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Cloud based ERP systems and Data Security for Cloud based ERP Applications - SAP S/4HANA.

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Abstract - In this research, we will talk about data security in cloud-based ERP. We utilized SAP S/4HANA cloud (Public edition) in this research. It is an analysis of security issues connected to cloud data and associated topics. The paper will examine data in detail. Worldwide protection techniques and strategies are employed to guarantee the highest level of data protection by lowering risks and threats in Cloud ERP. Although many apps benefit from having access to data on the cloud ERP, doing so exposes data to applications that may already have security flaws. Now-a-days many Organizations preferring Cloud based ERPs than on premises ERP so, we decided to Explore the Cloud based ERP. The paper will also discuss data security issues for Data-at-Rest and Data-in-Transit. All tiers of SaaS (Software as a Service), PaaS (Platform as a Service) are used in the study. In this research we also explore the solutions for different security issues in Cloud ERP.

Key Words: Data Security, Cloud Computing, SAP S/4HANA, Cloud ERP

1.INTRODUCTION

Software for enterprise resource planning, or cloud ERP, is accessed online. Cloud ERP software serves as the "brains" or "backbone" of an organization's IT infrastructure, offering cutting-edge capability for all key business operations. Cloud ERP is often provided "as a service," hosted on a provider's cloud computing infrastructure (software-as-a-service or SaaS ERP). Instead of owning the programme, customers lease it through a yearly or monthly subscription. The provider handles application maintenance, updates and innovations, storage systems, and security; there are no upfront hardware costs. SaaS ERP, often known as cloud ERP, is hosted on the cloud platform of your provider, and is controlled by their IT department. On the other side, on-premises ERP is set up and maintained by your IT staff or a partner on your own gear and servers. When it comes to ERP deployment alternatives, businesses are increasingly embracing the cloud. 63% of organizations choose cloud ERP software over on-premises ERP, according to a recent poll.

With its cutting-edge functionality and flexibility, cloud ERP is a crucial component for success in the digital age. ERP systems have historically provided enormous value to businesses, assisting them in increasing productivity and gaining knowledge. But because of digitization, everything has altered, even the level of competitiveness. ERP systems installed locally simply can't keep up. They are challenging to adapt to long-term change. Most traditional ERP systems, which were created for a more straightforward environment, fall short of providing the speed, flexibility, and insight that businesses want to operate in new, more flexible ways.

Customers today demand quicker product and service delivery, constant product and service improvement, higher reliability, and cheaper prices. To provide customers with the best value, companies frequently need to go outside their own walls. For production, product distribution, sales management, service, support, and even fundamental business activities, they collaborate digitally with a wide range of partners. They therefore require software that not only helps them manage their increasingly complicated internal processes, but also aids in managing global business networks. Without cloud ERP, this is not possible. It is reasonable to wonder if cloud ERP is secure considering recent headlines about viruses and data breaches. No system is impenetrable, however the level of security your system has depends on how it was implemented and who oversees it.

Important data is protected from unwanted access by SAP HANA Security, which also makes sure that the company's adopted security standards are adhered to. Multitenant databases, a feature of SAP HANA, allow for the creation of several databases on a single SAP HANA system. Multitenant database container is the name given to it. Therefore, all security-related features are provided by SAP HANA for all multitenant databases [3].

The key distinction between traditional ECC security and SAP Security for S/4HANA is that with S/4HANA, security must be applied at both the application and database layers, whereas in the traditional three-tier design, the database could only be accessible through the ECC.

Database security is a challenging endeavor that calls for a full-fledged 360-degree strategy; fortunately, SAP HANA and SAP HANA Cloud are pre-configured with a comprehensive, powerful, and secure security framework. It aids companies in adhering to security-related laws and policies and works to safeguard the data's confidentiality, integrity, and accessibility from frequent dangers like unauthorized access, erroneous privileges, and a lack of control rules.

2 RELATED RESEARCH :

(**Robert Brunel**, **2015**) Relational database systems constantly face the difficulty of managing hierarchies. We discovered that, in order to satisfy the needs of typical applications, today's Database management systems still leave a lot to also be desired through analyses of client cases at SAP. Our research offers a fresh perspective on how hierarchies are handled in SQL-based systems. We outline a method for representing hierarchical data natively and add expressive constructs for building, modifying, and querying a hierarchy to the SQL language. By utilizing current index and query processing techniques, the constructions can be examined effectively. We use preliminary tests on a S/4 prototype to show that our ideas are workable [1].

(Patryk Morawiec, 2022) The use of cloud-based ERP systems has grown over the past several years. Cloud technology is one of the ICT areas that is currently undergoing the quickest growth. 32% of big ERP users may transition from an on-premises approach to a software-as-a-service one in 2023. A less strict and competitive environment, relative advantage, testability, ICT skills and equipment, support from top management and other factors all have a direct favorable impact on the desire to adopt cloud ERP systems. Complexity exists in direct bad effect on cloud - based ERP adoption decision [2].

3. SECURITY NECESSITY

The need for security is growing along with the usage of dispersed networks including the Internet for handling company data. When utilizing a distributed network, you must ensure that your information and procedures fulfil your business requirements while preventing unwanted access to vital data. There shouldn't be any processing time or information loss because of user error, carelessness, or attempted exploitation of your system. These security requirements also apply to SAP S/4HANA.

