SOLUTION BRIEF

Volumez

POSTGRESQL ON ORACLE CLOUD INFRASTRUCTURE WITH VOLUMEZ

A Volumez shape is a purpose-built data infrastructure tailored to each workload's specific requirements-no guesswork, no black-box tuning, no cloud waste.

Storage performance is a critical factor influencing PostgreSQL's ability to handle demanding workloads efficiently.

PostgreSQL is a powerful and popular open-source relational database, but organizations face several IT and business challenges when deploying it at scale or in complex environments. These challenges often become more pronounced as businesses grow, requiring careful planning, expertise, and investment in the right data infrastructure.

As data volumes grow, PostgreSQL performs more I/O operations for scanning, indexing, and joining large tables. If the underlying storage is slow or has low IOPS (Input/Output Operations Per Second), queries that once took milliseconds can degrade to seconds or minutes, creating significant performance bottlenecks.

High-performance storage can dramatically improve transaction throughput (TPS) and query response times, especially for read/write-heavy or read-only workloads.

Here are the main ways storage performance affects PostgreSQL:

- Query performance - Slow storage increases latency for scans, joins, and index lookups.
- Transaction throughput - High-performance storage can boost TPS by 100%–300% or more for demanding workloads.
- Cache efficiency - Poor storage performance increases reliance on disk, reducing overall system efficiency.
- Write-Ahead Logs (WALs) and Writes - Write-heavy workloads amplify storage performance requirements due to WAL and index updates.

In summary, storage performance is foundational to PostgreSQL's scalability, reliability, and speed. Investing in high-performance storage is essential for maintaining optimal PostgreSQL workload performance, especially as data volumes and concurrency increase.

Introducing the Volumez Shape

A Volumez shape redefines cloud block storage by creating a logical volume from native Oracle Cloud Infrastructure (OCI) resources, typically using storage-optimized VM compute instances like the DenseIO.E5 family.

It runs a full data path on OCI-supported Linux, ensuring consistent, supportable infrastructure from storage media to application nodes. The Volumez shape delivers a predictable, high-performance infrastructure tailored for the most demanding workloads like real-time transaction processing running on top of PostgreSQL.

Volumez DIaaS (Data Infrastructure as a Service) programmatically composes and manages these shapes in real time, optimizing performance and cost through infrastructure-as-code. This approach offers deterministic IaaS utilization with flexibility and control, eliminating manual tuning and vendor lock-in while integrating seamlessly into existing environments without application changes.

How Volumez DIaaS works

Volumez DIaaS is a cloud orchestration platform that transforms public cloud shapes into a distributed storage data layer, dedicated to delivering storage capacity and performance for applications. Unlike hyperconverged (HCI) models that mix storage and compute, Volumez separates these resources, allowing administrators to set application-specific performance metrics—such as IOPS, throughput, capacity, and resiliency—independent of volume size and based on dynamic policies.

Storage is presented to application VMs or containers as local NVMe devices via NVMe-oF, and Kubernetes integration is supported through a CSI plugin. Volumez leverages ephemeral instance storage to create a resilient, persistent storage layer with ultra-low latency, orchestrated via a SaaS portal where users define performance policies per volume. The platform handles data resiliency, RAID, and data layout for optimal performance, and abstracts away cloud storage implementation details, enabling predictable, high-performance storage tailored to workload needs.

KEY BENEFITS

- **Faster transactions.** Achieve consistent sub-millisecond latency and high TPS, delivering up to 3X higher performance than standard cloud storage and eliminating latency spikes for improved customer experiences and increased revenues.
- **Optimized cloud costs.** Get precisely the IOPS, throughput, and latency your workload requires-no waste, no overprovisioning. Volumez shapes dynamically allocate resources based on actual needs, ensuring you pay only for what you use, which improves cloud ROI and minimizes cloud waste.
- **Enterprise-grade data services.** Despite leveraging ephemeral storage, the Volumez shape delivers advanced data services such as snapshots, encryption, thin provisioning, and multi-zone mirroring, all built on standard Linux components and providing robust data protection and resiliency.

Typical use cases running on PostgreSQL with a Volumez shape

- High-volume, real-time transaction processing, such as order management and financial trades
- Real-time payments and fraud scoring, supporting predictive analytics (fraud detection), natural language processing, and real-time decisioning
- Ad-tech, real-time bidding (RTB)
- Risk management workloads
- Ride-hailing / logistics

Key features and capabilities

Self-managed high-performance block storage

- Delivers 65K TPS or 3X higher performance and 3.1ms latency or one-third the latency than other cloud-native storage services.
- Ensures guaranteed performance – 2.3M IOPS, 16 GB/s throughput, and sub-200 microseconds latency for consolidated workloads.

