

Cloud Computing for Big Data Analytics: A Comparative Evaluation

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Abstract - The fusion of cloud computing with big data analytics has emerged as a catalyst for transformative insights and operational efficiency in a data-driven environment. The study investigates the function of cloud computing in the context of big data analytics, outlining its importance, potential, and constraints. It demonstrates the development of cloud computing platforms and the services they provide for storing, processing, and analyzing data. In addition, it explores the broad spectrum of big data analytics tools, platforms, and methodologies, highlighting the scalability and adaptability they accomplish in cloud contexts.

This study explores the distinct benefits and difficulties that arise as firms progressively move their analytical workloads to the cloud, examining crucial factors including security, compliance, and cost-effectiveness. The article examines the transformative effects of cloud-based big data analytics on several industries, from healthcare to finance, revealing creative solutions and predictive capabilities. It does this by drawing conclusions from real-world case studies.

Keywords: Cloud Analytics, Big Data Cloud, Platform Comparison, Data-driven Decisions, Security Assessment, Cloud Services, Business, Insights, Performance Evaluation.

1. Introduction

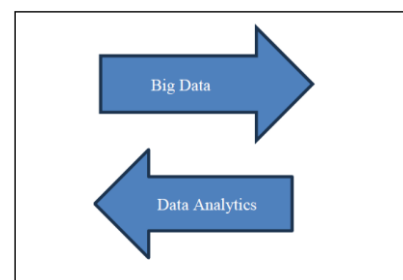
"Big Data" describes data volumes of one exabyte or more. According to Wikipedia, "big data" is a collection of datasets that are so large and complicated that they are difficult to process using database management tools or conventional data processing software. The issues involved in handling big data include gathering, storing, searching, sharing, transferring, analyzing, and visualizing it.

Volume, Velocity, and Variety are the three traits that must accompany the data to be deemed "big data" according to industry analyst Doug Laney from Gartner in 2001. Data size is determined by a quality or attributes called volume, which is typically expressed in Terabytes or Petabytes. Social media sites like Facebook, for instance, retain user images in addition to other things. Facebook is thought to hold over 250 billion

photos and more than 2.5 trillion posts from its users due to the vast number of users. The amount of data that needs to be processed and stored is tremendously large. 'Big data's' most illustrative characteristic is volume.

Velocity is the second quality or attribute. This is a reference to how much data is created or how quickly it needs to be processed and examined. For instance, Facebook members post more than 900 million images every day, or 104 photos per second. As a result, Facebook must analyze, store, and retrieve this data in real time for its users. As can be seen, the Internet of Things (IoT) and social media are the biggest data generators, and both are on the rise.

Variety, which refers to various data types that are produced from various sources, is the third attribute. Structured data (transactional data, spreadsheets, relational databases, etc.), semi-structured data (Extensible Markup Language, web server logs, etc.), and unstructured data (social media postings, audio, photos, and video, etc.) are the three main categories into which "Big Data" is typically divided. Meta-data, or data about data, is referred to in the literature as a fourth category.



2. Aim

The main goal of this research is to examine the interaction between big data and cloud computing, with a particular emphasis on how doing so can enable organizations to effectively manage, process, and gain useful insights from massive and complex datasets. This study aims to examine the core ideas behind big data and cloud computing, to highlight the benefits and drawbacks of its intersection, and to offer useful advice on how to deploy cloud-based big data analytics solutions. The ultimate objective is to arm enterprises with the

information and tactics required to capitalize on the promise of big data and cloud computing together, empowering them to make data-driven decisions, promote innovation, and keep a competitive edge in a data-centric environment.

3. Objective

The first step is to give a thorough evaluation of the fundamental ideas and supporting technology for both big data and cloud computing. This requires a thorough investigation of the fundamental elements and skills present in these two transforming realms.

Second, to examine the benefits and difficulties brought about by the combination of big data and cloud computing. The focus of this inquiry will be on crucial factors such data processing, scalability, cost-effectiveness, and cost-effective data storage. By doing this, we hope to present a complete view of the complexities related to this integration.

The third goal is to examine actual use cases and applications where cloud computing has been applied to big data analytics. We look to demonstrate the transformative impact on creativity and competitive advantage through in-depth assessments of how expands across many industries have used this integration.

