

## ABSTRACT

### **ANALYSIS OF HTTP LOAD BALANCING PERFORMANCE USING ROUND ROBIN, LEAST CONNECTION, AND LEAST RESPONSE TIME ALGORITHM IN NODE JS**

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This study presents a performance analysis of three load balancing algorithms Round Robin, Least Connection, and Least Response Time in cloud computing environments using Node.js. The research aimed to evaluate the performance, efficiency, and scalability of these algorithms under varying request loads, ranging from 1,000 to 10,000 requests. Using DigitalOcean's cloud infrastructure and Apache JMeter, key performance metrics including throughput, latency, and CPU usage were measured in a controlled environment with requests distributed across three mirrored servers.

The results reveal that while Round Robin showed higher throughput at lower request levels, Least Connection and Least Response Time outperformed it at higher loads. Least Connection consistently demonstrated better scalability, with a peak scalability factor of 2.42 at 10,000 requests compared to Round Robin's 1.82. Least Response Time, though less efficient at mid-range loads, showed competitive performance at specific request levels. In terms of CPU usage, Least Connection was the most efficient, followed by Round Robin and Least Response Time, with Least Connection proving to be the most reliable option for handling heavy traffic and ensuring consistent performance

**Index Term:** Load Balancing, Round Robin, Least Connection, Cloud Computing, Least Response Time

## INTISARI

### ***ANALISA PERFORMA HTTP LOAD BALANCING MENGGUNAKAN ALGORITMA ROUND ROBIN, LEAST CONNECTION, LEAST RESPONSE TIME PADA NODE JS***

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Studi ini menyajikan analisis kinerja tiga algoritma load balancing—Round Robin, Least Connection, dan Least Response Time—dalam lingkungan komputasi awan menggunakan Node.js. Penelitian ini bertujuan untuk mengevaluasi kinerja, efisiensi, dan skalabilitas dari ketiga algoritma tersebut di bawah berbagai beban permintaan, mulai dari 1.000 hingga 10.000 permintaan. Menggunakan infrastruktur cloud DigitalOcean dan Apache JMeter, metrik kinerja utama seperti throughput, latensi, dan penggunaan CPU diukur dalam lingkungan terkontrol dengan permintaan yang didistribusikan ke tiga server yang identik.

Hasil penelitian menunjukkan bahwa meskipun Round Robin menunjukkan throughput yang lebih tinggi pada level permintaan yang lebih rendah, Least Connection dan Least Response Time mengunggulinya pada beban yang lebih tinggi. Least Connection secara konsisten menunjukkan skalabilitas yang lebih baik, dengan faktor skalabilitas puncak sebesar 2,42 pada 10.000 permintaan dibandingkan dengan Round Robin yang mencapai 1,82. Least Response Time, meskipun kurang efisien pada beban menengah, menunjukkan kinerja yang kompetitif pada level permintaan tertentu. Dalam hal penggunaan CPU, Least Connection adalah yang paling efisien, diikuti oleh Round Robin dan Least Response Time, dengan Least Connection terbukti menjadi pilihan paling andal untuk menangani lalu lintas yang padat dan memastikan kinerja yang konsisten.

**Kata Kunci:** *Load Balancing*, Round Robin, Least Connection, Least Response Time, *Cloud Computing*