SOLUTION BRIEF

QxStack vSAN ReadyNode -Solution Brief for Oracle® Database

vmware

QxStack vSAN ReadyNode Series - Solution Brief for Oracle® Database

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Challenges in your data center

Nowadays, a database system, like Oracle® Database, is like the cardiovascular system of an organization which is very essential and will impact the operating efficiency and competitiveness of an enterprise. Yet, enterprises actually are reluctant to invest too much as it is not directly generating corporate revenue. Thus, the cost-performance ratio will be the critical index that enterprises turn to. On top of that, enterprises also struggle to get a guarantee on performance to avoid investment waste. With these considerations, an enterprise may wonder: How to spend as less as possible and gain optimized and promised performance for their database system?

QxStack vSAN ReadyNode with Intel® Optane™ Technology

With QxStack vSAN ReadyNode in Intel® Optane™ plus SATA SSD configuration, you can get:

- ***71%** higher performance*
- ***14x** better latency*
- ***33%** better price performance*

QCT now launch a new QxStack vSAN ReadyNode with Intel® Optane™ NVMe SSD and SATA SSD configuration that helps you reach the balance and get performance guarantee.

QxStack vSAN ReadyNode adopts Intel® Optane™ SSD technology which can deliver an extremely high-performance and ultra-low latency, especially in write-intensive workload. QCT's powerful server provides ultimate compute and storage density, flexible and scalable I/O options, and solid reliability making it excellent for diversified software-defined workloads. With the great combination of QCT powerful server, VMware vSAN, and Intel® Optane™ SSD technology, you can get 71% higher performance and 14 times better latency comparing to all SATA SSD configuration!

And compared to the investment in all NVMe based vSAN solution, NVMe and SSD combination have much better cost-efficiency. On top of that, according to our testing and calculation, this combination provides a 33% better cost-performance ratio compared to SATA based ALL-Flash vSAN solutions!

QCT discreetly simulate real workload running scenarios, validate and ensure the performance data. With QxStack vSAN ReadyNode, you can definitely reach a perfect balance between performance requirement and investment consideration and stand in a leading position in a market.

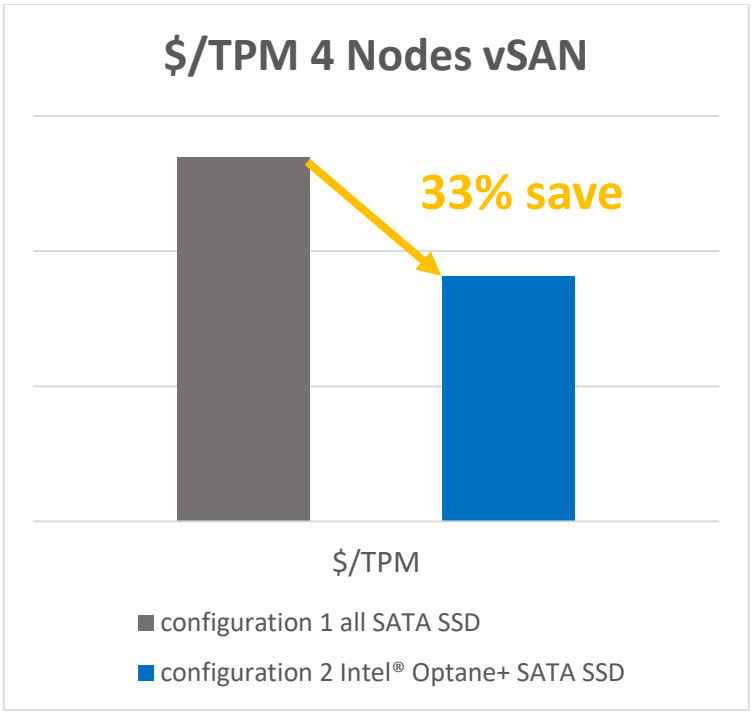


Figure 1. Cost per TPM comparison between Configuration"1" and Configuration"2".

Testing overview and key results

- **Test overview:**

  The purpose of the test is to compare the performance between Intel® Optane™ NVMe SSD plus SATA SSD configuration and all SATA based all-flash configuration on vSAN. HammerDB, a database workload simulation tool, is used to generate the synthetic workload similar to the industry standard TPC-C benchmark. The workload simulates an On-Line Transaction Processing (OLTP) I/O behavior running on virtual machines(VM) running Oracle® Database 12c Enterprise Edition 12.2.0.1.0.

- **Test configuration:**

  Two different configurations "1" and "2", shown in Table 1 are compared based on the OLTP workload performance. The only difference between the two test configuration is the caches adopted on vSAN™ which are Intel® Optane™ SSD DC P4800X and Intel® SSD DC S4600, other configurations remain the same with the same hardware and testing configurations.

  Each node includes one VM, each VM running a TPC-C like workload with 400 warehouses and 100 virtual users. The test duration is set to 30 minutes including the ramp-up period. The Transactions per Minutes (TPM) values generated during the test are recorded to compare the performance between the two configurations. The vSAN™ backend latency is also recorded for further analysis.

