One Platform, Three Engines

Open Source DBaaS Patterns on Kubernetes

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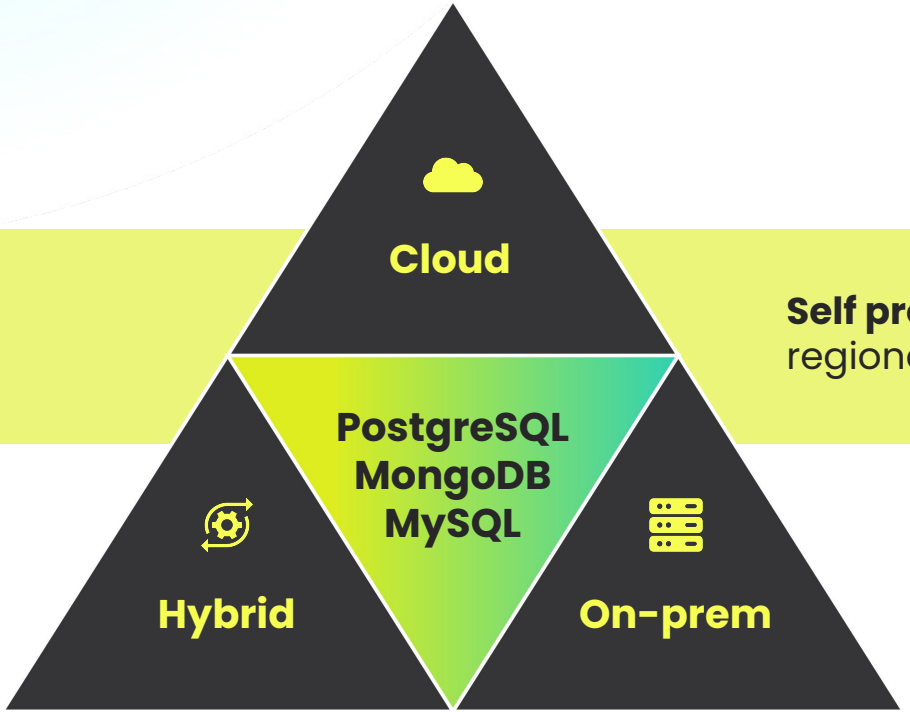
Three-Engine DBaaS



Self provisioning – Multi cloud/ cluster/ regional replication **– Unified operations**

The Operational Reality: Why Teams Struggle

Public cloud providers solve these — at a price

High Availability & Failover

DB engines (MySQL, Postgres, MongoDB) behave differently under failure.

- Different replication models: Galera, Group Replication, Replica Sets
- Complex external orchestrators like Patroni
- Varying quorum, election, and split-brain semantics

Backups & Disaster Recovery

Fragmented tooling landscape across engines:

- XtraBackup, PBM, pgBackRest, mongodump
- PITR reliability (binlog/oplog/WAL archiving)
- Requirement for continuous restore testing

Infrastructure, Platform & Hidden Operational Costs

Every engine adds its own surface area — across three dimensions

Infrastructure & Security

- Storage performance directly impacts reliability
- Encryption lifecycle: TLS, key rotation, CA
- Cross-region DR orchestration

Engineering Challenges

- Self-service provisioning
- Tenant isolation & credentials
- Fleet-wide upgrades
- Monitoring & query analytics

Operational Costs

- Expensive specialized expertise
- 24/7 on-call burden
- Backup storage costs
- You own the SLA & response

