International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Cloud Replacing Traditional Database

Ankit Srivastava

Designation – Independent Researcher

Abstract

Technology has changed rapidly and has changed the way we store, manage and read data. Data management is one of the most attractive aspects of cloud computing and is an alternative to the problem faced by database platforms, which can be scaled, modularized, and inexpensive. In this research paper, we will learn the main reasons why databases to cloud migration has taken place and the pros and cons of it. In the past few years, cloud computing has changed the way organizations hold, store and use data. The era of databases is fast changing and the core of data management in companies are being dispensed with. There are many good reasons why cloud databases are the preferred choice for today's businesses.

Keyword: Cloud, Data, Migration, database, cloud computing, Healthcare, database management

Introduction

In the digital age, data created by companies, individuals and organizations is more complex than ever before [1]. The traditional database platforms have been unable to meet this data explosion, so cloud computing was born. [2] [3] [4] Cloud computing is the storage, processing, and analysis of big data through on-demand access to compute and storage capacity. [4]

Some of the reasons for switching to cloud from databases include scaling, cost-effectiveness and the ever-increasing requirement of real-time data analysis. There are several advantages of cloud computing — from more access, security, and access to cutting edge analytics and machine learning. [5] [6] Yet, using cloud computing in data management isn't without its challenges like data privacy, regulatory compliance, or seamless integration to existing systems.

Cloud computing and data management

Cloud computing has been a game-changer in the data administration [7]. Cloud computing provides a highly scalable, modular infrastructure so that businesses can store, manage and analyze massive amounts of data without consuming large amounts of on-premises hardware and infrastructure. [6] Clouds services, ranging from storage to database and data analytics, are some of the services provided by the cloud platforms for companies to harness the big data computing. The biggest benefit of cloud data management is that you can increase or decrease resources as needed so your business can respond to changes in the demand for data. Cloud computing is also cost effective, because organizations can use pay-as-you-go model instead of making upfront capital investments like with traditional on-premise data centers. [6]

Figure 1 Cloud data management

Advantages of Cloud-based Data Management

The adoption of cloud-based data management solutions offers several advantages over traditional database systems:

- **Scalability:** Cloud platforms allow organizations to easily scale their data storage and processing capabilities as their data needs grow, without the need for significant investments in hardware and infrastructure [5].
- **Cost-effectiveness:** Cloud-based solutions typically offer a more cost-effective approach to data management, as organizations can pay only for the resources they consume, rather than investing in expensive on-premises infrastructure [4].
- **Accessibility:** Cloud-based data management solutions enable remote and mobile access to data, allowing employees and stakeholders to access and collaborate on data from anywhere, at any time .
- **Enhanced Security:** Cloud providers often offer advanced security measures, such as data encryption, access controls, and disaster recovery mechanisms, which can be difficult and costly for organizations to implement on their own .

Challenges and Considerations

While the adoption of cloud-based data management solutions offers numerous benefits, there are also several challenges and considerations that organizations must address:

Data Privacy and Compliance: The storage and processing of sensitive data in the cloud raises concerns about data privacy and compliance with regulatory requirements.

Integration with Existing Systems: Integrating cloud-based data management solutions with existing on-premises systems can be a complex and time-consuming process, requiring careful planning and coordination.

vendor Lock-in: Relying on a single cloud provider can lead to vendor lock-in, which can limit an organization's flexibility and make it difficult to migrate to alternative providers in the future.

Network Dependence: Cloud-based data management solutions rely on a stable and reliable network connection, which can be a concern for organizations with poor internet infrastructure or remote locations.

Cost cutting in cloud database

The primary reason for moving from the database model to the cloud is the savings. Cloud computing is more affordable than traditional data centers where you pay only for what you use, and do not have to spend on costly infrastructure on-premises. [4] In the cloud, organizations can benefit from the economies of scale by cloud providers who can use their huge infrastructure and resources to offer data services at a lower price [7]. And also cloud services can mitigate the operating and maintenance costs of traditional database systems like hardware upgrade, license fees, and support staff [7].

Another reason for the cost-efficiency of cloud-based data management is the scale up or down capabilities. This flexibility allows companies to correlate storage and processing with data consumption so that they don't overprovision resources or have an underutilized infrastructure. Data storage in the cloud can also save a lot of money especially if you have variable data needs or are on a tight IT budget.

Cloud database in Healthcare

The healthcare industry has also been an early adopter of cloud data management solutions due to the explosion of medical data and their diversity as well as the necessity for safe and secure data storage and collaboration. Cloud computing can also break down the data silos in healthcare by offering one single place for data integration and data analysis. Healthcare organizations are starting to embrace cloud computing for many reasons over legacy infrastructures, such as the fact that it can cope with healthcare data's increased volume, speed and diversity, or enable data coupling and analytics at scale. Cloud-based services can also help healthcare professionals work together and share information, to improve coordination of care delivery. Yet cloud migration of healthcare workloads is not a walk in the park. Because healthcare information is highly private and requires regulatory compliance for use, like HIPAA, migration to cloud can be challenging and cautious. [8] [9] [10]

Technical job seekers and cloud database skills

As the adoption of cloud-based data management solutions continues to grow, the demand for technical professionals with expertise in cloud database technologies is also increasing.

Cloud database skills have become increasingly valuable in the job market, as organizations seek to leverage the benefits of cloud computing to enhance their data management capabilities.

Key skills that are in high demand include:

- **cloud database administration:** Proficiency in managing and maintaining cloud-based database services, such as Amazon RDS, Microsoft Azure SQL Database, or Google Cloud SQL.
- **cloud data engineering:** Expertise in designing, implementing, and optimizing data pipelines and workflows in the cloud, using tools like Apache Spark, Apache Hadoop, or Google Cloud Dataflow.
- **cloud data analytics:** Familiarity with cloud-based data analysis and visualization tools, such as Amazon Athena, Google BigQuery, or Microsoft Power BI, to extract insights from cloud-stored data.

