarizmi., A, & Batubara., I.H. (2021). Cluster Analysis Using K-Means Algorithm and Fuzzy C-Means Clustering For Grouping Students' Abilities In Online Learning Process. Journal of Computer Science, Information Technology and Telecommunication Engineering 2 (1), 139-144

Batubara., I.H, & Sari., I.P. (2021). Improving Critical Thinkingability Through Guided Discovery Methods Assisted By Cabri 3d Software. International Journal of Economic, Technology and Social Sciences (Injects) 2 (1), 325-330

Sari., I.P, Ramadhani., F, Satria., A, & Apdilah., D. (2023). Implementasi Pengolahan Citra Digital dalam Pengenalan Wajah menggunakan Algoritma PCA dan Viola Jones. Hello World Jurnal Ilmu Komputer 2 (3), 146-157

Sari., I.P, Fahroza., M.F, Mufit., M.I, & Qathrunad., I.F. (2021). Implementation of Dijkstra's Algorithm to Determine the Shortest Route in a City. Journal of Computer Science, Information Technology and Telecommunication Engineering 2 (1), 134-138

Batubara., I.H, & Sari., I.P. (2021). Improving Critical Thinkingability Through Guided Discovery Methods Assisted By Cabri 3d Software. International Journal of Economic, Technology and Social Sciences (Injects) 2 (1), 325-330

Apdilah., D, Sulaiman., O.K, & Sari., I.P. (2021). Optimization Of The Fuzzy C-Means Cluster Center For Credit Data Grouping Using Genetic Algorithms. Al'adzkiya International of Computer Science and Information Technology (AIoCSIT) Journal 2 (2), 156-163

Sari., I.P, Batubara., I.H, & Al-Khowarizmi., A. (2021). Sensitivity Of Obtaining Errors In The Combination Of Fuzzy And Neural Networks For Conducting Student Assessment On E-Learning. International Journal of Economic, Technology and Social Sciences (Injects) 2 (1), 331-338

Ramadhani., F, Satria., A, & Sari., I.P. (2023). Implementasi Metode Fuzzy K-Nearest Neighbor dalam Klasifikasi Penyakit Demam Berdarah. Hello World Jurnal Ilmu Komputer 2 (2), 58-62

Sari., I.P, Al-Khowarizmi., A, Ramadhani., F, & Sulaiman., O.K. (2023). Implementation of the Selection Sort Algorithm to Sort Data in PHP Programming Language. Journal of Computer Science, Information Technology and Telecommunication Engineering 4 (1)

Sulaiman., O.K, Sari., I.P, & Satria., A. (2021). Implementation Data Mining For Level Analysis Traffic Violation By Algorithm Association Rule. Al'adzkiya International of Computer Science and Information Technology (AIoCSIT) Journal 2 (2), 128-135

Sari., I.P & Batubara., I.H. (2021). Optimization of the FP-Growth Algorithm in Data Mining Techniques to Get the Electric Power Theft Pattern for the Development of Smart City. 2021 4th International Conference of Computer and Informatics Engineering (IC2IE), 293-298

Batubara., I.H, & Sari., I.P. (2021). Combination of Analytic Hierarchy Process (AHP) Method and Profile Matching Method with Matrix Decomposition in Determining Olympiad Candidates. International Journal of Economic, Technology and Social Sciences 2, 470-477

Sari., I.P, Al-Khowarizmi, A., Sulaiman., O.K, & Apdilah., D. (2023). Implementation of Data Classification Using K-Means Algorithm in Clustering Stunting Cases. Journal of Computer Science, Information Technology and Telecommunication Engineering 4 (2), 402-412