The Business Case: Real Cost Comparison

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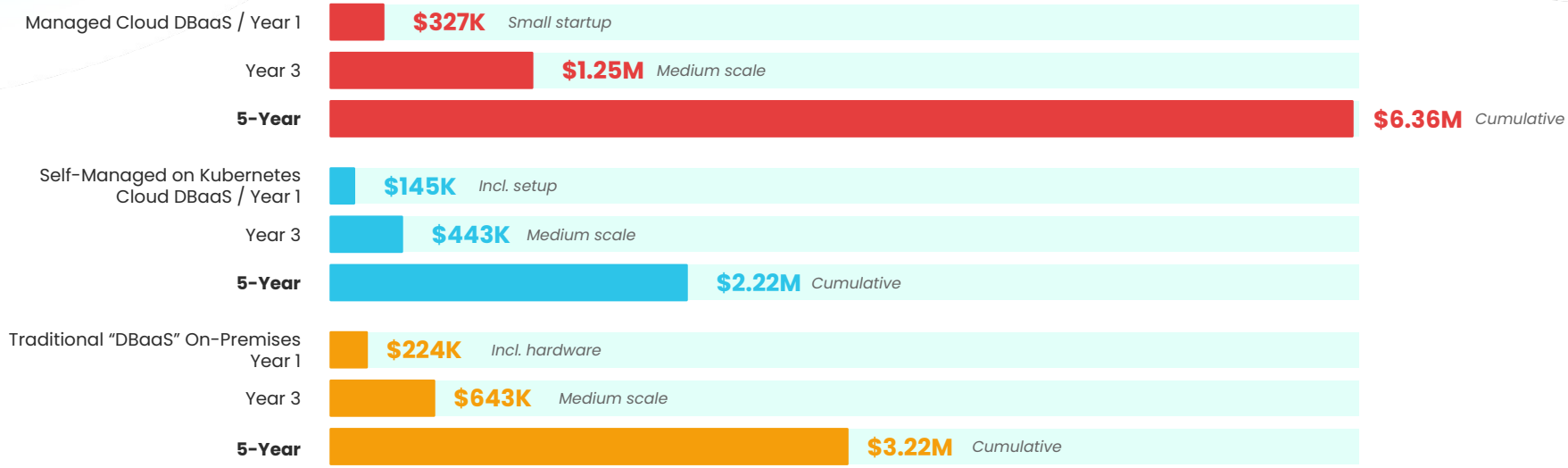
Includes: compute, storage, backup, licensing, monitoring, DBA staff (amortised), DR, and egress. Excludes one-time migration costs.



5-Year saving | K8s vs. Managed DBaaS: **$4.14M (65%)**

K8s vs. On-Prem: **$1.0M (31%)** cheaper

Three Approaches to the Same Problem

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Baseline: 3-node HA cluster · 16 vCPU / 64 GB RAM · 2 TB storage · multi-AZ · backups and monitoring

Managed Cloud

e.g. RDS, Cloud SQL, Atlas

- Provider-managed; no infra/K8s expertise
- Complex pricing (IOPS, transfer, backup)
- AWS RDS Multi-AZ db.r6g.4xlarge x 3
- 100% DB size backup cost extra

K8s Self-Managed

EKS / GKE / Bare Metal

- Compute + PV; no DBaaS premium
- Open source: Apache 2.0 (Zero licensing)
- Needs 1–2 FTE expertise (amortised)
- S3/GCS standard rates for backup

Traditional On-Prem

Bare Metal or VM, No K8s

- CapEx: Hardware + DC Colo (15% OpEx)
- Staff: Dedicated DBA team; engine spec.
- MySQL/PostgreSQL CE = $0 license
- DR adds ~60–80% infra cost

The Hidden Costs

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Managed DBaaS

Egress lock-in tax: Moving data out costs $0.09/GB; 10 TB = $900/event

Migration compounds: Provider tooling needed; exit cost grows with GB

Upgrade surprise: Major upgrades can force downtime on provider schedule

Config ceiling: Unsupported parameters force expensive tier jumps

K8s Self-Managed

Platform investment: 6–12 months build time; requires K8s expertise

Upgrade cadence: 3 engines x separate releases; high validation effort

DR gap: Failover, fencing, and **traffic remain yours to build**

Tooling assembly: Self-service & observability not in standard operators

Traditional On-Prem

Capacity misjudgement: Over-provision = waste; under = 6-12wk delay

HW refresh cycle: Servers depreciate 3-5 yrs; recurrent large CapEx

DR cost: Secondary site doubles infra costs; often skipped

Talent retention: On-prem DBA skills are rare and expensive

Kubernetes Operators Shrink the Problem

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Automation & Intelligence

- Automated failover & recovery via control loops
- Knowledge for MySQL, PostgreSQL, MongoDB encoded in controllers

Data Management

- Declarative backups, restores, PITR, and retention via CRs
- Built-in DR: cross-region replicas and log shipping

Operations & Lifecycle

- Rolling upgrades with health-aware sequencing
- Consistent operational model across database engines

Efficiency & Scale

- Reduced operational burden; fewer engine runbooks
- Namespace + CR as standard tenancy model

Conclusion

Deepen Your Expertise

Want to learn more about how to compose a **Multi-Database DBaaS** from **Open Source Kubernetes Operators**?

Join George's presentation tomorrow

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