SOUTH CITY COMPUTER

Technical White Paper | January 2026

The Sub-Second Website

How We Achieved 46x Faster Page Loads Using Rust, WebP, and Memory-Resident Architecture

EXECUTIVE SUMMARY

This white paper documents the complete rebuild of the South City Computer website, achieving a 52-millisecond page load time compared to the industry average of 2.4 seconds.

Key Results:
• Load time: 52ms (46x improvement over average)
• Binary size: 13MB with all assets embedded
• Server throughput: 600+ req/sec on commodity hardware
• Zero disk reads during operation

THE PROBLEM

Modern websites suffer from complexity bloat:

• Average WordPress site takes 2.5-3 seconds to load
• Each second of delay reduces conversions by 7%
• 53% of users abandon sites that take >3 seconds
• Mobile load times are even worse (13+ seconds)

TECHNICAL ARCHITECTURE

Our solution uses a single-binary monolithic architecture:

1. Rust + Actix Web: High-performance web server
2. rust-embed: All assets compiled into the binary
3. WebP images: 78% reduction in image size
4. Minified CSS/JS: Optimized resources
5. No database: Zero query latency

This eliminates all disk I/O during normal operation, serving all content directly from memory.

PERFORMANCE DATA

Load Test Metrics (1000 requests):

• Average response time: 52ms
• 95th percentile: 68ms
• Throughput: 612 requests/second
• Zero errors across all tests

Comparison with Typical Websites:

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Our Solution:        52ms
Static site:         200ms
Optimized WordPress: 800ms
Average WordPress:   2400ms [bar truncated - 46x longer]
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IMAGE OPTIMIZATION

PNG/JPEG to WebP Conversion:

Image	Original	WebP	Reduction
Storefront	3.2MB	687KB	78.5%
Wall mural	2.1MB	134KB	93.6%
Store interior	1.8MB	245KB	86.4%
TOTAL	20MB	4.3MB	78.5%

CONCLUSION

By eliminating unnecessary complexity and focusing on fundamentals, we achieved dramatic performance improvements:

• 46x faster than average website
• 20x fewer network requests
• Zero database dependencies
• Single binary, easy to deploy

These principles can be applied to any website, from simple business pages to complex enterprise applications.

CONTACT

South City Computer
Puerto Morelos, Mexico
www.southcitycomputer.com