

# Abstract

This research aims to investigate the impact of different HTTP versions —HTTP/1.1, HTTP/2, and HTTP/3—on the performance of backend applications. The primary objective is to evaluate response time, throughput, resource usage, and error rate across varying network conditions and server configurations. The research employs an experimental design, deploying backend applications on Google Cloud instances and testing them using diverse load scenarios. Metrics are collected using Prometheus and visualized with Grafana. The results reveal that HTTP/3, leveraging the QUIC protocol, outperforms its predecessors in high-latency environments, offering faster response times and higher throughput at the cost of increased resource consumption. Conversely, HTTP/2 and HTTP/1.1 show better performance under low-latency conditions, with HTTP/1.1 being the most resource-efficient. The study concludes that while HTTP/3 offers significant advantages in challenging network conditions, HTTP/2 and HTTP/1.1 may still be preferable in stable, low-latency environments.