The convergence of machine learning, artificial intelligence, and serverless computing will be highlighted, emphasizing their importance in data processing and analytics. This analysis will provide an opportunity into this field's evolving future.

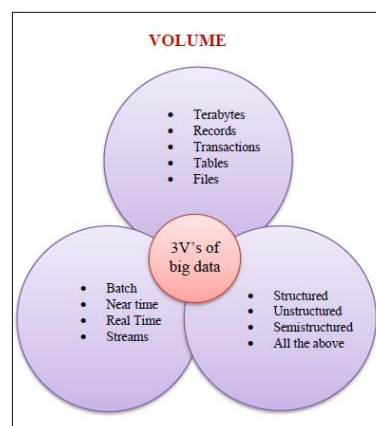
4. Opportunities

- Flexibility and scalability: To adapt to a business's changing demands, cloud computing platforms may be simply scaled up or down. Big data analytics, which frequently calls for the processing of enormous and intricate datasets, depend on this.

- Cost-effectiveness: Because cloud computing operates on a pay-as-you-go model, you only pay for the resources you really utilize. This can help you save a lot of money, especially if your big data demands are unpredictable.
- Quickness: Cloud computing platforms provide high-performance computing resources that may be leveraged to rapidly and efficiently execute big data workloads.
- Accessibility: Platforms for cloud computing are reachable from any location with an internet connection. This makes it simple for groups to work together on big data analytics projects, regardless of where they are in the world.

5. Research Methodology

This study's research technique uses a mixed-methods approach to thoroughly examine the point at which big data and cloud computing converge. Through focus groups, focus interviews, and content analysis of case studies and pertinent industry literature, qualitative data will also be acquired concurrently. These in-depth qualitative analyses seek to learn more about the struggles, successes, and experiences of businesses that have embraced this technological convergence.



6. Literature Review

Sr. No	Prediction Model	Authors	Techniques	Conference/Journal And Year	Year	Conclusion
1	Application of Cloud Computing for the Development of Big Data	Lam Ying Xian; Muhammad Ehsan Rana	Big Data processing, Big data Analytics	International Conference on Data Analytics for Business and Industry	2021	The application of cloud computing in the development of big data solutions has revolutionized the way organizations harness data for insights and innovation. The synergy between cloud and big data opens new opportunities for organizations to remain competitive in a data-driven world.
2	The Rise of Big Data and Cloud Computing	MohaiminUllam, Shamim Reza	Big Data Technologies, Big Data and Cloud Computing	Internet of Things and Cloud Computing	2019	Big data has become a new phenomenon in recent years Paradigm that offers abundant data and possibilities Improve and/or enable research and decision support. Applications with unprecedented value for the digital and Applications including business, science and technology.

