ANALISIS PERBANDINGAN PERFORMA *LATENCY* DAN BIAYA LAYANAN *SERVERLESS* AWS LAMBDA DAN GOOGLE CLOUD FUNCTIONS DALAM PEMROSESAN DATA *REAL-TIME*: STUDI KASUS APLIKASI IOT

SKRIPSI

Diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Sarjana Teknik pada Program Studi Sistem Telekomunikasi

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PROGRAM STUDI SISTEM TELEKOMUNIKASI

KAMPUS UPI DI PURWAKARTA

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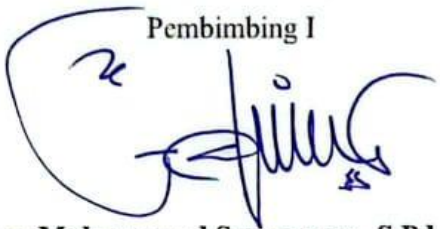
Pembimbing I



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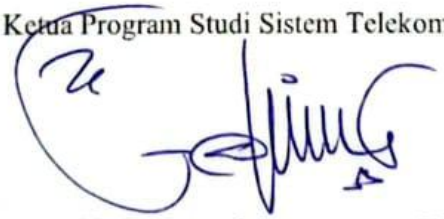

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ABSTRAK

ANALISIS PERBANDINGAN PERFORMA *LATENCY* DAN BIAYA LAYANAN *SERVERLESS* AWS LAMBDA DAN GOOGLE CLOUD FUNCTIONS DALAM PEMROSESAN DATA *REAL-TIME*: STUDI KASUS APLIKASI IOT

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Penelitian ini melakukan analisis perbandingan performa dari *latency* dan biaya AWS Lambda dan Google Cloud Functions (GCF) pada pemrosesan data *real-time Internet of Things* (IoT) menggunakan ESP32-CAM. Perangkat IoT mengambil gambar setiap 5.000 ms selama 7 hari secara berturut-turut, lalu dikirim kepada layanan *serverless cloud* pada AWS dan GCP melalui AWS API Gateway dan HTTP *Trigger*. Data gambar kemudian disimpan di Amazon S3 dan Google Cloud Storage (GCS). Data yang diambil untuk menganalisis *latency* adalah data *timestamp* pada proses pengiriman ke *serverless*, proses sampai di *serverless* dan proses tersimpan di *cloud storage*. *Latency* dianalisis secara *end-to-end* yaitu sebagai selisih waktu dari pengambilan gambar di perangkat IoT hingga objek tersimpan di *storage* (T3–T1). Analisis data menggunakan statistik deskriptif dan untuk dapat dibandingkan dan penghitungan biaya per 1.000 objek berdasarkan tagihan layanan. Hasil menunjukkan *volume* pengambilan data yang diperoses pada AWS dan GCP cukup sebanding untuk beban ringan. Rata-rata *latency end-to-end* AWS lebih rendah dibanding GCP, dengan *bottleneck* utama berasal dari perangkat atau jaringan, bukan waktu eksekusi *serverless*. Biaya pada beban ringan didominasi oleh operasi dan retensi penyimpanan objek.

Kata kunci: *Serverless*, AWS Lambda, Google Cloud Functions, IoT, *latency*, biaya.

ABSTRACT

COMPARATIVE ANALYSIS OF LATENCY PERFORMANCE AND COST OF AWS LAMBDA *AND* GOOGLE CLOUD FUNCTIONS *SERVERLESS SERVICES IN REAL-TIME DATA PROCESSING: CASE STUDY OF* IOT *APPLICATION*

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This study presents a comparative analysis of latency and cost between AWS Lambda and Google Cloud Functions (GCF) *for real-time Internet of Things* (IoT) *processing using an* ESP32-CAM*. The device captured and transmitted an image every 5,000 ms (*5 *s) for seven consecutive days to both serverless services via* AWS API Gateway *and the* GCF HTTP *trigger. The resulting objects were stored in Amazon S3 and Google Cloud Storage (GCS). End-to-end latency was defined as the elapsed time from image capture on the device until the object is durably stored (T3–T1), using timestamps recorded at dispatch to the serverless endpoint, at arrival/start within the function, and at write completion in cloud storage. Data were analyzed using descriptive statistics, and costs were computed per 1,000 objects from provider billing records to enable direct comparison. The results show that, under a light workload, both platforms processed a comparable volume of data. However, average end-to-end latency on* AWS *was lower than on* GCF *in this scenario, with the dominant bottlenecks attributable to the device or network paths rather than function execution time. Under light load, total cost is driven primarily by object-storage operations and retention rather than compute.*

Keywords*: Serverless,* AWS Lambda, Google Cloud Functions, IoT, *latency, cost.*

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