Building Big Data Analytics Data Lake with All-Flash Ceph

QCT Marco Huang

QCT Amy Chang

Agenda

- Introduction of QCT
- Why data lake architecture
- Brief on Data Lake with All-Flash Ceph architecture
    - Architecture design
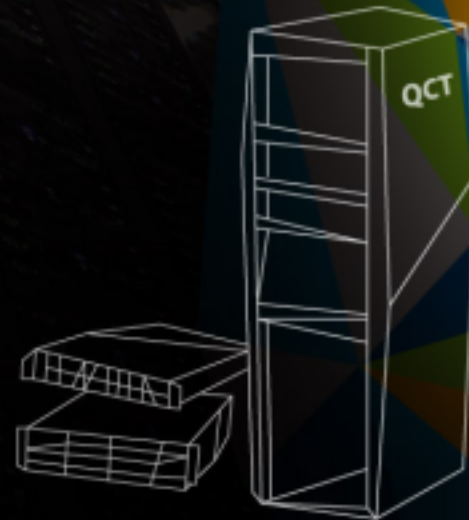   - Hardware selection
    - Testing result
- Conclusion

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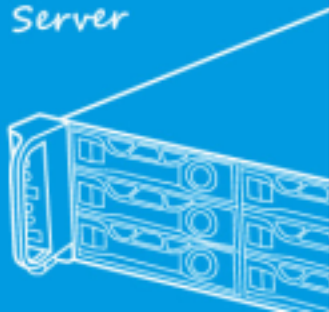A leading cloud datacenter solution provider that delivers **Server**, **Storage**, **Networking**, **Rack System** and **Cloud Solution** under a single, proven roof
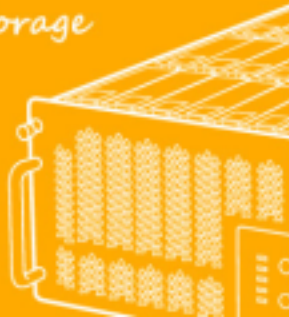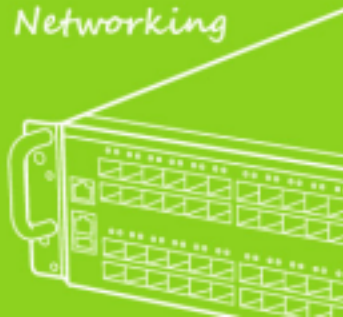
Server

Storage

Networking

Rack System

Solution

Data-powered company needs flexible data analytic framework

Popular Hadoop framework is top choice for executing analytical tasks yet can't scale-out on-demand

Data-Generating Center → Data-Powered Company

Hyper-converged Hadoop Framework VS Disaggregated SDS Architecture

Paradigm Shift for Enterprise: Need for data analytics increases

Prefer Disaggregated Architecture: Target to scale-out on demand

Data Lake with All-Flash Ceph Architecture

Disaggregate data analytics cluster and backend storage to provide higher flexibility

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Data Lake with All-Flash Ceph Architecture

Disaggregate data analytics cluster and backend storage to provide higher flexibility

