

p4-cache — Executive Briefing

The opportunity

Every Perforce shop with a depot above a few terabytes pays for storage capacity at the rate of its worst-case access pattern. In typical environments, 5–15% of depot data is read in any 30-day window; the other 85–95% sits on premium storage — NetApp, Pure Storage, Isilon, or premium cloud SSD — paying enterprise prices for content that is rarely accessed.

p4-cache eliminates this inefficiency. The product is a userspace daemon plus a per-call +X archive trigger binary that transparently tiers cold depot files to commodity object storage — Azure Blob, AWS S3, GCS, or NFS — while keeping the hot working set on commodity NVMe. Perforce itself is unchanged: no patches, no protocol changes, no client software, no developer impact. The result is a storage architecture that pays for capacity at rates aligned to actual access patterns.

Financial impact

Recurring annual savings for a multi-petabyte Perforce deployment running on enterprise storage:

Depot size	Current storage TCO/yr	With p4-cache/yr	Annual savings
200 TB	\$900,000	\$182,000	\$718,000
500 TB	\$2,250,000	\$447,500	\$1,802,500
1 PB	\$4,500,000	\$835,000	\$3,665,000
2 PB	\$9,000,000	\$1,570,000	\$7,430,000

Plus avoided refresh CapEx. Enterprise storage arrays carry a \$2–3M+ refresh pulse every 4–5 years. p4-cache lets the customer skip that pulse entirely. For a multi-petabyte deployment, the avoided CapEx is on the same order as the recurring annual savings.

Five-year picture: 1PB Perforce deployment

Path forward	5-year TCO	Operational impact
Refresh the array	\$7–15M	<i>Status quo. Next refresh in 2030.</i>
FabricPool to S3 (stay on NetApp)	\$5–9M	<i>Tiering helps. Lock-in persists.</i>
p4-cache + commodity NVMe + blob	\$4–5M	<i>New software license. No refresh.</i>

Why this works now

- Modern enterprise NVMe is fast enough to replace SAN for Perforce workloads. A 2U commodity server holds 60–120 TB of NVMe at \$40–80/TB acquisition — an order of magnitude cheaper than enterprise SAN over a 5-year horizon.
- Object storage is durable, well-understood, and 15–100× cheaper per TB than enterprise arrays. Azure Blob Cool at \$120/TB/year vs. enterprise NetApp at \$1,800/TB/year fully loaded.
- The remaining piece — a Perforce-aware tiering layer that operates transparently to `p4d` — is what p4-cache provides. The architecture works because of these three facts together, not any one alone.

Risk profile

p4-cache is purpose-built for environments where Perforce uptime is non-negotiable and audit trails matter:

- **Reversible by design.** Stop the daemon, remove the `+X` modifier from the typemap, and `p4d` returns to a stock deployment serving whatever is locally resident.
- **Perforce-native high availability.** p4-cache fits inside commit-edge replication; it does not invent a new HA model or modify the existing one. Failover is the same operation as today.
- **Content-hash verified.** Every restore is streaming-MD5 verified against `db.storage.digest` — the same hash `p4d` already stores. A corrupted or tampered file fails the restore rather than reaching `p4d`.
- **Forensic-watermarked.** Every cold-tier write carries a deployment-identifying watermark in object metadata. A leaked or exfiltrated blob is traceable to the licensed deployment that produced it.
- **Audit-logged.** Every depot file read is recorded to Elasticsearch or PostgreSQL with TLS, custom CA, deduplication, batching, and disk-spool resilience.
- **Production-grade.** ~47K-line Rust workspace across six crates (daemon, trigger, shared, license, license-tool, integrity-stamp). Three independent code audits, all engineering findings closed. Zero open HIGH or CRITICAL findings. Workspace-wide compile-time defenses against entire classes of bugs.

Engineering maturity, with citations

This is the pillar most year-1 commercial products cannot claim. We can. Three independent code audits — quality, security, and verify-binary verification — are documented in the source repo and available under NDA. All engineering findings closed with pinning tests. The workspace enforces, at compile time: every unsafe operation requires an explicit unsafe block; holding mutex guards across await boundaries is a compile error; silent integer casts are denied. Rust edition 2024, MSRV 1.88. Automated gates on cargo audit and cargo deny. Fuzz harnesses on the trigger request handler and the Perforce checkpoint parser.

Commercial structure

- Annual subscription, priced per terabyte of managed capacity. Published list runs from \$2K/yr (5 TB) to the flat \$100K/yr cap (reached at 1 PB and above).
- Multi-year enterprise license agreements available for deployments above 500 TB. Typical structure: 3-year commitment, paid migration services, reference rights, committed growth bands.

- Free 60-day evaluation — feature-complete, capacity-limited (5 TiB combined managed capacity) — designed for running a real proof-of-concept against a representative subset of your depot.
- Perpetual license option available for procurement environments that prefer CapEx accounting. Priced at 3× annual list, capped at \$100,000 (the same flat license cap), plus 18% annual maintenance.
- The runtime carries an Ed25519-signed license envelope. Soft and hard managed-capacity ceilings surface as Prometheus metrics so operator alerting can fire before a hard breach. A hard managed-capacity breach refuses new admissions only — cold-tier uploads keep running (draining the cache is the recovery path), and reads and restores of already-tracked files continue.

Next steps

1. Request the architecture deep-dive, security & compliance brief, and engineering maturity brief for your technical and security teams.
2. Schedule a 30-minute call to discuss your storage baseline, refresh timeline, and proof-of-concept scope.

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