SOLUTION BRIEF

QCT QxStor Red Hat Ceph Storage Edition™
Intel® Xeon® Processors and Intel® Solid-State Drive Data Center Family for PCIe*
Software Defined Storage

Optimize Ceph* Configurations to Petabyte Scale on QCT Ultra-dense Storage Servers

Software-defined Storage: An Inevitable Alternative to Traditional SAN or NAS Storage

New dynamics of today's business and unstructured data have pushed the data center storage environment to a new level. It drives the billion dollar storage market through a fundamental structural shift from traditional proprietary storage arrays to new technologies like software defined storage and also pushes forward all of the technologies that support it from storage software itself to hardware components including server platform design, solid state drives (SSD), networking controllers, and so on.

Cloud service providers have been adopting open source software designed to run on standard server hardware to achieve petabyte scale storage capacity. Enterprises are seeking to emulate the efficiency achieved by these public cloud providers and are realizing that traditional SAN or NAS storage is no longer feasible to reliably and dynamically scale-out storage capacity in time. QCT QxStor Red Hat Ceph Storage Edition offers validated and pre-configured hardware and software which combine into a nimble marketplace alternative over historical storage solutions. It is optimized for different workloads, running on QCT ultra dense storage servers, and uses the best of Intel technology for data center storage uses, with the Intel® Xeon® E5-2600 v3 family of processors, Intel® dual port 10GbE network controllers and the Intel® Solid State Drives Data Center Family.

QCT–We Make Cloud Magic Possible

Table of Contents

QCT QxStor Red Hat Ceph Storage Edition: An Optimized Petabyte Scaled Solution for Cloud

QCT is a leader in hyperscale data center technology and is now extending this market leadership into the software-defined infrastructure space. QCT has reinvented data center storage technology based on Intel® Xeon® processors to design and develop cutting edge storage servers by boosting storage capacity, density and performance.

QCT QxStor integrates QCT storage servers, Intel technology and Red Hat* Ceph* Storage software, together bringing seamless interoperability, ease of maintenance, and optimized performance to data centers. This results in a range of innovative storage options meant for cloud applications and workloads.

Ceph is an open source storage software platform that has a vibrant community, growing market acceptance, and is the number one choice of OpenStack (Cinder) deployments for 2015.[1] It offers a robust, massively scalable and stable platform for both block and object storage that can be used in public clouds or to make a private cloud for an enterprise. It is well suited for rich media, archive, and cloud infrastructure workloads, and when deployed as recommended has no single point of failure.

QxStor RCT-200 on QuantaGrid D51PH-1ULH

- Optimized for throughput workloads
- The densest 1U server, providing 4:1 HDD to SSD ratio for best Ceph performance

Optimal Configuration of QCT Storage Design

QxStor Red Hat Ceph Storage Edition is designed and validated on two storage focused servers optimized either for throughput or cost/capacity: the QuantaGrid D51PH-1ULH, and the QuantaPlex T21P-4U.

QuantaGrid D51PH-1ULH: an Ultra Dense 1U Ceph Building Block

QxStor RCT-200 is configured for optimized data throughput per drive on the QuantaGrid D51PH-1ULH. As Figure 1 shows, it is an ultra dense 1U server with 12x disk drives and 4x SSD, which results in an optimal 1U design for Ceph. The exquisite hot-swappable SSD slots will not sacrifice the HDD spaces, increasing the space utilization rate by 25%, compared to present 1U 3.5'' storage servers in the market.

RCT-200 features the Intel® Xeon® E5-2600 v3 family of processors and Intel 10GbE NICs, resulting in both extreme storage density and the computing power to complete Ceph storage tasks and the necessary networking bandwidth to accelerate throughput. With a 1U enclosure creating an entire (build-

QxStor RCT-400 & RCC-400 on QuantaPlex T21P-4U

- Optimized for throughput and cost/capacity workloads
- With the highest density up to 620TB capacity per server for Ceph

Figure 1. QCT QxStor Red Hat Ceph Storage Edition offerings – throughput optimized and cost/capacity optimized sku

ing block) 'node' in the cluster, it provides a smaller minimum failure domain than most typical Ceph deployments, providing naturally higher reliability and scalability.

QuantaPlex T21P-4U Maximizes Storage Capacity at Petabyte Scale

RCC-400 uses the QuantaPlex T21P-4U, an optimal configuration for cost/capacity-optimized workloads. Tailored to meet the growing storage capacity demand in hyperscale data center, the QuantaPlex T21P-4U is equipped with two models: one server node has 78x HDD with up to 620 terabytes of storage in 4U space, while the other model has two individual nodes, each node with 35x HDD.

To achieve excellent price per TB, RCC-400 enables erasure-coded pools of storage for object archive workloads. The Intel® Xeon® E5-2600 v3 processor family provides sufficient computing power to support writes when using compute-intensive erasure coding while the Intel 10GbE network adaptors support plenty of bandwidth, resulting in an amazing price-performance ratio. Intel has worked with the Ceph open source community to ensure that Ceph has optimized routines for Erasure Coding, thereby helping everyone make best use of Ceph for their large capacity storage needs.