Allows multiple data analytics cluster to run concurrently

M Ceph-Monitor Node   Ceph-OSD Node

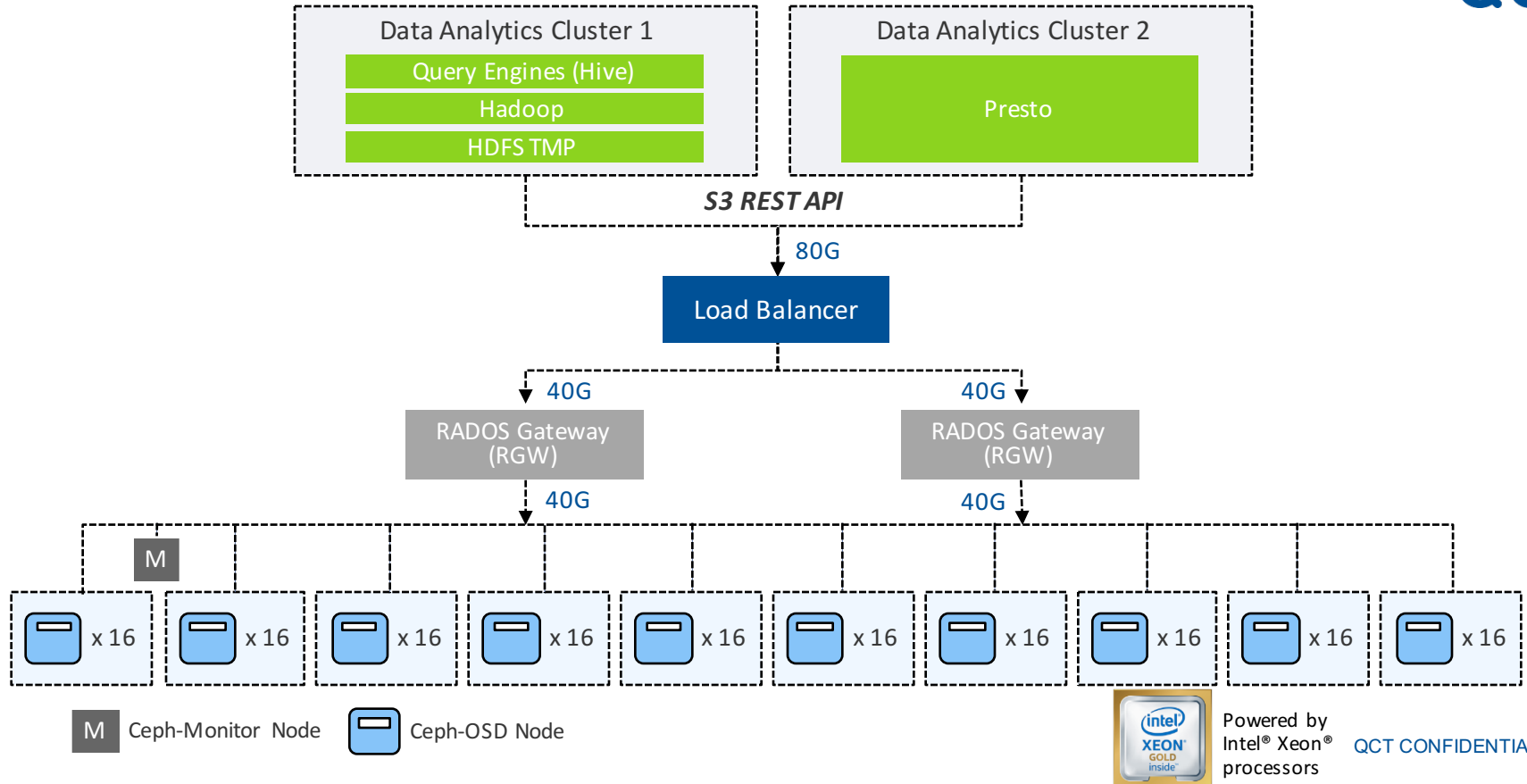Powered by Intel® Xeon® processors

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Data Lake with All-Flash Ceph Architecture

Disaggregate data analytics cluster and backend storage to provide higher flexibility

Data Analytics Cluster 1
- Query Engines (Hive)
- Hadoop
- HDFS TMP

Data Analytics Cluster 2
- Presto

S3 REST API

80G

Load Balancer

40G · 40G

RADOS Gateway (RGW) · RADOS Gateway (RGW)

