SOLUTION BRIEF

RED HAT STORAGE AND QCT

Agile software-defined storage for telecos and cloud service providers

INTRODUCTION

As competitive pressure builds, telecommunications companies and cloud service providers (CSPs) are actively seeking new ways to deploy applications, gain business agility, and monetize their considerable infrastructure investments. To do so requires modern, scalable, and cost-effective storage solutions that complement the latest application and deployment innovations. Unfortunately, traditional monolithic storage solutions have become an impediment and a bottleneck for the latest agile web-scale applications—actively constraining applications in terms of scale, flexibility, and affordability. Business agility ultimately suffers as a result.

Successful web-scale or hyperscale organizations have demonstrated the path forward, unencumbered by the limitations of traditional, proprietary, enterprise-centric storage solutions. These organizations have achieved cost-effective scale by strategically deploying open source software on top of customizable cost-efficient industry-standard hardware. This approach has given them access to large and active developer communities and aggressive commodity price curves for industry-standard systems and components. To achieve similar results, however, telcos and CSPs must take a more nuanced approach—one that avoids the considerable resources expended by web-scale organizations to develop and customize open source software to fit their unique needs.

Red Hat and Quanta Cloud Technology (QCT) are ideally positioned to help telcos and CSPs as they transition new storage infrastructure from proprietary, monolithic storage appliances to open, software-defined storage. As the global leader in open source software, Red Hat uniquely offers essential integration across the entire software stack—offering organizations robust software, proven reference architectures, global support, and ultimately the confidence to deploy open source software technology in production. As a leader in datacenter solutions, QCT is well versed in hyperscale deployments and provides large-scale datacenter hardware and cloud solutions to cloud providers, such as Facebook.

ACHIEVING COST-EFFECTIVE SCALE WITH SOFTWARE-DEFINED STORAGE

Like other IT-based organizations, telcos and CSPs are deeply concerned about storage.[1] Google, Facebook, Flickr, Snapchat, YouTube, Netflix, and other web-scale operations have set the stage for radically different data consumption and generation patterns, causing digital assets to expand exponentially. For the first time in decades, however, storage technology is actually changing rapidly in response. Traditional storage solutions have long been a last bastion of proprietary technology, but like computing and networking, storage is finally yielding to undeniable shifts toward industry-standard hardware and open, community-driven software stacks.

1   Vanson Bourne survey of 500 IT Decision Makers reveals that 74% are worried about their organization's ability to cope with increased data requirements. www.slideshare.net/Red_Hat_Storage/storage-limitations-frustrations-and-coping-with-future-needs

2   streamingmedia.com/PressRelease/81-of-US-Households-Have-a-DVR-Netflix-or-Use-VOD_40554.aspx

THE RISE OF SOFTWARE-DEFINED STORAGE

In just a few years, applications have gone from being server-based, to virtualized, to new container models, and emerging microservices. Storage, however, has continued to be deployed in familiar and highly static ways. Traditional storage appliances are narrowly optimized, in concert with their enterprise-centric design point. They can be extremely limiting when extended to much larger telco and CSP environments, forcing organizations to live within the parameters of a given storage appliance or system. Many now recognize that these tensions represent a fundamental disconnect.

In contrast, software-defined storage can be designed, tailored, and optimized to fit specific applications and business needs—and it can adapt rapidly as needs change. Only open, software-defined storage can allow storage infrastructure to become:

- **Hyperscale**. Elastic software-defined storage infrastructure can scale from petabytes to exabytes and can be re-deployed and rapidly recovered as needed.

- **Lower cost**. Cost-effective storage scalability is essential for business growth. Unlike monolithic appliances with proprietary software, software-defined storage rides predictable pricing curves in terms of acquisition, energy consumption, and licensing.

- **On-demand**. To match rapidly evolving application models, storage must become dynamic and changeable—and essentially available on demand. To exploit revenue opportunities, telcos need to quickly deploy and scale fine-grained applications and microservices—together with their storage resources. They also need the ability to decommission applications and recover their resources to maximize the utilization and reuse of infrastructure.