3	Challenges and Benefits of Deploying Big Data Analytics in the Cloud for Business Intelligence	Data Integration and Management, Cost-Efficiency	Bala M. Balachandran, Shivika Prasad	International Conference on Knowledge Based and Intelligent Information and Engineering Systems	2017	In the ever-evolving landscape of data-driven decision making, the adoption of big data analytics in the cloud has emerged as a transformative force, challenging and empowering organizations seeking to leverage their data assets for business intelligence
4	Regression Analysis	M.Smithetal.	Statistical Modeling	Big Data Research	2019	This paper explores regression analysis as a predictive model for cloud-based big data analytics, highlighting its significance in comprehending data link ages and forecasting the future.
5	Challenges of Cloud Computing & Big Data Analytics	Anita Gupta; Abhay Mehrotra; P. M. Khan	Challenges in Big Data Analytics	International Conference on Computing for Sustainable Global Development	2015	We've delved into the diverse landscape of cloud computing and big data analytics, shedding light on the myriad challenges faced by practitioners and researchers in these interconnected fields.
6	Cloud Platform	Duan, Y., & Huang, J.	Comparative Analysis	IEEE International Congress on Big Data	2017	In order to shed light on the unique methodologies and strategies used on various cloud services, this study gives a thorough comparative analysis of big data management on several cloud platforms.
7	Big data Analytics tools	Verma,P., Ahuja,S., Sharma,M.	Comparative Analysis	Procedia Computer Science	2014	This study offers insights into the unique features and methodologies of numerous big data analytics tools through a detailed comparison examination.
8	Review Paper on Big Data Analytics in Cloud Computing	Saneh Lata Yadav , Asha Sohal	Map Reduce and Hadoop, Data Preprocessing	International Journal of Computer Trends and Technology	2017	This article describes a systematic process Exploring big data in the cloud environment Calculate. Big data is large and complex data sets and is created from various sources such as social networks.
9	Model for Big Data Analytics in Cloud Environment	Anupama M. Pande and Sunita A. Khaparde	Distributed Clustering, Map Reduce, K-Means	International Journal of Computer Applications	2013	Propose a distributed clustering model for big data analytics in the cloud using the K-Means and Map Reduce algorithm, which improves efficiency and scalability.
10	Service Performance and Analysis in Cloud Computing	Kaiqi Xiong	Security Considerations, Cloud Cost Analysis	IEEE	2019	By understanding the challenges and opportunities associated with service performance and analytics in cloud computing, cloud providers and customers can improve the quality of service provided to customers.
11	Cloud Computing: A Review	Abhishek Gautam	Services, Deployment Model	Journal For Research in Applied Science and Engineering Technology	2017	This article concluded the Introduction to Cloud Computing part, about its development and the purpose of development. And three types of services, Saas, Paas, Iaas.
12	Big Data Analytic Using Cloud Computing	Vinay kumarjain,Shi shirkumar	Big Data Processing, Real-time Data Analytics	IEEE International Conference on Spatial Data Mining and Geographical Knowledge Services	2015	The fusion of big data analytics and cloud computing offers businesses the opportunity to thrive in an era of data-driven competition. As the digital realm expands, the tools and techniques described in this document serve as a guide for those embarking on the journey to realize the potential of big data analytics in the cloud.
13	Cloud Computing-based Big Data mining Connotation and Solution	Yuan jjugen,xingruo nan	Data mining, Cloud computing	IEEE Second International Conference on Advances in Computing and Communication Engineering	2015	The convergence of cloud computing and big data mining has ushered in a new era of data-driven decision making and advanced analytics.

14	Cloud Based Big Data Analytics a Review	Amit Kumar Manekar, G. Pradeepini	Data management, Distributed Computing	International Conference on Computational Intelligence and Communication Networks	2015	We explore the dynamic and evolving landscape of cloud-based big data analytics. The convergence of big data and cloud computing has opened up a host of new possibilities.
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7. Future Scope

- Integration of advanced analytics and AI: As machine learning and artificial intelligence (AI) technologies continue to advance, it will become more crucial to include big data and cloud computing into AI-driven analytics. Research can concentrate on improving real-time data analysis for predictive and prescriptive insights as well as optimizing AI algorithms in cloud environments.
- Edge computing and IoT: As Internet of Things (IoT) devices proliferate, so do the potential and difficulties associated with managing and analyzing data closer to its source. Future studies can explore the effective processing and analysis of data from edge devices and sensors using cloud computing.
- Hybrid and Multi-Cloud Environments: For flexibility and redundancy, businesses are increasingly implementing hybrid and multi- cloud strategies. Future research might examine the most effective methods for controlling and maximizing data and analytics workloads across various on-premises and cloud service providers.
- Data Privacy and Security: Research on effective data protection methods within the context of big data and cloud computing will remain vital as data privacy legislation grow and cybersecurity threats endure. This includes adhering to international data privacy standards, access control, and encryption.
- Cost Optimization: Future research on cloud- based big data analytics can concentrate on cost optimization measures, such as effective resource allocation, auto-scaling mechanisms, and picking the appropriate pricing models to limit costs.

8. Conclusion

Big data analytics and cloud computing together have a transformational power that improves the scalability and effectiveness of data-driven decision-making. Applications in the real world highlight its potential. However, it is crucial to handle security, compliance, and cost management. The relationship between cloud computing and big data analytics is a catalyst for innovation in this constantly changing digital age. The scope of data-driven opportunities grows tremendously as technology, from machine learning to artificial intelligence, continues to progress. The difficulties we encounter, such as those involving data security, moral

issues, and cost reduction, simply serve to highlight how important and fundamental this collaboration.

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