Chapter 3
Serverless Computing:
Unveiling the Future of Cloud Technology

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ABSTRACT

This chapter serves as a comprehensive initiation into serverless computing, a revolutionary paradigm in cloud computing. It begins by elucidating the foundational concepts, breaking down its architecture that simplifies development through modular functions triggered by specific events. The narrative unfolds, highlighting the myriad benefits, such as enhanced efficiency, seamless scalability, and liberating developers from intricate server management. A comparative analysis with traditional cloud computing underscores serverless computing's unique attributes. However, the chapter maintains balance by addressing challenges like cold start latency, execution duration limits, and potential vendor lock-in. The exploration concludes by showcasing real-world applications in domains like real-time data processing, backend APIs, batch processing, image and video processing, and chatbots. Offering a nuanced understanding of serverless computing, this chapter stands as an invaluable resource for readers exploring its advantages, challenges, and diverse applications.

1. INTRODUCTION

Serverless computing, a revolutionary paradigm in cloud computing, operates on a dynamic allocation version wherein the cloud company takes at the obligation of dealing with server assets seamlessly. Unlike traditional computing fashions, developers are relieved of the load of provisioning and coping with servers, allowing them to recognition absolutely on coding and application development. The concept of 'serverless' can be fairly deceptive, because it does no longer suggest the absence of servers but as a substitute a shift in obligation. (Hassan, 2021)

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In a serverless structure, the cloud supplier oversees all factors of server space and infrastructure, allowing developers to operate with out the need to subject themselves with server control complexities. This approach ends in elevated efficiency and reduced operational overhead, which ends up in a extra streamlined development method (Jones, 2021).

To illustrate, consider a situation wherein a developer is constructing an application. In a conventional setup, the developer might worry about server provisioning, scalability, and maintenance. However, with serverless computing, the developer can focus solely on writing code for the software's functionality. The cloud provider automatically scales resources up or down primarily based on demand, ensuring best overall performance with out manual intervention.

Essentially, serverless computing frees developers from the complexities of managing servers so they can focus on building creative and effective applications, with the cloud provider taking care of the underlying infrastructure effortlessly. With its growing popularity, this revolutionary approach is propelling the creation of cloud-based applications. (Smith, 2022).

Serverless computing is an innovative approach to application development in which applications are built using small, independent functions that respond to specified inputs. Consider these functions as discrete coding units, each intended to carry out a particular task. (Jones, 2021). The serverless architecture kicks in when a specific event takes place, such a user accessing a website or uploading a file.

The beauty of it is that when an event triggers a function, the cloud provider dynamically performs that function and, upon completion, stops it. Because of this on-demand execution, developers don't have to worry about maintaining servers up and running all the time because resources are only used when needed. It's economical and efficient, much like flipping on a light switch when you need it and off when you don't.

Now, let's talk about the key players in the serverless game. Various platforms provide serverless capabilities, and some of the prominent ones include AWS Lambda, Apache OpenWhisk, Azure Functions, Google Cloud Functions, IronFunctions, and OpenLambda. Each of these platforms offers a set of tools and services that empower developers to create and scale applications effortlessly without delving into the complexities of managing infrastructure.

2. PURPOSE OF SERVERLESS COMPUTING

Serverless computing aims to simplify application development and operation for developers by relieving them of the burden of managing servers. To operate their apps, developers in traditional computing must configure and manage servers, which can be difficult and time-consuming. With serverless computing, the cloud provider handles all server-related responsibilities, such as resource allocation, scaling, and maintenance, allowing developers to concentrate on building the code for their applications. It's similar to renting a fully staffed kitchen so you can prepare meals without having to purchase, assemble, or clean any kitchenware. With this method, developers may work more efficiently and expand their business because they only pay for the computing power they really utilize when their code executes in response to specific events or requests.(Wen 2017)

Containerization is a lightweight, portable, and effective technique of packaging, distributing, and running software. It entails packing an application into a single container along with all of its libraries, runtime components, and dependencies. Regardless of the underlying infrastructure, containers offer a consistent and isolated environment for programs to run in. A prominent approach for creating, packaging,

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