Enterprise-grade data resiliency

- Offers built-in high availability, disaster recovery, and data protection.
- Delivers zero data loss with various RAID strategies, unlimited instant snapshots and 2-second restores, cross-zone mirroring, 13 9's data durability, plus encryption through 3rd party integrations.
- Profiles media resources and places copies on separate failure domains for greater data availability and resiliency protection against hardware, network, data center, and site failures.

PostgreSQL performance benchmarking

- Delivers up to 80% cost savings and higher performance than native cloud block storage, read the white paper.
- OCI offers the lowest latency and best cost among AWS, Azure, and OCI.
- For large-scale public cloud deployments, Volumez DIaaS is recommended for superior flexibility, performance, and resiliency.

Infrastructure-as-Code and real-time monitoring

- Uses a declarative policy engine where builders define the workload needs (IOPS, throughput, capacity, and resiliency), and it intelligently creates the data layer to match purpose-built for the workload.
- Provides full observability, including extensive performance metrics and logging, making life easier for cloud engineering teams.
- Continuously monitors every component of the infrastructure, allowing for deep inspection of historical performance, either using Volumez' web interface or via APIs.

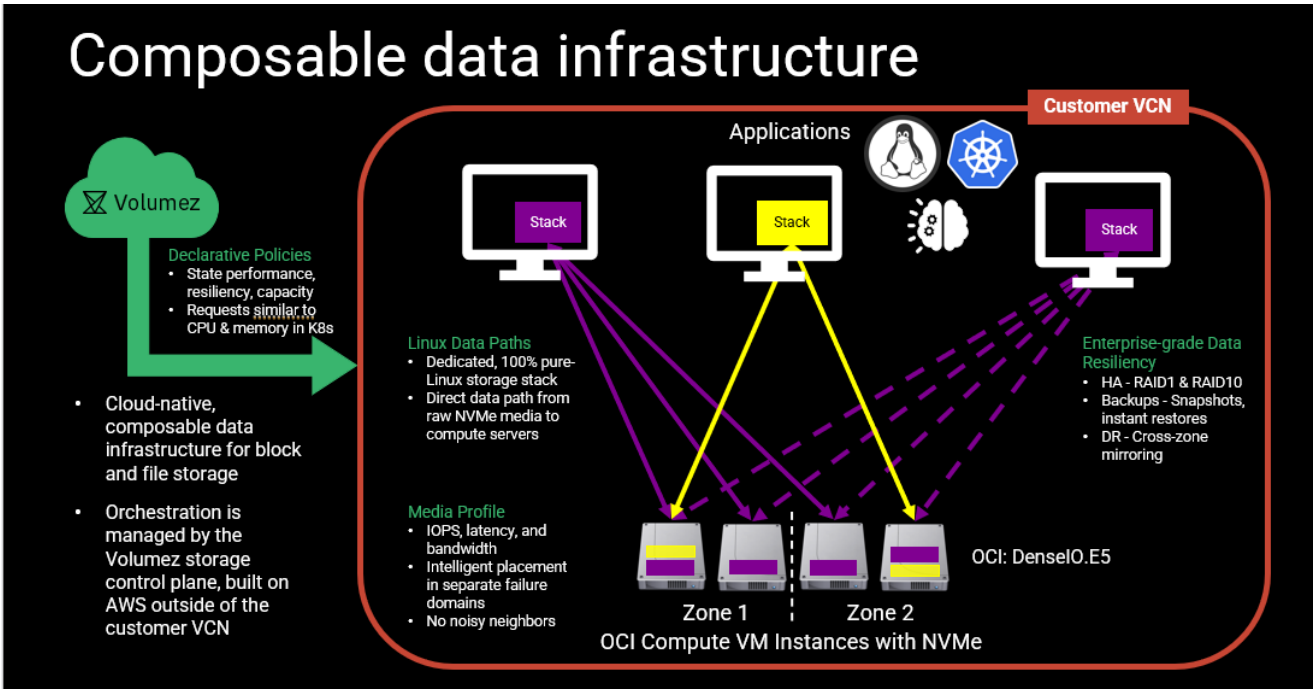

Figure 1: High-level architecture.

Get started today

Volumez shapes redefine cloud block storage by creating logical volumes from native OCI resources like DenseIO.E5 instances, delivering predictable high-performance infrastructure for demanding workloads such as PostgreSQL-based transaction processing. The Volumez DIaaS programmatically composes and manages these shapes via infrastructure-as-code, optimizing cost and performance while eliminating manual tuning and vendor loc

Visit the Oracle Cloud Marketplace and deploy a Volumez shape for PostgreSQL with 1-click.

