Chapter 14
Serverless Computing Real-World Applications and Benefits in Cloud Environments

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ABSTRACT

Serverless computing has emerged as a transformative paradigm in cloud environments, revolutionizing the way applications are developed and deployed. In traditional computing models, developers had to manage the underlying infrastructure, server provisioning, and scaling, leading to increased complexity and operational overhead. Serverless computing abstracts away these concerns, allowing developers to focus solely on writing code and delivering business value. This chapter explores the real-world applications and benefits of serverless computing, shedding light on its practical implications for businesses and developers. One of the most significant advantages of serverless computing lies in its ability to dynamically scale resources based on demand, ensuring optimal performance and cost-efficiency. This elasticity enables applications to handle variable workloads effectively, avoiding the underutilization or over provisioning of resources.

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INTRODUCTION TO SERVERLESS COMPUTING

Serverless computing represents a transformative paradigm in the world of cloud computing. It's a concept that has gained remarkable popularity due to its potential to revolutionize the way applications are developed and managed. In this chapter, we will delve into the core aspects of serverless computing, starting with its definition and concept, followed by an exploration of its historical context and its evolution within the broader landscape of cloud computing.

Definition and Concept of Serverless Computing

Serverless computing is a revolutionary paradigm within cloud computing that shifts the traditional approach to application development and deployment. Serverless Computing is a new form of computing architecture that is becoming increasingly popular due to its advantages of scalability, cost-efficiency, and increased flexibility. Shafiei, Khonsari, and Mousavi (2022) provide a comprehensive overview of serverless computing, exploring its opportunities, challenges, and applications. They found that serverless computing has been adopted for a wide variety of use cases, including web and mobile backend, IoT applications, data processing, machine learning, and DevOps. At its core, serverless computing frees developers from the burdens of managing servers and infrastructure, allowing them to focus solely on writing code and executing tasks. In this model, cloud service providers take on the responsibilities of provisioning, scaling, and maintaining the underlying hardware and software resources. Serverless applications are event-driven, meaning they run in response to specific events or triggers, which can be anything from an HTTP request to changes in a database. This dynamic resource allocation and event-based execution lead to several key benefits, including cost efficiency, scalability, and reduced operational overhead. The concept of serverless computing marks a significant departure from traditional server-based models, and its innovative approach has rapidly gained popularity due to its potential to streamline application development, enhance flexibility, and optimize resource utilization in cloud environments. Eskandani and Salvaneschi (2021) present a new dataset for serverless computing, called the Wonderless Dataset. The dataset consists of real-world serverless workloads, such as Amazon Web Services Lambda and Google Cloud Functions, and provides comprehensive performance metrics to enable better performance analysis and optimization. The authors also discuss the implications for serverless computing and provide a comprehensive evaluation of the dataset. The findings of this study will be of great use to researchers and practitioners exploring serverless computing.

Serverless computing architecture is a revolutionary approach in cloud computing that fundamentally transforms the traditional server-centric model. In a serverless architecture, the primary focus shifts from managing servers to executing individual functions in response to specific events. At the core of this model is Function as a Service (FaaS), where developers deploy discrete functions that are triggered by events such as HTTP requests, database modifications, or file uploads. These functions are executed in ephemeral, stateless containers, eliminating the need for continuous server management. Event-driven programming is a cornerstone of serverless computing, where events, like changes in data or the passage of time, dynamically trigger the execution of functions. Key characteristics include automatic scaling, where cloud providers handle the scaling of resources based on demand, and a pay-as-you-go pricing model, ensuring cost efficiency by charging only for actual function execution time. This architecture enhances agility, scalability, and cost-effectiveness, allowing developers to focus on code logic without