As the demand for cloud database skills continues to grow, technical job seekers who can demonstrate proficiency in these areas are likely to have a competitive advantage in the job market.

Litterateur Review

Getting data off of databases and on to cloud-based data warehouse systems is a common development in recent times. Cloud computing also has many benefits over the older on-premises databases such as scaling, adaptability and affordability. As it is understood, several use cases motivate data storage in the

cloud. Another important motivator is the big data analytics which can be carried out using the cloud platform as it gives the computing power and scale needed to handle and process large amount of data. [7] [9] Another big use case is disaster recovery and continuity. Data backup in the cloud — The data backup in the cloud is a fast, secure way of backing up data for an instant recovery from a natural disaster or some other unexpected cause. Healthcare has been the pioneer of using the cloud for data management solutions as it's struggling with a growing amount and array of medical data, data storage and sharing while maintaining security and compliance [11].

Conclusion

Database Migration to Cloud is one of the most radical developments in the management of data. Old-school systems had their moment but today, business environments demand a way beyond what these old-school systems can support. Cloud databases are an agile, affordable and safe solution that can help companies build a better business through data. Cloud databases will quickly become the standard in industries of every business as technology improves.

This article has investigated trends and barriers in implementing cloud-based data management solutions in healthcare for the current period. It turns out that there are numerous advantages of cloud-based data management, such as scale, flexibility and cost-effectiveness, which made it the preferred choice in many industries, healthcare included. Yet, the shift to the cloud isn't an overnight phenomenon especially in highly regulated industries such as healthcare where privacy and security of data are paramount. In a market that is growing with more and more requests for cloud database skills, technical job applicants that can show an ability in this space will gain a leg up in the hiring process.

References

1. G. A.-M. Taufiq-Hail, A. R. A. Alanzi, S. A. M. Yusof, and M. Alruwaili, "Software as a Service (SaaS) Cloud Computing: An Empirical Investigation on University Students' Perception," Jan. 01, 2021, Informing Science Institute. doi: 10.28945/4740.
2. E. A. Shawakfa and H. Alsghaier, "An empirical study of cloud computing and big data analytics," Jan. 01, 2018, Inderscience Publishers. doi: 10.1504/ijica.2018.093736.
3. R. Kune, P. Konugurthi, A. Agarwal, R. R. Chillarige, and R. Buyya, "The Anatomy of Big Data Computing," Jan. 01, 2015, Cornell University. doi: 10.48550/arxiv.1509.01331.
4. P. K. Mahapatra, A. R. Tripathy, and A. Tripathy, "Emerging Cloud Computing Trends for Business Transformation." p. 71, Jul. 13, 2021. doi: 10.1002/9781119785873.ch4.
5. S. Riaz, A. H. Khan, M. Haroon, S. Latif, and S. Bhatti, "Big Data Security and Privacy: Current Challenges and Future Research perspective in Cloud Environment," Aug. 01, 2020. doi: 10.1109/icimtech50083.2020.9211239.
6. S. Khan, K. A. Shakil, and M. Alam, "Big Data Computing Using Cloud-Based Technologies, Challenges and Future Perspectives," Jan. 01, 2017, Cornell University. doi: 10.48550/arxiv.1712.05233.
7. A. K. Singh and R. Gupta, "A privacy-preserving model based on differential approach for sensitive data in cloud environment," Apr. 18, 2022, Springer Science+Business Media. doi: 10.1007/s11042-021-11751-w.
8. M. Masud, G. S. Gaba, K. Choudhary, R. Alroobaea, and M. S. Hossain, "A robust and lightweight secure access scheme for cloud based E-healthcare services," May 03, 2021, Springer Nature. doi:

10.1007/s12083-021-01162-x.

9. R. Ranchal et al., "Disrupting Healthcare Silos: Addressing Data Volume, Velocity and Variety With a Cloud-Native Healthcare Data Ingestion Service," Jun. 10, 2020, Institute of Electrical and Electronics Engineers. doi: 10.1109/jbhi.2020.3001518.
10. B. Ogwel, G. W. Odhiambo-Otieno, G. O. Okello, J. Abila, and R. Omore, "Leveraging cloud computing for improved health service delivery: Findings from public health facilities in Kisumu County, Western Kenya-2019," May 18, 2021, Wiley. doi: 10.1002/lrh2.10276.
11. M. Hashem, I. Yaqoob, N. B. Anuar, S. Mokhtar, A. Gani, and S. U. Khan, "The rise of 'big data' on cloud computing: Review and open research issues," Aug. 10, 2014, Elsevier BV. doi: 10.1016/j.is.2014.07.006.
12. M. D. de Assunção, R. N. Calheiros, S. Bianchi, M. A. S. Netto, and R. Buyya, "Big Data computing and clouds: Trends and future directions," Aug. 27, 2014, Elsevier BV. doi: 10.1016/j.jpdc.2014.08.003.
13. A. Alam, I. Ullah, and Y.-K. Lee, "Video Big Data Analytics in the Cloud: A Reference Architecture, Survey, Opportunities, and Open Research Issues," Jan. 01, 2020, Institute of Electrical and Electronics Engineers. doi: 10.1109/access.2020.3017135.
14. S. Khan, K. A. Shakil, and M. Alam, "Cloud-Based Big Data Management and Analytics for Scholarly Resources: Current Trends, Challenges and Scope for Future Research," Jan. 01, 2016, Cornell University. doi: 10.48550/arxiv.1606.01808.