

# Chapter 12

## Big Data and Cloud Computing

**Dina Darwish**

*Ahram Canadian University, Egypt*

### **ABSTRACT**

*Big data helps organizations of all sizes track performance, detect issues, and find growth opportunities. Big data has advantages, but supporting it with computer resources and software services may cost even the biggest organizations. Sales, IoT sensors, and user feedback give analytics, and clouds can handle big data. Cloud computing changed computer infrastructure, since all services are cloud-based. Cloud computing is great for massive data storage, administration, and analytics due to its flexibility, pay-as-you-go or pay-per-use strategy, and minimal upfront cost. This chapter examines big data and its analytics with cloud computing for businesses and end users and discusses the key concepts of big data and cloud computing; the advantages, benefits, and disadvantages of big data analytics; cloud service types for big data analytics; security challenges; differences between big data and cloud computing; applications of big data analytics; choosing the cloud deployment model; and security and research issues in big data.*

### **INTRODUCTION**

Organizations of varying scales acknowledge the significance of data and employ it to assess performance, identify challenges, and uncover novel avenues for expansion. The utilization of big data has become essential in the field of machine learning for the purpose of training intricate models and enabling the advancement of Artificial Intelligence (AI).

Big data offers advantages, however, the substantial amount of computing resources and software services needed to sustain big data projects can impose financial and intellectual strains on even the most sizable enterprises. Cloud computing has made substantial advancements in addressing the need for processing and storing vast amounts of data. The provision of extensive computing resources and services enables the feasibility of big data initiatives for organizations, with the potential for near-limitless capabilities.

This chapter will encompass an analysis of the limitations, an evaluation of the cloud models, and an examination of the current services offered for big data in the cloud. The concepts of big data and

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cloud computing, although distinct, have become closely interconnected to the point where they are almost synonymous. The definition and interconnection of these two concepts are of utmost importance.

The term “big data” encompasses vast volumes of data that can be categorized as structured, semi-structured, or unstructured. The subject matter pertains to analytics and is commonly obtained from diverse sources, encompassing user input, Internet-of-Things (IoT) sensors, and sales data.

The primary concern associated with big data pertains to the extensive computing and networking infrastructure necessary for the establishment of a large-scale data center. The financial commitment associated with acquiring servers, storage systems, and dedicated networks can be significant, along with the requisite software proficiency needed to establish an effective distributed computing infrastructure. Furthermore, the value of big data to an organization is contingent upon its operational state, rendering it devoid of significance when it is not in use. For an extended period, the technological demands of big data have limited its accessibility to only the most substantial and financially well-endowed organizations. The field of cloud computing has experienced significant advancements in this particular domain.

Cloud computing has revolutionized the utilization and conceptualization of computing infrastructure. The scope of cloud paradigms has been broadened to include any entity that can be classified as a service. Cloud computing has become a highly sought-after solution for big data storage, management, and analytics due to its various benefits. These advantages include its elasticity, pay-as-you-go or pay-per-use pricing model, and minimal initial investment, among others. Amazon, Google, and Microsoft have developed their own cost-effective big data systems, recognizing the growing significance of big data in various organizational and disciplinary contexts. These systems possess the capability to scale in order to meet the needs of businesses across various sizes. The increased adoption of the term Analytics as a Service (AaaS) has been driven by its ability to offer a faster and more efficient approach to integrating, transforming, and visualizing different types of Data Analytics.

This chapter discusses the Significance of implementing Big data and its analytics along with the use of cloud computing for both organizations, and end users, also, this chapter focuses on the main concepts related to Big data and cloud computing, advantages and benefits of Big data analytics, the cloud service types for Big data analytics, and security issues for Big data and cloud computing, along with other topics in this area. The main topics to be covered in this chapter includes the following;

- Big Data and Cloud Computing Main Concepts
- Types of Big data analytics
- The integration of Big data and Machine learning
- Benefits of Big data analytics
- Difference between Big data and cloud computing
- The cloud service types for Big data analytics
- Applications of Big data analytics
- Trends in applying Big data analytics in the cloud
- Security issues for Big data and cloud computing
- Pros and cons of Big data in the cloud
- Choosing the right cloud deployment model
- Real case studies of applying Big data analytics with cloud computing
- Research issues in Big data
- Future scopes of Big data analytics in the cloud

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