- **Consolidated and converged**. Because software-defined storage is Internet Protocol (IP)-based, organizations can use the same network fabric infrastructure deployed for their applications. This convergence simplifies network fabrics and often eliminates the need for Fibre Channel storage area networks (SANs).

- **Lower risk**. Managing risk is a big part of storage. Losing a few servers or a network link is not a significant issue, but losing data can ruin reputations and destroy a business. Distributed software-defined storage minimizes the risk of failure and isolates problems.

Because of these advantages, software-defined storage has emerged as a compelling alternative for a majority of storage needs. A dramatic shift is now taking place from traditional, proprietary, scale-up storage toward software-defined scale-out storage.

RED HAT STORAGE ON QCT SERVERS

Red Hat and QCT both understand that deploying at scale is fundamentally different than deploying for the enterprise. At scale, even very small configuration choices accrue to impact overall performance or cost. Choosing the right processor, memory configuration, network card, or storage server can make an enormous difference in aggregate when deploying petabytes of storage.

Based on clusters of industry-standard x86 hardware, Red Hat Storage offers petabyte scalability through an open software-defined platform that scales across physical, virtual, and cloud resources. Organizations can achieve multidimensional scalability, adding more storage media to increase capacity, or more servers for more performance. A variety of storage media can be used, including NVM Express (NVMe), solid state devices (SSDs), and hard disk drives (HDDs).

Red Hat Ceph Storage offers high-performance object storage for emerging applications like video content delivery networks, cloud DVR, and network functions virtualization (NFV).

Distributed and parallel data access provides performance that scales with capacity—to petabytes and beyond. Software and hardware configurations can be designed for input/output operations per second (IOPS)-intensive, throughput-intensive, or cost-capacity-focused workloads—all within the same software-defined storage framework. Object, block, and file storage can all be accommodated.

Together, Red Hat® Storage and QCT combine best-in-class software along with optimized servers and verified rack-level solutions, letting telcos and CSPs deploy rapidly with confidence.

- **Red Hat Ceph Storage** is ideal for operators building modern cloud storage platforms, offering block or object storage and OpenStack® compatibility. The software provides continuous data protection and availability when the underlying hardware changes, delivering unrivaled flexibility and power to automatically manage exponential data growth.

- **Red Hat Gluster Storage** is a scalable, distributed file system that can easily and securely manage big, unstructured, and semistructured data. The platform is straightforward to deploy and operate. Red Hat Gluster Storage can bring value to most large-scale deployments and can be offered in physical, virtual, and cloud environments—including containerized environments.

- **Optimized servers and fully validated rack-level QCT configurations** combine with either Red Hat Ceph Storage or Red Hat Gluster Storage. With extensive experience deploying large, web-scale installations around the globe, QCT works closely with telcos and CSPs to design, evaluate, and deploy the right combination of servers, storage, and network infrastructure.

STORAGE SOLUTIONS FOR MODERN APPLICATIONS

As described in the sections that follow, modern applications and deployment methods drive business agility and bring new capabilities, but also demand new storage solutions.

RED HAT CEPH STORAGE FOR VIDEO CONTENT DELIVERY

Video consumption patterns are changing, moving away from the fixed devices and schedules of traditional television. This transition is dramatically impacting consumption patterns for telco services. Popular video-on-demand services are now driving large and growing amounts of unicast traffic on telco networks. For example, global IP video traffic will be 82% of all IP traffic (both business and consumer) by 2020, up from 70% in 2015.[3] This growth requires massive amounts of storage—up to exabytes—to store classic movies for video on demand. There are also complex intellectual property and digital rights management (DRM) issues that must also be satisfied. All of this requires careful attention to how video is stored, streamed, and consumed.

As a scalable and efficient object storage platform, Red Hat Ceph Storage is ideal for content delivery networks (CDNs) and emerging cloud DVR solutions. Cloud DVR moves video storage from the set-top box to the cloud and offers access from any device and any location. It also offers considerable opportunities for providers through enhanced and new revenue streams, reduced operational expenses, and better control over what is recorded and how.

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3 *cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/vni-hyperconnectivity-wp.html*

Red Hat Gluster Storage lets organizations choose software-defined storage over traditional appliances for new container-based applications and microservices.