40G · 40G

Compatibility with S3 allows users to connect on premise cloud to public cloud

M

x 16 · x 16 · x 16 · x 16 · x 16 · x 16 · x 16 · x 16 · x 16 · x 16

M Ceph-Monitor Node   Ceph-OSD Node
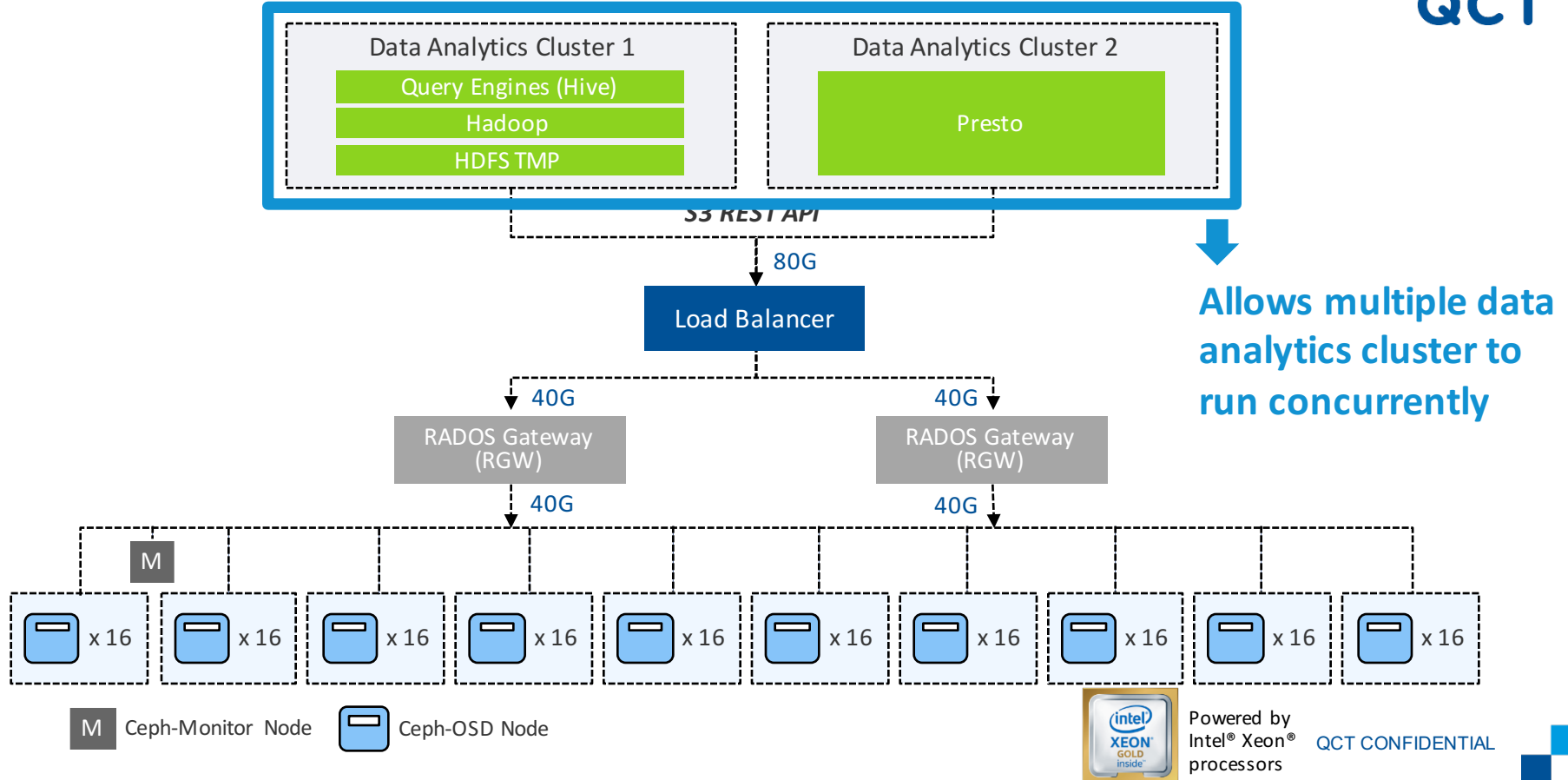