**DIAMANTI**

# Deploying Database-as-a-Service on Diamanti Enterprise Kubernetes® Platform

As enterprises transform operations and add new digital services and applications, the number of databases in use and the number of instances of each database grow rapidly. The resulting operational challenges have many IT teams seeking to adopt a database-as-a-service (DBaaS) model.

Through automation and self-service, DBaaS allows developers and business teams to access database services directly with less friction and less delay, decreasing time to market for new features and applications.

While a variety of DBaaS offerings are available in the cloud, many enterprises opt to create their own DBaaS frameworks for reasons of control, cost, security, and flexibility—including the ability to support a mix of different database platforms.

The transition to DBaaS coincides with another important trend affecting enterprise IT: the rapid adoption of containers and Kubernetes.

It's been common for teams running applications in Kubernetes to utilize databases outside the framework while accepting increased complexity as an unwelcome side effect; it's now becoming simple to run databases inside containerized environments.

A number of Kubernetes features facilitate containerized databases and DBaaS:

- **Persistent volumes** provide a standard way of requesting and managing storage volumes independent of underlying storage infrastructure. A database container can fail and be replaced without disrupting database operations.
- **Built-in high availability and self-healing** ensures that the desired set of database instances are always running.
- **Ingress control and TCP load balancing** enable database services to be accessed via single endpoints with load balancing across multiple database instances.
- **The Operator framework** enables Kubernetes to manage database lifecycle needs, simplifying provisioning, backup, disaster recovery, and other operations. Many databases now have Kubernetes Operators.

Diamanti is Kubernetes certified

However, there are still some important gaps in existing solutions that merit attention for anyone building a DBaaS framework on Kubernetes:

- **Performance** is critical. Deploying Kubernetes using VMs rather than bare-metal servers can reduce database performance. Underlying storage must consistently deliver high IOPS and low latency. Networking can become a bottleneck and may consume excessive CPU resources.
- **Kubernetes cluster management** can be complex and time consuming.
- **Multiple availability zones** providing resiliency for system and site failures are important for many database deployments.
- **Storage subsystem** is a must. While Kubernetes can facilitate the provisioning and consumption of storage, management of the underlying storage subsystem along with a scale-out architecture is critical.

## A Bare-Metal Kubernetes Platform Optimized for DBaaS

Diamanti Enterprise Kubernetes Platform is the industry's only purpose-built, fully integrated Kubernetes solution, spanning on-premises and public cloud environments. Diamanti gives developers, database admins, and infrastructure architects the simplicity, performance, efficiency, and enterprise features to run DBaaS at scale in production.

Intuitive workflows dramatically simplify the deployment of databases on the Diamanti platform. Database administrators can leverage the self-service capabilities to define and use the storage and network resources as well as independently manage them.
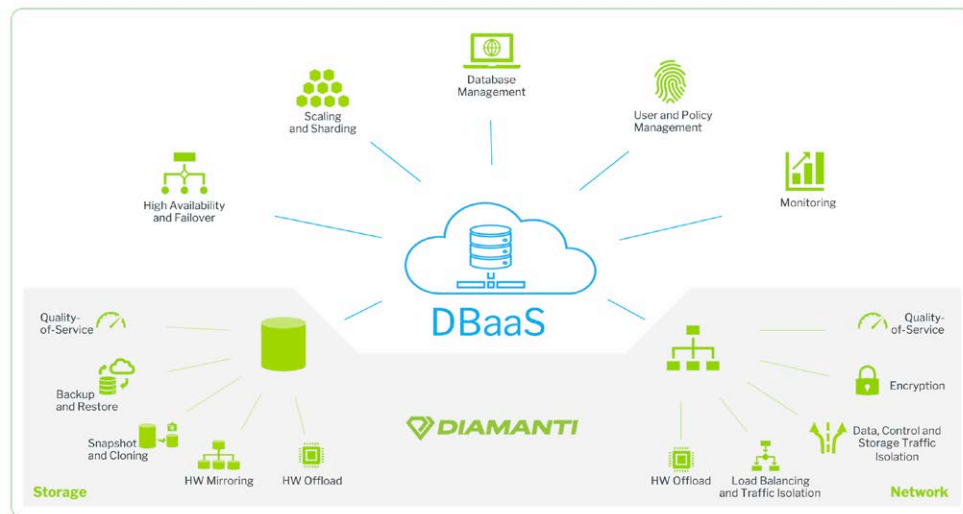


*Figure 1: Database-as-a-Service on Diamanti Enterprise Kubernetes Platform*

Diamanti delivers high-performance, low-latency access to storage and network resources with hardware offload and acceleration. Through innovative system design and proven QoS, Diamanti eliminates the need for overprovisioning and increases resource utilization for maximum efficiency.

Diamanti's 2019 Container Benchmark Survey showed a significant spike in levels of concern about security. Diamanti complements Kubernetes' native security with full separation of storage and network traffic, multi-tenant isolation, and an ecosystem of security partners.

