

QUOBYTE - THE DATA CENTER FILE SYSTEM

# OPENSTACK WHITEPAPER

Fast and Reliable Software Storage



# Quobyte

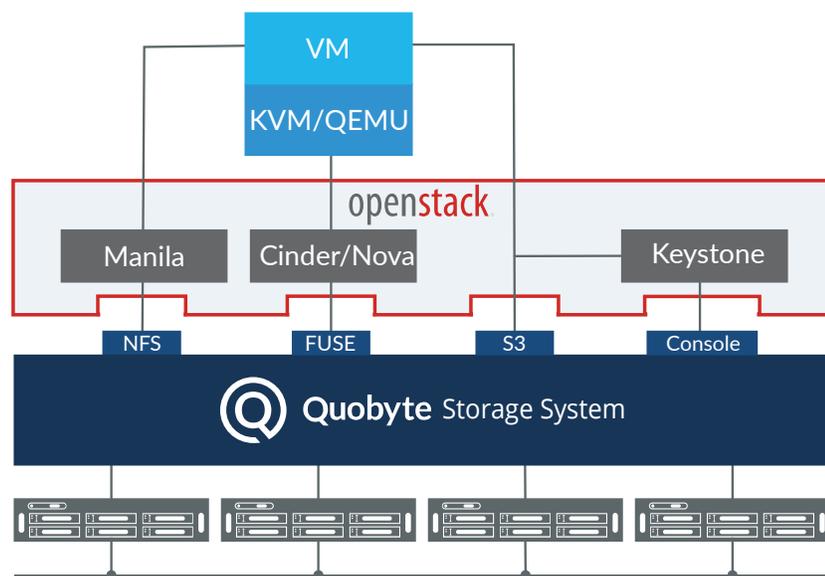
[www.quobyte.com](http://www.quobyte.com)

# Quobyte – Fast and Scalable Storage for OpenStack

Public cloud providers have introduced a new benchmark for enterprise IT infrastructures. Their agility, ease of use, and cost efficiency set a new standard. OpenStack gives service providers and IT departments a tool to deliver services that are on par with public clouds while capitalizing on their individual strengths.

But there's a catch: In order to live up to these promises, an OpenStack infrastructure needs to be based on a storage system that is aligned with OpenStack's core features: a simple hardware foundation, a complete set of services, and powerful management structures.

Quobyte provides such a storage system as a complete software storage solution that's seamlessly integrated with OpenStack. Quobyte unifies block storage for VMs, shared file storage between VMs, and object storage and is integrated with OpenStack's multi-tenancy support.



## High-Performance VM Backend for Cinder

At its core, Quobyte is a scalable, partition- and fault-tolerant distributed file system. With its highly-optimized IO path and advanced replication mechanisms, it achieves a 5x better IOPS performance and lower latency than other fault-tolerant file or block storage systems.

The Cinder integration builds on Quobyte's high-performance file storage and keeps virtual machine images in image files. Virtual machine images can

thus be managed and backed up with standard tools. As a distributed file system, Quobyte also supports live migration: it automatically moves live virtual machines around between hosts.

Quobyte has no static pool abstraction, it rather places each virtual machine image on storage devices (HDDs, SSDs, and SMR) that can be governed by a freely configurable policy engine. The assignment of files to storage devices is dynamic and can be changed at any time. Using the policy engine, live virtual machine images can be moved to dedicated storage devices or assigned to devices with specific performance characteristics for optimized tiering.

Quobyte's storage services have minimal hardware demands and do not require dedicated machines (no journaling devices required). Combining Quobyte with VMs on the same machine means these virtual machines benefit from using a local replica of the respective VM image yielding a better performance and significantly lowering network utilization.

## **Integrated Shared File Storage with Manila**

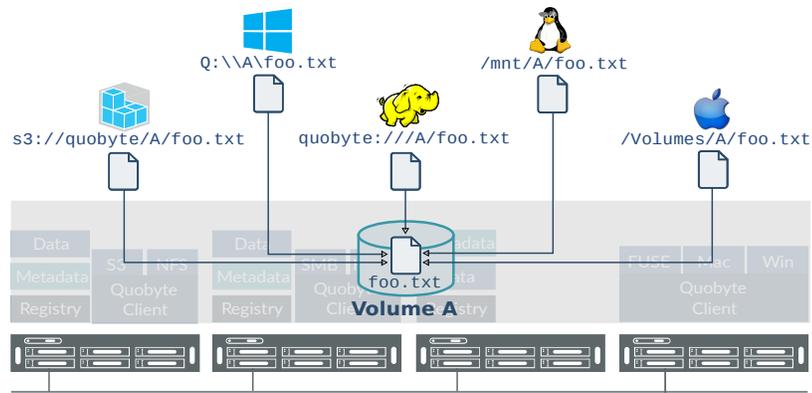
Quobyte's Manila integration directly accesses Quobyte's built-in NFS proxies. It enables direct and concurrent access to all Quobyte file systems and does not require running any extra services such as proxy VMs. Since no intermediaries are used for file system access, the resulting performance is on par with NFS access in non-virtualized environments.

Manila file shares are regular Quobyte file systems and can be accessed via other Quobyte interfaces, such as S3 proxies or the Hadoop adapter. Like any other Quobyte file system, Manila-exported file systems fully benefit from the built-in quota mechanism, multi-tenancy structures, placement through the policy engine (that allows tiering and isolation), and high-performance access.