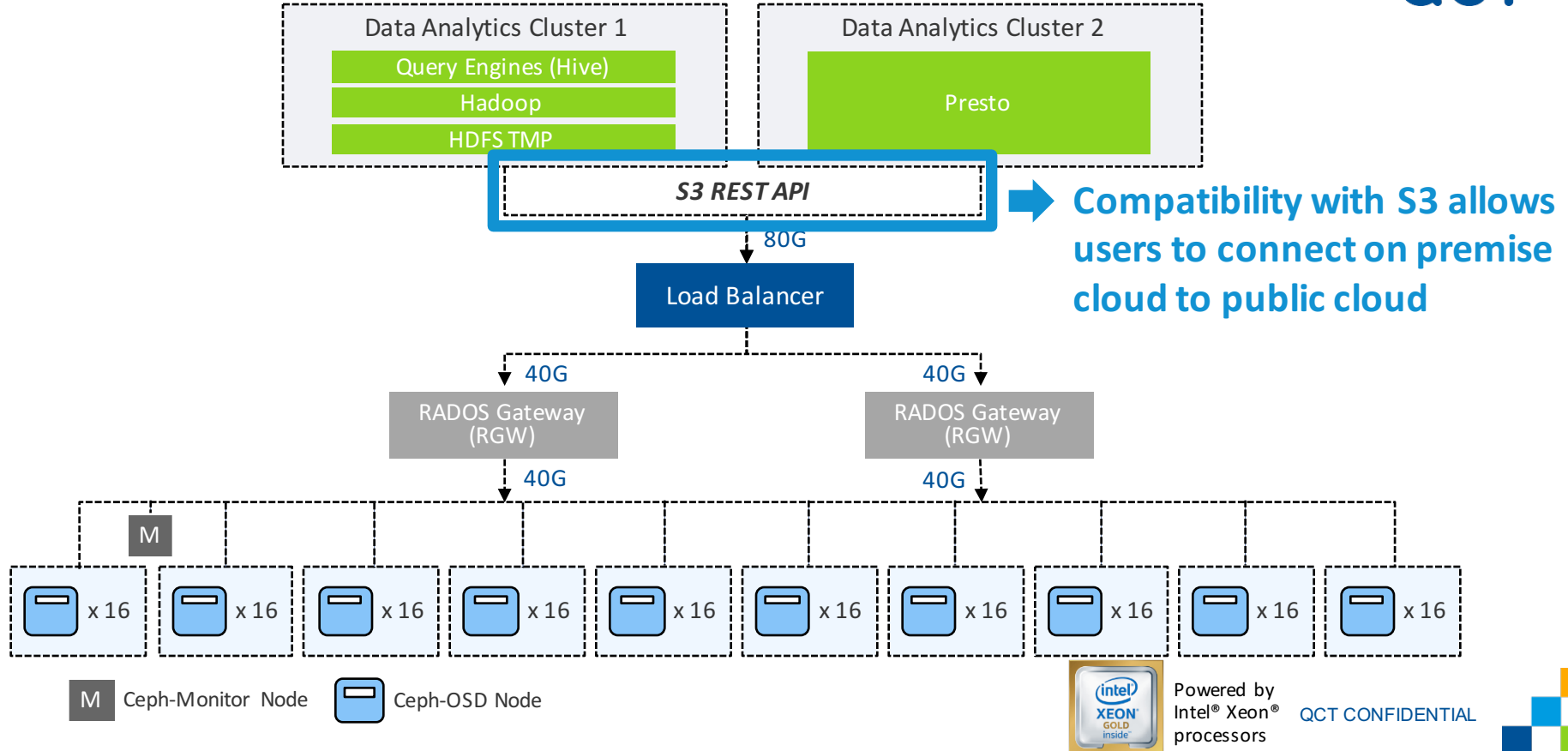
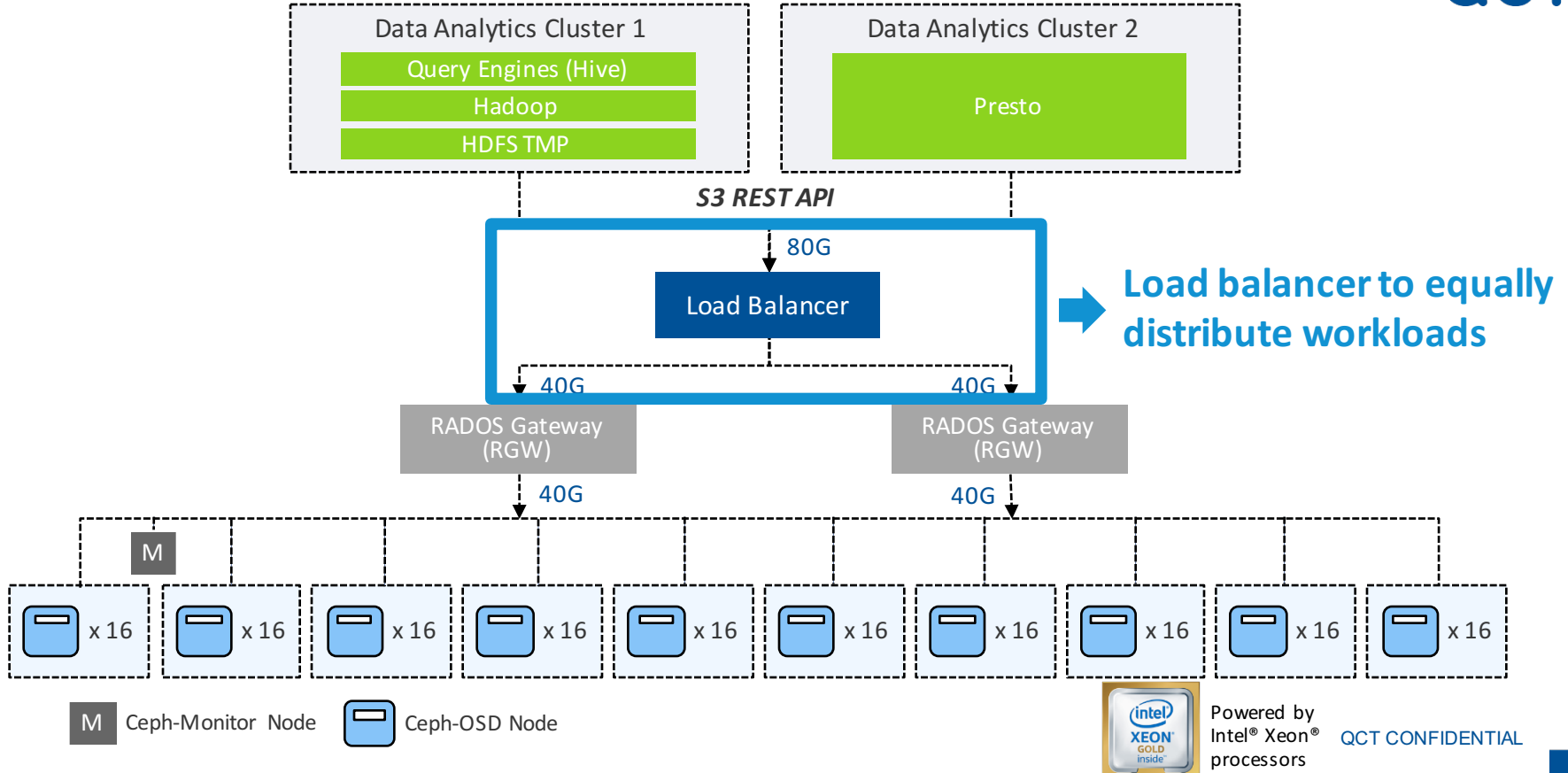Powered by Intel® Xeon® processors

