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Serverless Computing: The Future of Scalability and Efficiency with AWS, Azure, and GCP

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Abstract: *Serverless computing has fundamentally transformed cloud technology by enabling developers to deploy applications without the burden of managing server infrastructure. This paper delves into the serverless offerings from major cloud providers—AWS (Amazon Web Services), Azure (Microsoft Azure), and GCP (Google Cloud Platform)—and explores how each contributes to this paradigm shift. The discussion highlights the core advantages of serverless computing, including cost efficiency through a pay-as-you-go model, automatic scaling that adjusts to changing demands, and reduced operational complexity, which allows developers to focus more on coding and less on infrastructure concerns.*

However, serverless computing is not without its challenges. Notable issues include "cold start" delays, where initial function executions may experience latency, impacting overall performance. Additionally, the shared nature of serverless environments raises potential security concerns, and the limited visibility into the execution environment can make debugging and optimization more complex.

The paper also considers future trends in serverless computing across AWS, Azure, and GCP. It discusses emerging approaches such as combining serverless with traditional computing models to create hybrid architectures that leverage the strengths of both. Furthermore, it examines ongoing advancements aimed at improving support for complex, stateful applications, seeking to address current limitations and enhance the capabilities of serverless platforms.

This exploration provides a detailed look at the current state of serverless computing and anticipates future developments, focusing on how AWS, Azure, and GCP are shaping the evolution of this technology.

Keywords: Serverless Computing, Function-as-a-Service (FaaS), AWS Lambda, Azure Functions, Google Cloud Functions, Cold Start Latency, Pay-as-You-Go Pricing, Automatic Scaling, Hybrid Cloud Architectures and Stateful Applications