Red Hat Ceph Storage and QCT help make a cloud DVR approach economically viable through open, software-defined storage and industry-standard hardware. The software is robust and reliable, with both Red Hat and community backing. With Ceph triple-redundant replication, there is less chance of losing production data that could lead to downtime and service outages.

NETWORK FUNCTIONS VIRTUALIZATION ON OPENSTACK ON RED HAT CEPH STORAGE

NFV is growing rapidly, with as many as 60% of telecommunication professionals now actively exploring the technology.[4] NFV is an increasingly popular concept for telcos for its ability to use commercial off-the-shelf hardware and open source software as a single control plane for deployment of network functional elements and orchestration. As a customizable cloud platform, OpenStack provides the foundation for NFV.[5]

Red Hat Ceph Storage offers mature interfaces for enterprise block and object storage, making it well-suited for archival, rich media, and cloud infrastructure workloads like OpenStack. In fact, Ceph is consistently the most popular platform for OpenStack, according to annual OpenStack surveys.[6] Delivered in a unified self-healing and self-managing platform with no single point of failure, Red Hat Ceph Storage handles data management so telcos can focus on improving application availability.

Beyond NFV, OpenStack infrastructure has many uses as a platform for web-scale application services. Once general-purpose OpenStack infrastructure is deployed, many organizations are using it to add cloud DVR and other services as their needs dictate.

PERSISTENT STORAGE FOR CONTAINERIZED APPLICATIONS WITH RED HAT GLUSTER STORAGE

The move toward microservices is profound and compelling. Successful web-scale organizations already operate in massive clouds, using containers heavily as a development and deployment model. Containers offer distinct advantages over common virtualization approaches.

- **Performance and efficiency**. Containers can provide bare-metal performance without the resource utilization overhead of a virtual machine image.

- **Increased density**. A single, physical system can support hundreds of containers, but only a handful of virtualized servers.

- **Agility**. No longer constrained by machine images, organizations can scale each dimension of service as the business demands, essentially operating at the level of a microservice.

- **Elasticity**. Containers can be spun up rapidly to serve evolving needs. More importantly, containers can be spun down quickly to reallocate resources. This level of agility was previously impossible with virtual machines (VMs), since they are separate entities running their own kernel, requiring interaction with the hypervisor.

Red Hat Gluster Storage can provide persistent storage for containerized applications, offering highly elastic storage in support of agile services. It can also be deployed as a container, allowing applications and their storage to be deployed together using the same methods (containers) and with unified orchestration.

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4   www.opnfv.org/news-faq/press-release/2015/11/opnfv-and-heavy-reading-release-results-survey-evaluate-project's

5   www.openstack.org/assets/telecoms-and-nfv/OpenStack-Foundation-NFV-Report.pdf

6   57% choose Ceph according to the April 2016 OpenStack User Survey (www.openstack.org/assets/survey/April-2016-User-Survey-Report.pdf)

With an extensive background deploying infrastructure for web-scale companies, QCT can help take the cost and risk out of deploying software-defined storage at scale—offering significant value through large-scale integration and rack-level assembly, testing, and evaluation.

QCT INFRASTRUCTURE FOR CLOUD-NATIVE APPLICATIONS

Deployments at web scale require a profound level of trust and confidence that solutions can actually deliver at promised levels and meet business needs. Together with Red Hat Storage, QCT can deliver solutions for telcos and CSPs that help ensure success by offering:

- **Global integration.** Thousands of QCT engineers are focused on integration, allowing QCT to integrate, test, and validate any combination of servers, storage, and network switching. QCT can then deliver pretested, preconfigured, precabled, and preloaded racks that are ready to run.

- **Large-scale manufacturing.** With large-scale manufacturing capabilities, QCT can rapidly assemble and deploy large-count rack-level solutions and is among the largest server manufacturers globally. In fact, QCT has the capacity to assemble racks and support customers through several facilities across North America, Europe, and Asia-Pacific regions.

- **Innovation.** QCT is an innovator at scale, and was an early contributor to the Open Compute Project (OCP), a nonprofit organization launched by Facebook engineers to standardize the designs of datacenter products. QCT-manufactured servers were among the first OCP designs.