4. SERVICE FOR KEY MANAGEMENT FOR SAP DATA CUSTODIAN

SAP S/4HANA programs are rapidly being deployed on public cloud platforms like AWS, Azure, and GCP as SAP customers pursue a cloud-first strategy. Our customers need to have control over their cryptography for improved security and information protection, enabling them to take preventative measures to secure their data stored on SAP cloud services. Simplifying the process of safeguarding sensitive information in public, corporate, hybrid, and inter environments is Data Management Custodian Key Management System (KMS). To safeguard your data, it offers secret key provision, control, and monitoring services.

- FIPS 140-2 certification compliance (for select cases)
- preserving the privacy of data
- preventing access to client data by cloud service providers
- Separation of Functions
- Multiple key chain hierarchies and master key management outside of the HANA environment
- Access, authentication, and authorization based on roles.
- KMS audit logs of access

5. TRANSPARENCY AND CONTROL SERVICE

Customers have access to data visibility and control capabilities through SAP Data Custodian Transparent and Control Services. The solution offers information management, compliance and auditing reporting, insight into and protection for cloud data, and the quick detection and reporting of data protection risks. Customers now have control about how personal data is accessed and used. Customers may easily establish strategy frameworks for regulatory and corporate compliance with SAP Data Custodian.

6. APPLICATION-LEVEL SECURITY

Customers can access vulnerability scanning records just at cloud application level, and SAP maintains platform-level logs for cloud services. Modification audit trails, read logs, and permission trace logs, among others, are examples of application-level security audit logs. Customers can do this to guarantee that the applications are used in accordance with its security policies and to keep track of access to their information. Please see the SAP Publishing book on the topic for more details on logs for SAP S/4HANA security. The safety of an SAP S/4HANA system may be ensured via the configuration and use of logging, which are both covered in detail in this book [5].

7. CLOUD EDITION FOR THREAT DETECTION

Through an intake subscription license model, SaaS Threat Detection Cloud Version offers real security incident monitoring for customers' SAP landscapes at an affordable price. This service enables the customer to take advantage of SAP's experience in tracking security vulnerabilities in SAP systems, assisting the customer in quickly identifying and counteracting potential risks. This is an inter cloud app that utilizes SAP HANA Cloud and operates on SAP Business Software System (Cloud Foundry). It could keep an eye on the logs of SAP ABAP, SAP HANA, and SAP Java applications. With the ability to analyze and analyze security events throughout the whole SAP landscape, customers can quickly recognize and counteract possible attacks [4].

8. DATA PRIVACY CONTROLS

The customer administrator can configure built-in privacy restrictions that are available in the SAP Business Technology Platform. This offers a variety of privacy configuration choices and the transparent collecting of user data. Customers using SAP BTP can manage consent, track modifications and logging, create information reports, and start data erasure using data privacy settings. Customers may preserve visibility and control over their data privacy with the use of these crucial features.

9. COMMON PROBLEMS

Data theft: The theft of data files from huge corporations and the compromising of client privacy are two of the hottest news stories right now. However, when looking into the specifics of the data breaches, it's more frequent to discover that the data was kept on-site at the business rather than in the cloud.

Data Loss: Although losing entire files is dreadful, it can occur in the event of a natural disaster, when data is mistakenly deleted, or if a system fails. Your data can only be restored if it is often and routinely backed up. With erp Systems, the infrastructure providers regularly and redundantly perform off-site backups. It is simple to restore lost data to quickly get your machine back up and running.

10. GUIDANCE FOR IMPLEMENTATION RISKS

Although there is some risk involved with any project, the following five helpful suggestions will increase your chances of finishing the job on time and within your projected budget.

Choose partners for software, business processes, and implementation who have industry and regional expertise. Always speak with references from companies like yours.

Don't push outmoded technology past its breaking point. Remove outmoded, isolated systems that are out-of-date and, to the extent practicable, combine your data into a single database (a single version of the truth) with integrated business intelligence to improve performance across borders.

In the digital economy, companies frequently need to link their systems with those of their customers and suppliers as well as other business units. Verify your ability to integrate the cloud and your knowledge of supplier networks.

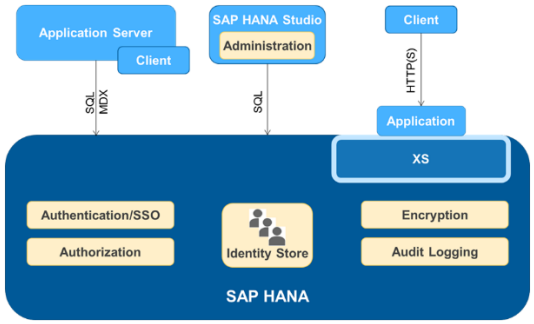

Fig 1 : Shows the Basic Architecture of SAP HANA

11. IMPLEMENTATION AND RESULTS

We implemented a Sample Donations Application (ERP) using SAP S/4 HANA. We also implement and investigated how the Data Security concerns damage the running of Applications. Our Application main moto is it is a record of Donations that are donated by a donor. Observed all security features of SAP S/4 HANA by using our Sample application.

12. CONCLUSION

The trend of enhancing cloud data storage methods is undoubtedly growing with the increasing use of cloud technology for data storage. If not properly protected, data stored in the cloud may be in danger. The hazards and safety threats to cloud-based data were covered in this essay, along with an overview of three different security issues. In order to determine the risks posed by the hypervisor, virtualization is investigated.

Similar concerns brought on by multitenancy and public clouds have been discussed. This paper's main topics included data security, including its risks and potential remedies in cloud computing. It has been addressed how to effectively encrypt data in the cloud using various types of data and encryption methods.

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