## **Object Storage with S3 Interface**

All data in Quobyte can be exported with an S3 storage interface which supports a major subset of the original S3 functionality, including ACLs. As Quobyte is a unified storage system, data in Quobyte files can be accessed via any of the supported interface.

Quobyte's S3 proxies are stateless, so they integrate well with standard web load balancing techniques for scalability and availability.



## Keystone - Multi-Tenancy

Multi-tenancy is one of the key features of OpenStack as it allows convenient logical isolation between customers. Quobyte's access control module includes a Keystone backend that allows all user and access management to be done in Keystone.

The integration extends to all parts of a Quobyte deployment: customers can self-manage file systems in isolated namespaces, file systems can also be exported to specific tenants, and S3 object storage users rely on Keystone's capabilities for access key management.

Optionally, Quobyte's policy engine complements the logical isolation on the physical side by putting data on dedicated storage resources.

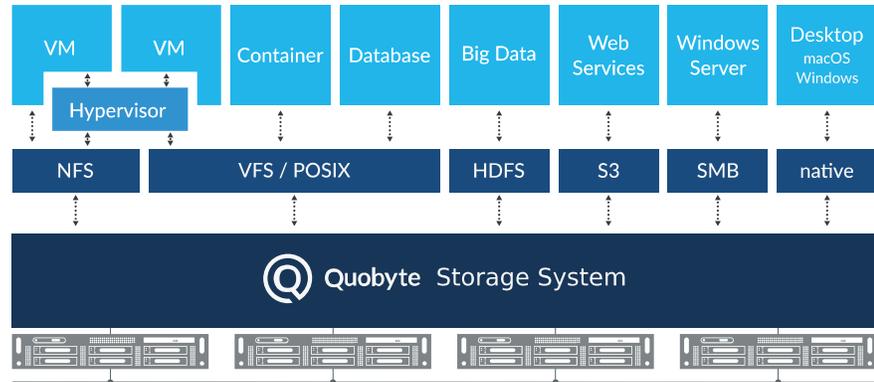
## Hardware Platform

Quobyte is a software-only storage system that runs on most any Linux distribution and does not have any special hardware requirements. It stores data on formatted drives that are attached to the host via a JBOD controller. The drives are treated as fully independent failure domains. In particular there is no journal structure that requires a separate storage device. Devices are only weakly associated with their host: they can be set offline at any time, removed from the server and put into a different server.

There are also no special requirements on the networking side. While Quobyte can be configured to make use of a separate storage network, its architecture and resource demands do not require a dedicated storage network.

## OpenStack and Beyond

Quobyte is a high-performance storage system that can host the full spectrum of OpenStack workloads in one single deployment. Since all data is contained in regular Quobyte file systems, it can be made available directly to non-OpenStack consumers. Additionally, the deployment can be shared with other use cases like a Big Data or microservices cluster or they can be accessed using our native Windows and macOS clients.



With its partition- and fault-tolerance, linear scalability, and policy-driven placement mechanisms, Quobyte makes installations of any size easier to manage and enables operating deployments at massive scale.

## Get Quobyte

Grab our Evaluation Guide, download Quobyte and be up-and-running in one hour.

[Click here »](#)

**Quobyte®**  
Data Center File System™. Fast and Reliable Software Storage.

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# Quobyte Datasheet

Interfaces	Native Client: Proxies: Object:	Linux, Mac, Windows, HDFS NFSv3, NFSv4, SMB S3
OpenStack	Drivers: Integration:	Manila, Cinder, S3 Keystone, OpenStack domains
Container Infrastructures	Shared file storage for stateful containers; deployable in containers	
Multitenancy	Built-in (also integrates with OpenStack domains) Unified ACLs across all interfaces and operating systems	
Data Placement	Dynamic and policy-defined down to the file level; enables performance isolation, system partitioning, tiering, and intelligent placement by locality	
High Availability	Built-in, with transparent failover	
Data Protection	Split-brain safe replication or erasure coding, configurable at the file level	
Checksums	End-to-end CRC32 at the block level	
Block Size	512 bytes to 2MB, configurable for each file	
Quotas	Based on capacity/files/file systems; per user, group, file system or tenant	
Live Updates	No service interruption with rolling updates	
Parallel IO	Striping, direct communication from client to many storage servers	
Network	Any IP network, multiple networks and storage backbone support	
Thin Provisioning	Yes, all volumes thinly provisioned	
Limits (per installation)	Servers: Capacity: File Systems: Files:	Min. 4, up to 10,000s Unlimited, max. 32PB per file Unlimited Up to 100,000,000 per file system
Management	WebUI, JSON-RPC API, and command line tools	
Platforms	OS: Frameworks:	Ubuntu, Debian, CentOS/RHEL, Fedora, openSUSE/SLES Docker, Mesos, Kubernetes, Rancher

## Key Benefits

- POSIX file system for seamless integration
- High IOPS, consistent sub-millisecond latency
- “Lights-out” data center resiliency; self-healing
- Near-perfect linear scaling
- 100% hardware and kernel independent
- Hadoop, Docker, and OpenStack support
- Erasure coding option, perfect for analytics and sequential workloads
- Policy-driven data placement and tiering
- Integrates with Kubernetes, Rancher, and Mesos

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