"This combination of performance, resilience, and cost efficiency makes the Volumez composability service an attractive option for organizations looking to optimize their PostgreSQL database deployments in the Oracle Cloud. Being able to easily compose and orchestrate OCI resources can enhance scalability and facilitate managing multiple database instances effectively."

Rasmus Ekman, Vice President of Cloud Engineering, Oracle

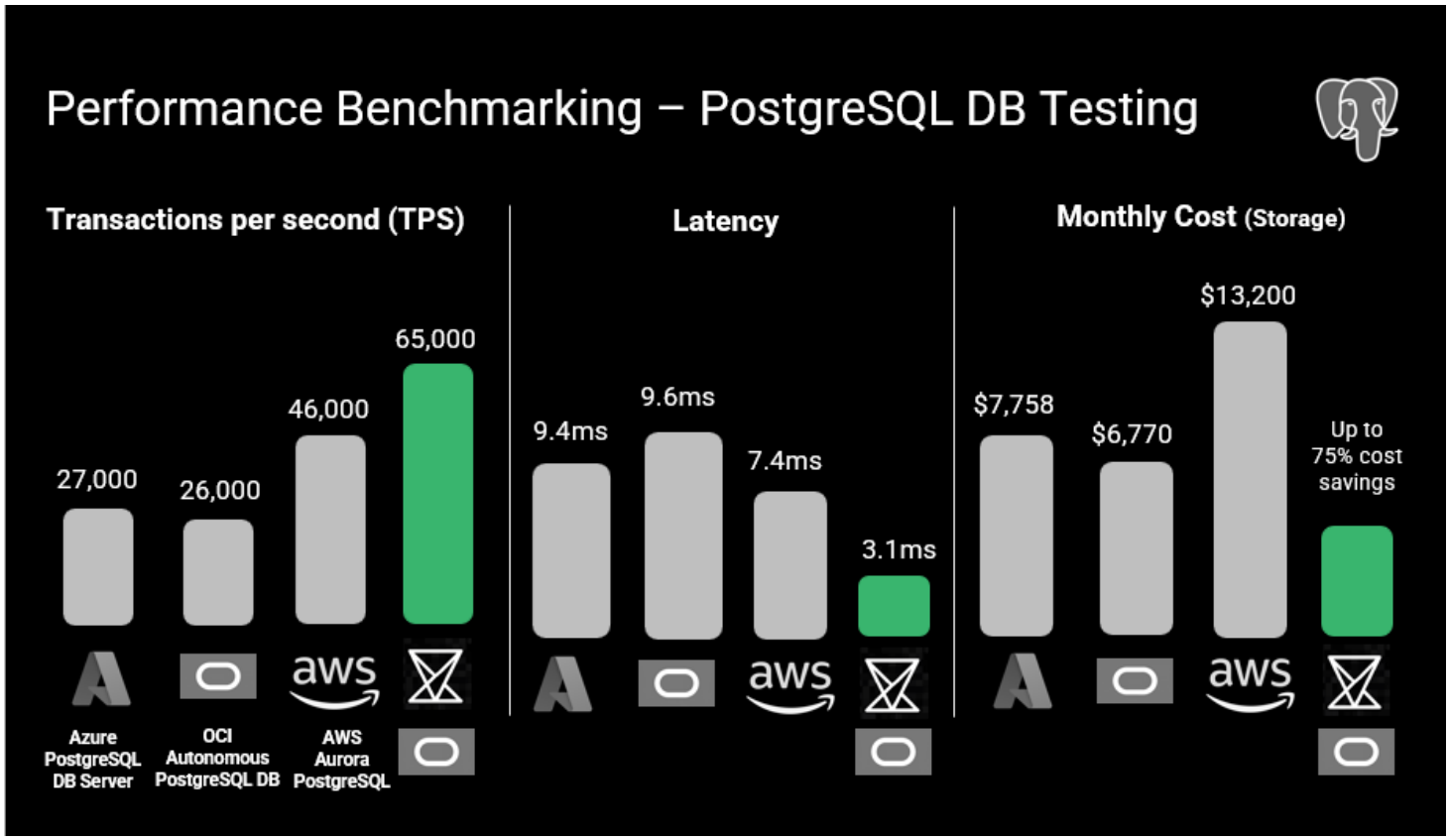

Figure 2: Pgbench performance benchmark.

Contact Us

About Volumez

Volumez innovates next generation cloud-native storage as the premier data infrastructure as a service company that helps organizations realize the true potential of their data. With its patented controller-less architecture, Volumez tackles latency and scalability challenges by establishing direct Linux data paths, ensuring exceptional performance and resiliency with transformative economics. Through innovative technology and a customer-centric approach, Volumez offers comprehensive solutions that streamline data workflows, enhance data quality, and drive informed decision-making. Discover more at Volumez.com.

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