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TECHNICAL BRIEF

RAG Latency Budgeting: Hitting Response Targets Without Cutting Corners

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> *RAG pipelines get slow for predictable reasons: parsing, retrieval, reranking, and long generations. This brief shows how to budget latency across steps and choose optimizations that do not reduce trust.*

TL;DR

- Break latency into steps so teams stop guessing where time goes.
- Cache what is safe to cache, and expire it with the same rules as data.
- Use short answers plus citations first; offer “expand” on demand.
- Budget compute for reranking only when retrieval is stable.

Executive Summary

Users abandon assistants that feel slow or inconsistent. RAG performance problems usually come from a few hotspots: document parsing, vector search, reranking models, and long generations. We propose a simple latency budget per stage, then provide optimizations that preserve quality. The focus is on reliability: predictable response times, not only fast median numbers.

Why It Matters

Latency is a product feature. In enterprise workflows, a few extra seconds can push users back to old habits. Slow systems also cost more because they generate more tokens and tie up GPU capacity. A budgeted approach makes trade-offs explicit and keeps performance work aligned to user expectations.

What We Built

- Tracing that logs per-stage timings and attaches them to a query ID.
- A caching layer for embeddings, retrieval results, and safe prompt fragments.
- Response shaping that returns a short answer with citations first, then expands if needed.
- Load shedding rules for peak times, with clear user messaging and fallbacks.

Observed Outcomes

- Lower tail latency by removing parsing work from the request path.
- More predictable response times under load with caching and admission control.
- Fewer support complaints after setting clear expectations for “deep” queries.

Implementation Notes

- Measure P95 and P99. Median numbers hide pain.
- Do not cache unrestricted content. Respect ACLs and retention.
- Start with retrieval quality. Performance work on a broken retriever is wasted.
- Keep a timeout budget and return partial results with citations when possible.

Governance & Risk

- Cache policy decisions and enforce them centrally.
- Keep logs lean. Store enough to debug without storing sensitive payloads.
- Make load shedding visible and measurable so it is not ignored.

Release Checklist

- Do we have per-stage latency tracing?
- Are caches aligned with ACLs and retention rules?
- Do we optimize for tail latency, not only median?
- Are fallbacks defined for peak load?
- Is retrieval quality stable before reranking spend increases?

Conclusion

A fast RAG system is designed, not tuned at the last minute. Once budgets and tracing are in place, teams can improve performance without sacrificing citations and trust.

Keywords

latency rag performance observability caching reranking