IT teams need enterprise-grade capabilities to protect data, ensure disaster recovery, and satisfy the performance requirements of many database instances simultaneously. To support diverse DBaaS needs, the Diamanti platform addresses the gaps found in other Kubernetes solutions with:

- Superior performance
- Guaranteed QoS to meet varied SLA requirements
- High availability with multi-zone deployments
- Efficient storage-level snapshots, replication, backup and failover

As a result, Diamanti provides the lowest total cost of ownership (TCO) to enterprise customers deploying DBaaS on-premises.

## Superior Performance

Each Diamanti cluster pools low-latency, high-performance NVMe flash storage and 40GbE networking and includes open-source Docker and Kubernetes pre-installed. Containers can be deployed just minutes after racking and stacking a Diamanti cluster. Performance scales in lockstep with your database needs, ensuring that SLAs can always be met.

Diamanti platform delivers tremendous storage performance in a small footprint with 1 million IOPS per node and latencies below 1 millisecond for database workloads.

## Meet your SLAs with Guaranteed QoS

A DBaaS environment has to support database instances for different needs and SLAs. In other environments, this can mean severely restricting the number or types of instances on each node. With customizable performance tiers, a Diamanti platform administrator can specify storage and network bandwidth for each database instance. A critical instance with a high SLA can run on the same node along with backup jobs and developer instances with no noisy neighbor effects.

## High Availability and Multi-Zone Deployments

High Availability (HA) is a must for mission-critical database instances. Diamanti multi-zone clusters allow Kubernetes nodes to be distributed across different availability zones (failure domains), ensuring applications can achieve Recovery Point Objective/Recovery Time Objective (RPO/RTO) of zero. Figure 2 demonstrates this configuration in orange.
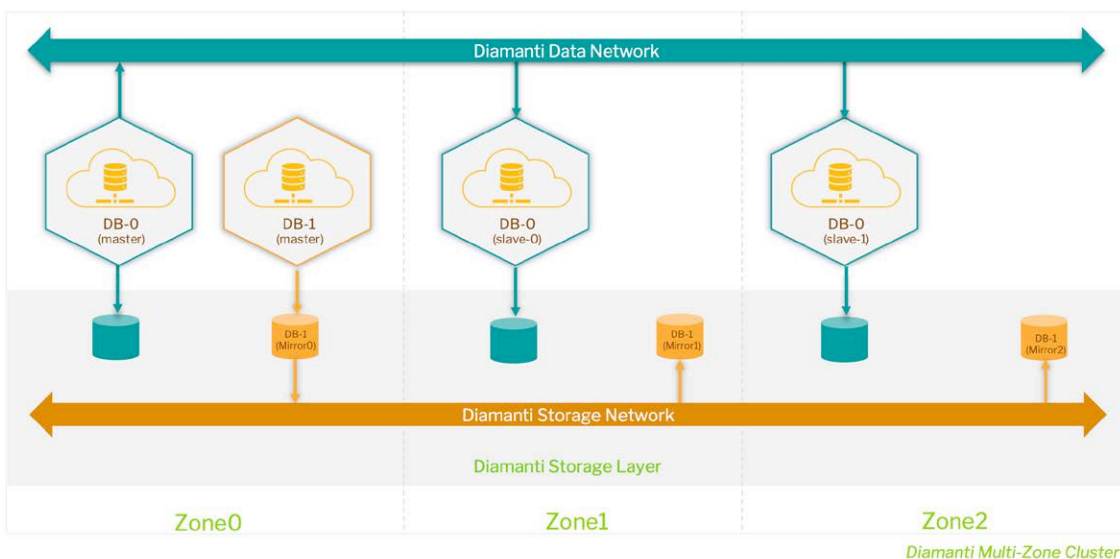


*Figure 2: Highly Available and Scalable Database Deployment on Diamanti*

Diamanti also allows configurations in which high availability functions can be achieved at the database layer for use cases in which there is a need to scale both reads as well as writes i.e. database sharding. Figure 2 demonstrates this deployment in teal.

## Storage-level Mirroring, Snapshots, Replication, Backup and Failover

Diamanti's unique storage and network architecture ensures databases are highly available with quick and easy migration across zones, providing an RPO/RTO of zero.

Zero-copy instant snapshots have no performance impact on running applications and conserve CPU cycles and network bandwidth for backup and recovery.

## Summary

The Diamanti Enterprise Kubernetes Platform provides a turnkey solution for deploying modern, cloud native containerized databases and associated applications. With its bare-metal architecture, guaranteed QoS, and PCIe-level isolation for storage and networking, the Diamanti platform provides guaranteed optimal performance for DBaaS environments. Multiple database instances can share the same Kubernetes cluster without noisy neighbor problems, leading to very high platform utilization and significantly reducing overall TCO.

**ABOUT DIAMANTI**

Diamanti delivers the industry's only purpose-built, fully integrated enterprise Kubernetes platform, spanning on-premises and public cloud environments. It gives infrastructure architects, IT operations, and application owners the performance, simplicity, security, and enterprise features they need to get cloud-native applications to market fast. Diamanti provides the lowest total cost of ownership to enterprise customers for their most demanding applications.

Based in San Jose, California, Diamanti is backed by venture investors ClearSky, CRV, Engineering Capital, Goldman Sachs, GSR Ventures, Northgate Capital, Threshold Ventures (formerly DFJ Venture), and Translink Capital. For more information visit www.diamanti.com or follow @DiamantiCom.

Rev. 110719