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	Current/yr	p4-cache License	Hot NVMe	Cold Blob	New Total	Annual Savings
200 TB	$900,000	$35,000	$9,000	$138,000	$182,000	**$718,000 (80%)**
500 TB	$2,250,000	$80,000	$22,500	$345,000	$447,500	**$1,802,500 (80%)**
1 PB	$4,500,000	$100,000	$45,000	$690,000	$835,000	**$3,665,000 (81%)**
2 PB	$9,000,000	$100,000	$90,000	$1,380,000	$1,570,000	**$7,430,000 (83%)**

The p4-cache license is $100,000/yr at 1PB and above (flat cap). Hot NVMe and Cold Blob costs are paid to your hardware vendor and cloud provider — not to p4-cache.

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**	*Status quo. Next refresh in 2030.*
FabricPool to S3 (stay on NetApp)	**$5–9M**	*Tiering helps. Lock-in persists.*
p4-cache + commodity NVMe + blob	**$4–5M**	*New software license. No refresh.*

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 and (where the SDK supports it) in the cloud-API `User-Agent`. 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.** ~40K-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***
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> *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 produce warnings. Rust edition 2024, MSRV 1.88. CI 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 ranges from $7K/yr (5 TB) to $519K/yr (2 PB).
- 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 (500 GB hot / 5 TB cold) — 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 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. Hard-ceiling breaches refuse new uploads; reads 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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