

## INTISARI

### OPTIMASI PERFORMA SITUS WEB FRONT-END MELALUI RELOKASI THIRD-PARTY SCRIPT ANALITIK DAN PENYEMATAN KONTEN MEDIA SOSIAL MENGGUNAKAN WEB WORKER

Oleh

Muhammad Pazrin Andreanor

23/530222/PPA/06720

Berbagai fitur penting pada situs web modern—seperti pelacakan pengguna, analitik, dan integrasi media sosial—sering mengandalkan *third-party script* seperti *Google Analytics*, *Meta Pixel*, dan *Twitter Widget*. Namun, eksekusi skrip ini di *thread* utama website dapat membebani performa halaman dan menurunkan pengalaman pengguna. Penelitian ini mengusulkan pendekatan optimasi dengan memindahkan eksekusi *third-party script* ke dalam *Web Worker*, yaitu *thread* terpisah yang disediakan oleh browser modern. Pendekatan ini menggabungkan tiga metode utama: *Script Offloading and Isolation*, *Inter-thread Communication*, dan *Proxy Pattern*, untuk memastikan eksekusi *Third-party script* berjalan aman dan tetap terhubung dengan antarmuka pengguna. Eksperimen dilakukan pada tiga jenis situs simulasi—blog, profil perusahaan, dan *e-commerce*—dengan hasil menunjukkan peningkatan skor performa hingga 13,3% dan *Total Blocking Time* hingga 51,8%, disertai *Trade-off* peningkatan penggunaan memori sebesar 1–4%. Selain itu, analisis *JavaScript Call Stack* menunjukkan bahwa rata-rata kedalaman tumpukan fungsi di *main thread* menurun dari 10 menjadi sekitar 4–6, yang mengindikasikan berkurangnya beban pemrosesan di *thread* utama akibat relokasi eksekusi skrip ke *Web Worker*. Hasil penelitian ini menunjukkan bahwa pemanfaatan *Web Worker* merupakan pendekatan efektif untuk meningkatkan performa situs web dengan dampak minimal terhadap konsumsi sumber daya.

Kata Kunci: Optimasi Website, *Front-end Performance*, *Third-Party Script*, *Web Worker*, *Main Thread*, *Multithreading*

## ABSTRACT

### ***OPTIMIZING FRONT-END WEBSITE PERFORMANCE BY RELOCATING ANALYTICAL AND SOCIAL MEDIA EMBEDDED CONTENT SCRIPTS USING WEB WORKER***

by

Muhammad Pazrin Andreanor

23/530222/PPA/06720

*Modern websites frequently rely on third-party scripts such as Google Analytics, Meta Pixel, and Twitter Widgets to enable features like user tracking, advertising, and social media integration. While essential, these scripts often run on the website main thread, causing performance degradation and delayed user interactions. This study introduces an optimization strategy that relocates third-party script execution to Web Workers—a multithreading API provided by modern browsers. The approach integrates three core techniques: Script Offloading and Isolation, Inter-thread Communication, and Proxy Pattern, allowing scripts to run safely in the background without disrupting the user interface. Experiments were conducted on three types of simulated websites—blog, company profile, and e-commerce. Results show up to a 13.3% improvement in performance score and a 51.8% reduction in total blocking time, with only a modest memory overhead of 1–4%. Additionally, JavaScript Call Stack analysis revealed that the average stack depth in the main thread dropped from 10 to around 4–6, confirming that script execution was successfully shifted away from the critical rendering path. These findings demonstrate that leveraging Web Workers for third-party scripts can significantly improve front-end performance while maintaining stability and resource efficiency.*

*Keywords: Web Optimization, Front-end Performance, Third-Party Script, Web Worker, Main Thread, Multithreading*