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Data Lake with All-Flash Ceph Architecture

Disaggregate data analytics cluster and backend storage to provide higher flexibility

Data Lake with All-Flash Ceph Architecture

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Ceph as backend storage to scale-out on demand
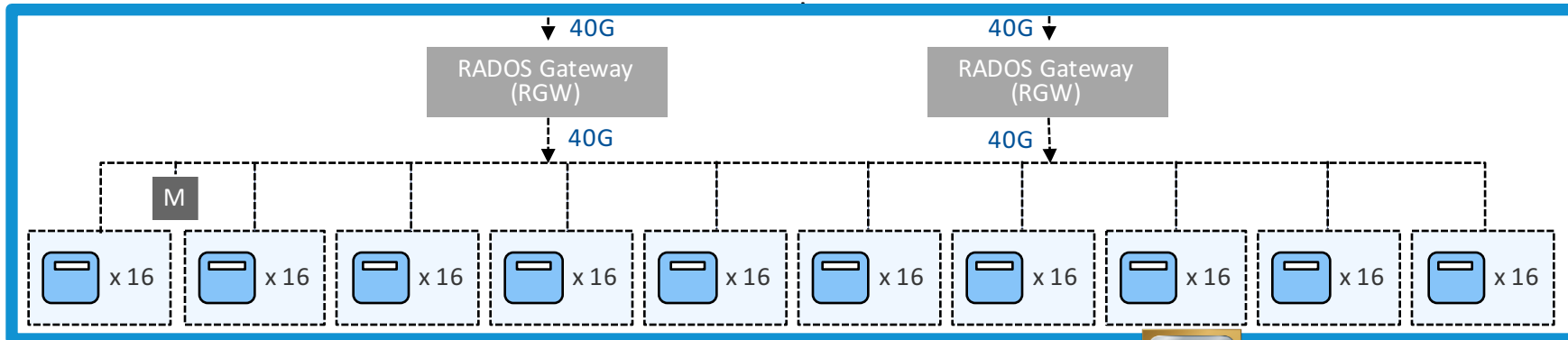
40G   40G

RADOS Gateway (RGW)   RADOS Gateway (RGW)

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M

x 16   x 16   x 16   x 16   x 16   x 16   x 16   x 16   x 16   x 16

M Ceph-Monitor Node   Ceph-OSD Node

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intel XEON GOLD inside

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QuantaGrid D52BQ-2U – Scale Along with Your Business

Intel Purley platform with up to 24 2.5" bays with SATA/SAS/NVMe support

QCT

Top shelf Xeon® P processor[1]

Up to **10**x PCIe expansion slots

Up to **26**x hot-swap drive bays

Up to **3**TB memory capacity[2]

All screw-less, hot-swappable!

As many as 24x SFF + optional extra 2x rear SSD bays (SATA/SAS/NVMe support)

12x LFF + optional extra 2x rear SSD bays (SATA/SAS/NVMe support)

intel XEON GOLD inside™

Powered by Intel® Xeon® processors

1. With limited conditions
2. With specific CPU

QxStor Ceph – Know your Demand, Easy to Configure

QCT QxStor Big Data Analytics Data Lake with All-Flash Ceph Solution

Throughput Optimized		Cost/Capacity Optimized	IOPS Optimized

Throughput Optimized

For Streaming Media

QxStor RCT-200

D51PH-1ULH

QxStor RCT-400

T21P-4U

+25% In **Total Storage Capacity** available[1]

-33% In sequential writing **Latency** Testing[2]

+50% In sequential writing **Throughput**[2]

Cost/Capacity Optimized

For Archiving

QxStor RCC-400

T21P-4U

Up to 560TB Per chassis

Up to 63% Cost down

IOPS Optimized

For Mission Critical App

QxStor RCI-300

Purley Available!

D51BP-1U

D52BQ-2U

+100% Improve in **IOPS** performance[3]

1.6M/s **Highest** IOPS[3]

-50% Reduce in **Latency**[3]

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[1] SKU statistics of RCT-200   [2] Test result of RCT-400   [3] Test result of RCI-300

All-Flash Ceph is preferred for data analytic workloads

NVMe is preferred both from the business and performance perspective

Business Perspective

NVMe is no longer a luxury device for enterprise with IO intensive workloads

High Performance-Optimized Storage

Cost Efficient Compared to HDD

Suitable for Mission Critical App

Performance Perspective

NVMe exhibits exceptional results on system metrics than conventional disks

CPU Utilization	Network Traffic		Disk Read Throughput	Disk Read Latency
x9.24	Incoming: **x3.9**		**x2.81**	**x9.77**
	Outgoing: **x16.1**			

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Test Result – Hive and Presto

Assured performance for data lake architecture when compared to HDFS hyper-converged architecture

Minor changes are observed in total runtime comparison between HDFS hyper-converged and Ceph disaggregated architecture using Hive.

