

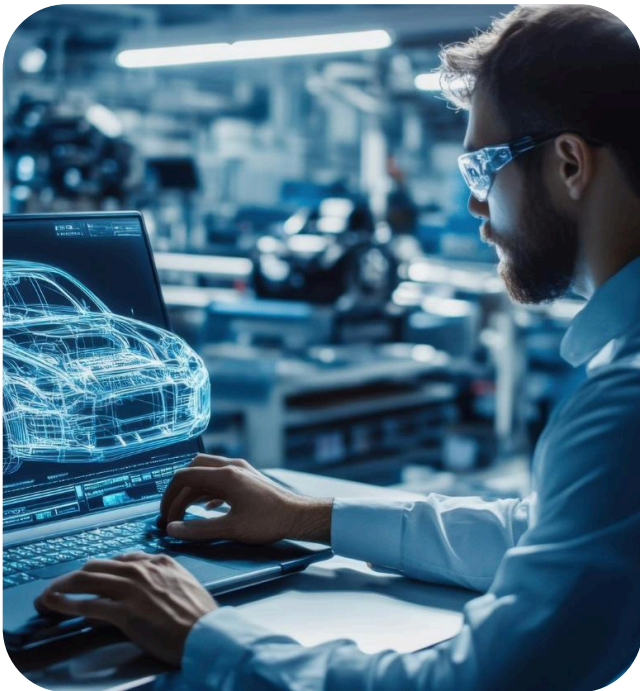


# Optimizing a Global Automotive Benchmarking Platform

Improving responsiveness, scalability, and user experience for a globally used automotive benchmarking application accessed by thousands of engineers across multiple countries.

## Overview

- Delivered a **modular, k6-based performance testing framework** with multi-region simulation.
- Built unified dashboards with **InfluxDB, Grafana, and AWS CloudWatch** for real-time performance and infrastructure visibility.
- Improved application responsiveness across **six global regions**, reducing latency and ensuring consistent performance.



## Client Profile

A US-based global engineering solutions provider specializing in automotive benchmarking and product development. With a footprint spanning four continents and a workforce of 2,000+, the company enables manufacturers to optimize costs and drive efficiency across the automotive value chain.

## Performance Bottlenecks and Latency Challenges

- **Geographical Latency:** Users across different continents experienced inconsistent load times and degraded performance.
- **Backend Bottlenecks:** Several long-running queries led to high resource utilization and impacted response times.
- **Lack of Monitoring Visibility:** Limited observability into backend systems and regional performance metrics.
- **UI Rendering Issues:** Browser-level delays impacted user experience during page rendering.

- **Scalability Gaps:** The application struggled under high concurrent usage from distributed locations.

## QBurst Solution: Global Performance Benchmarking & Optimization Framework

We engineered a repeatable, production-grade performance system to assess, optimize, and sustain application performance across global regions. The approach combined multi-region testing, backend tuning, and unified observability to deliver consistent user experience at scale.

- **Multi-Region Load Testing:** Simulated heavy user loads from six global regions using k6 to assess real-world performance and network latency patterns.
- **UI Performance Profiling:** Leveraged Browsertime to analyze frontend rendering behavior and identify slow-loading UI elements.
- **Backend Optimization:** Detected long-running queries causing resource saturation and provided detailed tuning recommendations.
- **Unified Observability:** Integrated InfluxDB, Grafana, and AWS CloudWatch for real-time performance insights.
- **CI/CD Integration:** Automated performance testing using Jenkins, with trigger-based execution across environments, regions, and load conditions.

## Implementation Approach: Performance Engineering & Continuous Monitoring

- Built **modular k6 scripts** for dynamic, **multi-region load simulation**
- Simulated peak concurrent usage **across global regions** to benchmark performance
- Optimized database queries to reduce CPU and memory spikes
- Configured CloudWatch KPIs across servers, databases, and network layers
- Enabled **real-time metrics streaming** using k6 → InfluxDB → Grafana
- Leveraged Browsertime for UI performance profiling to resolve frontend delays

# Business Impact: Scalable Performance and Global Consistency

- **Global Benchmarking at Scale:** Executed high-load tests across **six regions**, simulating **15,000+** concurrent users, and establishing baseline throughput of 2,500 requests/sec for continuous optimization.
- **Eliminated Bottlenecks:** Resolved critical backend issues through targeted query tuning, reducing query execution time by **40%**.
- **Enhanced Observability:** Enabled proactive monitoring with comprehensive, real-time CloudWatch dashboards.
- **Improved User Experience:** Reduced latency by **25%** and ensured consistent responsiveness for globally distributed users.
- **Future-Ready Framework:** Delivered a reusable, extensible k6-based testing framework with automated pipelines for continuous performance assurance.