WORKLOAD-OPTIMIZED STORAGE SERVERS

One of the advantages of software-defined storage is that different storage servers can be deployed to serve different workloads, all within the same storage cluster. QCT offers a broad range of servers optimized for Red Hat Storage in IOPS-intensive, throughput-intensive, or cost/capacity-centric applications. Figure 1 illustrates QCT QuantaGrid D51PH-1ULH and QCT QuantaPlex T21P-4U servers.

QCT QuantaGrid D51PH-1ULH   QCT QuantaPlex T21P-4U

Figure 1. QCT offers a range of flexible high-performance storage-optimized servers.

FULLY VALIDATED RACK-LEVEL QCT CONFIGURATIONS

With its integration and global manufacturing capabilities, QCT can deliver fully validated configurations of Intel-based QCT hardware—engineered as a turnkey, modular, scalable, rack-based solution for cloud-based applications. This ability significantly reduces the time, expense, risk, and uncertainty of engineering software-defined storage in-house. Rather than reinventing IT infrastructure, organizations can focus on providing an agile IT environment that generates real and lasting business value.

Fully validated QCT configurations let organizations focus on their workloads, development workflow, operations, and business. At the same time, organizations can profit from industry-proven QCT hardware and experience in architecting, integrating, optimizing, hardening, in-service testing, supporting, and evolving web-scale infrastructure solutions for large production environments.

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Fully validated configurations let organizations:

- Reduce deployment risk through the use of prevalidated and certified solutions.

- Increase innovation and software velocity to increase the business value of IT.

- Provide full-featured QCT rack-mount servers for optimal performance and efficiency.

- Allow for flexible infrastructure configurations to meet requirements and business needs.

QCT CENTER OF EXCELLENCE

Telcos and CSPs need assurances that infrastructure will work for their applications and data—at scale. To serve this need, the QCT Center of Excellence provides an ideal test environment for telcos and CSPs to do large-scale prototyping, design, and evaluation using their own applications and data. As of this writing, the QCT Center of Excellence currently supports 5.6PB of storage, allowing organizations to gain a realistic perspective of how their specific applications and data work with both Red Hat Storage software and QCT hardware infrastructure. Servers and components can be configured based on desired use case, with a choice of servers, processors, and network interfaces.

PERFORMANCE CHARACTERIZATION AND SUPPORT

Deploying successfully at web scale requires complete confidence that systems can deliver requisite levels of performance and support required levels of service. Specific QCT systems configured with Red Hat Storage can include benchmarks to validate performance levels, including benchmarks for VM capacity, as well as messaging and provisioning for particular tasks. Custom manufacturing levels and support services can also be selected to support the needs of the business, including:

- **Different manufacturing levels**. QCT can support full-server assembly and testing, rack-level assembly and testing (including switches) with full cabling, and full-rack to multirack level manufacturing, with full software loading, validation, and optimization.

- **Professional services**. QCT offers a range of global professional services, including QCT Advanced Replacement, Onsite Support, Seedstock Service, and Global Support to support businesses—across North America, EMEA, and Asia-Pacific regions.

CONCLUSION

Adopting software-defined storage need not involve undue risk and uncertainty, even when deploying at massive scale. With Red Hat Storage on QCT servers, telcos and CSPs can wield open, software-defined storage as a strategic weapon, following the lead of successful web-scale organizations and benefiting from considerable community innovation. Together, Red Hat and QCT can help take the cost and risk out of software-defined storage—bringing open source expertise and web-scale experience to bear on scalable, cost-effective storage for the most demanding modern applications.

About QCT

QCT (Quanta Cloud Technology) is a global datacenter solution provider extending the power of hyperscale datacenter design in standard and open SKUs to all datacenter customers. Product lines include servers, storage, network switches, integrated rack systems and cloud solutions, all delivering hyperscale efficiency, scalability, reliability, manageability, serviceability and optimized performance for each workload. QCT offers a full spectrum of datacenter products and services from engineering, integration and optimization to global supply chain support, all under one roof.