Accelerating QxStor with Intel SSD Technology

SSDs play a critical role in Ceph performance, delivering better latency and throughput. Using SSDs for journaling accelerates Ceph performance, especially writes. The falling purchase price per GB may be driving broader adoption of SSDs in the data center. Regardless, enterprises should aggressively exploit their use of SSD-based Ceph solutions to gain major benefits for a range of applications. Examples include high-throughput, high-quality, and large-scale delivery of entertainment, media streaming or block storage.

The ratio of HDD and SSD is key in Ceph architecture. Too few SSDs affects the performance and most stick to the advised ratios unless doing an all flash Ceph system.

RCT-200 Achieves the Ideal 4:1 Ratio of HDD to SATA SSDs

RCT-200 adopts the QCT D51PH-1ULH server. It's a perfect design hardware for throughput-optimized Ceph, incorporating 12x spinning disks drives with 3x SSDs of Intel SSD Data Center S3710 Series for Ceph journaling. The 4:1 ratio of HDD to SSD in the RCT-200 gives just the right balance of physical space, bytes of space, and Ceph performance for your money.

RCT-400 Boosting Ceph through NVMe SSD

RCT-400 has an extraordinary design, consolidating 2x Intel NVMe SSD DC P3700 Series on each QCT T21P-4U 35-bay server node. NVMe SSDs provide direct write benefits by providing a 'speedy' connection from the Intel processor to the logical disk device, dramatically boosting the RCT-400 sequential write performance by 50% and reducing latency by 33% in sequential writes. These improvements are made possible by the NVMe device interface, which was designed from the ground up for solid state disk drives.

Scaling to Exabyte

Ceph provides an infinitely scalable Ceph storage cluster based upon RADOS (Reliable Autonomic Distributed Object Store). Through thoroughly validation and testing, QxStor demonstrates linear scale-out performance for sequential reads and writes as the number of QxStor server nodes is increased. This capability is critical to allow organizations to scale out storage

The QCT QxStor RCT-400 enahnces Ceph sequential write performance dramatically, with 50% higher throughput and reducing latency by 33%. These improvements are made possible by the NVMe device interface, which was designed from the ground up for solid state drives like the Intel® SSD Data Center P3700 Series for PCIe®.

predictably by simply adding QxStor servers running Red Hat Ceph Storage.

Faster Time-to-Value

QxStor Red Hat Ceph Storage Edition is integrated with the best fit hardware components for Ceph, and is pre-configured with the optimal Ceph configuration and suitable Ceph replicate scheme – 3x replica in throughput optimized sku and erasure coded pool in cost/capacity optimized sku. It significantly shortens the time for enterprises to adopt Ceph. Enterprises no longer need to spend efforts or hire expertise from scratch on Ceph study, hardware sizing and software deployment.

Ease of Maintenance

Both the unique screw-less design in the QuantaPlex T21P-4U for RCT-400 and RCC-400, and the innovative hard drive carrier design in QuantaGrid D51PH-1ULH for RCT-200 allow IT operators to complete disk drive replacement tasks with simplicity and less time than normal.

Conclusion

Ceph has been redefining the foundation of block and object storage architecture in public and private cloud data centers. QCT QxStor Red Hat Ceph Storage Edition with Intel technology provides a compelling Ceph solution to enterprises and service providers. Organizations are no longer be trapped within yesterday's more rigid proprietary storage and can start embracing the seamlessly integrated QxStor.

QCT has maximized hardware and software aspects of each configuration related to Ceph performance by selecting the right Intel processors, SSD and network technology in QxStor.

For More Information

To learn more about QCT QxStor Red Hat Ceph Storage Edition, visit http://www.qct.io/Solution/Software-Defined-Infrastructure/Storage-Virtualization/QCT-and-Red-Hat-Ceph-Storage-p365c225c226c230 or find QCT contact at www.qct.io

For more information visit www.intel.com/storage

About QCT

QCT (Quanta Cloud Technology) is a global data center solution provider extending the power of hyperscale data center design in standard and open SKUs to all data center 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 data center products and services from engineering, integration and optimization to global supply chain support, all under one roof. The parent of QCT is Quanta Computer Inc., a Fortune Global 500 technology engineering and manufacturing company. http://www.QCT.io

[1] https://www.openstack.org/assets/survey/Public-User-Survey-Report.pdf, page 32

Disclaimers

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at www.intel.com/storage

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors and products. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

Configurations: NVMe performance configurations tested using the system listed on page 23 of http://www.qct.io/account/download/download?order_download_id=1065&dtype=Reference%20Architecture , using Ceph Benchmark Testing tool running librados for object storage. Testing performed by QCT and Red Hat.

For more information go to http://www.intel.com/performance.

0316/JT/HDW/PDF

Please Recycle