Up to 22.91% faster in total runtime for Ceph disaggregated architecture using Presto, the effect is especially notable for large data size.

Total Runtime with Hive

Total Runtime with Presto
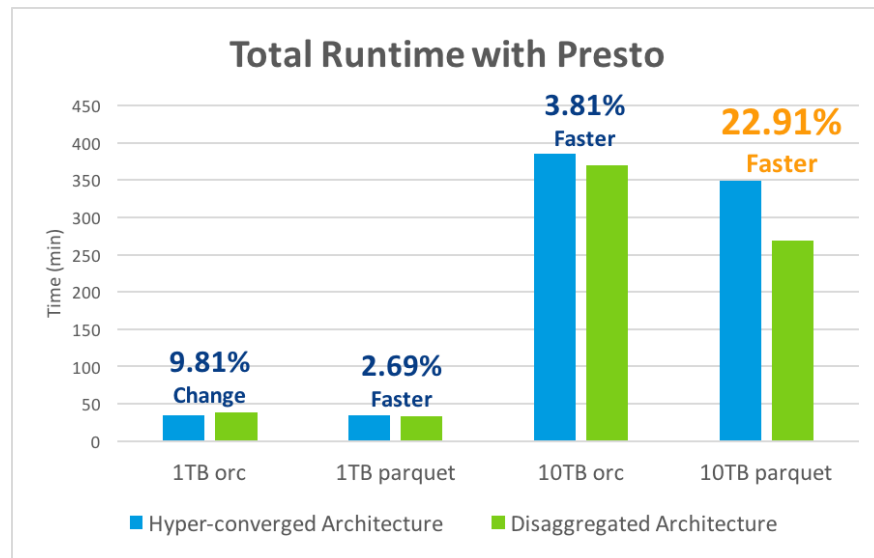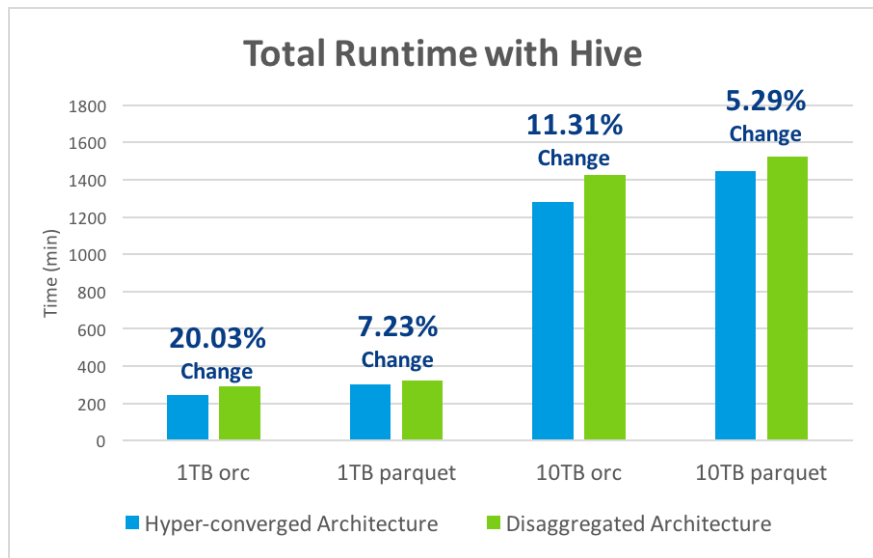
Disaggregated architecture is suitable for data analytics

Meet the demand for big data frameworks while providing higher flexibility

Scale-Out According to Need

Scaling components independently reduces cost & management complexity

Cost-Efficient Architecture

Lower storage required for data durability than HDFS or RAID based systems

Assured Performance Level

Comparable test results to hyper-converged architecture for data analytics

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