Table 1. Hardware Configuration

	Configuration1: Cache Tier: SATA SSD/ Capacity Tier: SATA SSD	**Configuration2: Cache Tier: NVMe SSD/ Capacity Tier: SATA SSD**
Server	QuantaGrid D52B-1U	
CPU	(2) Intel® Xeon® Gold 6138 Processor	
Memory	(24) 2666 MHz DDR4 RDIMM	
Cache	(2) Intel® SSD DC S4600	(2) Intel® Optane™ SSD DC P4800X
Capacity	(10) Intel® SSD DC S4500	
Control card	(1) Quanta LSI® 3216 12Gb/s SAS mezzanine	
NIC card	(1)ON 10GbE 82599ES-QCT	
Boot device	(1)SATADOM/m.2	

Table 2. Software Configuration

Software	**Version**	**Purpose**
VMware vCenter Server® and VMware ESXi™	6.7	VMware vCenter® provides a centralized platform to manage ESXi™ host
VMware vSAN™	6.7	Software-defined storage solution for hy-per-converged infrastructure
Linux operating system	Red Hat® Enterprise Linux®7.4	Operation system for Oracle® database
Oracle® Database	12c Enterprise Edition 12.2.0.1.0	Database software
HammerDB	V2.23	Complex OLTP load generator tool

- **Testing Result**

Transactions per Minutes (TPM)

In configuration “1”, each VM can deliver up to one million TPM but several spikes and drops emerged during the test, as shown in Fig. 1. It is hard to find a consistent level to measure the performance. In order to compare the TPM value with configuration “2”, we adopt the average TPM value generated by HammerDB at the end of the test, as shown in Table 3. This value includes the ramp up and checkpoints time duration of the test which reduces the real-time TPM shown in Fig 2. The total average TPM for all four VMs reach five million TPM in configuration “1”.

In configuration “2”, each VM has increased to three million TPM in the steady state when running HammerDB, as shown in Fig. 3. The TPM value shows a consistent performance level in each VM and does not show any drop or spike during the test. The total average TPM achieve to 10 million which dramatically increase by 71% compared to the configuration “1”, as shown in Table 3 and Fig. 4.

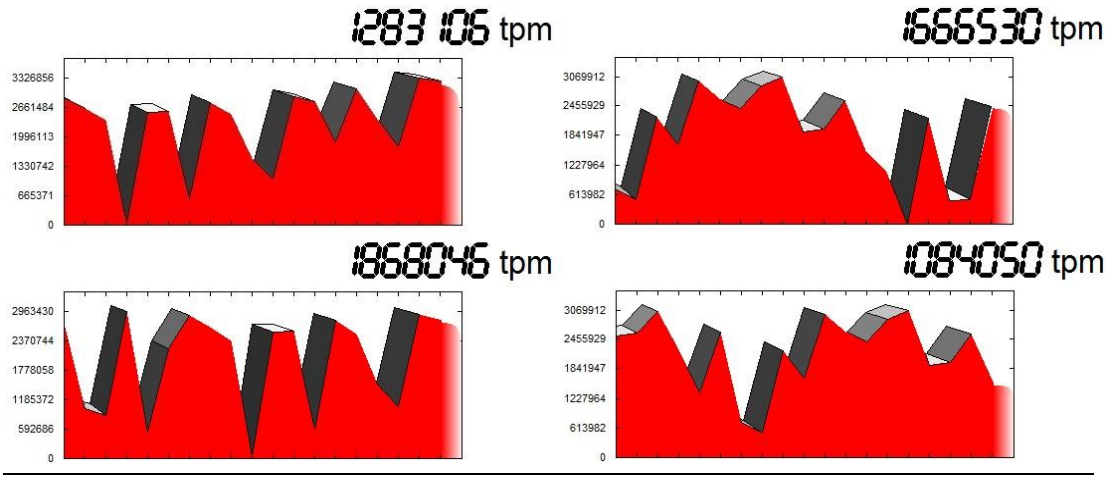


Figure 2. Real-Time TPM Value from HammerDB Dashboard – Configuration”1”.

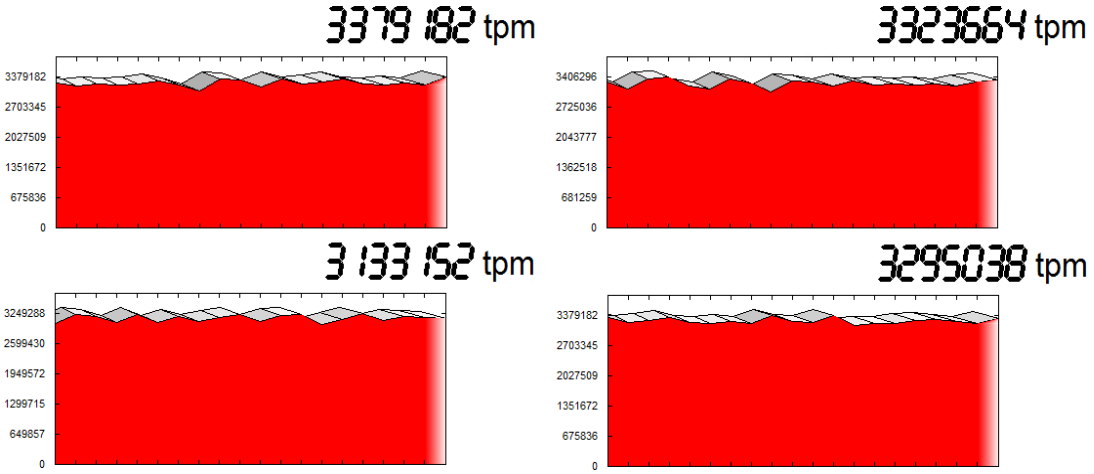


Figure 3. Real-Time TPM Value from HammerDB Dashboard – Configuration"2".

Table 3. Average TPM Value generated by HammerDB

Average TPM	Configuration 1	Configuration 2
Average TPM of VM 01	1854530	2543284
Average TPM of VM 02	1044660	2658719
Average TPM of VM 03	1484130	2592508
Average TPM of VM 04	1613936	2489965
Total Average TPM	5997256	10284476

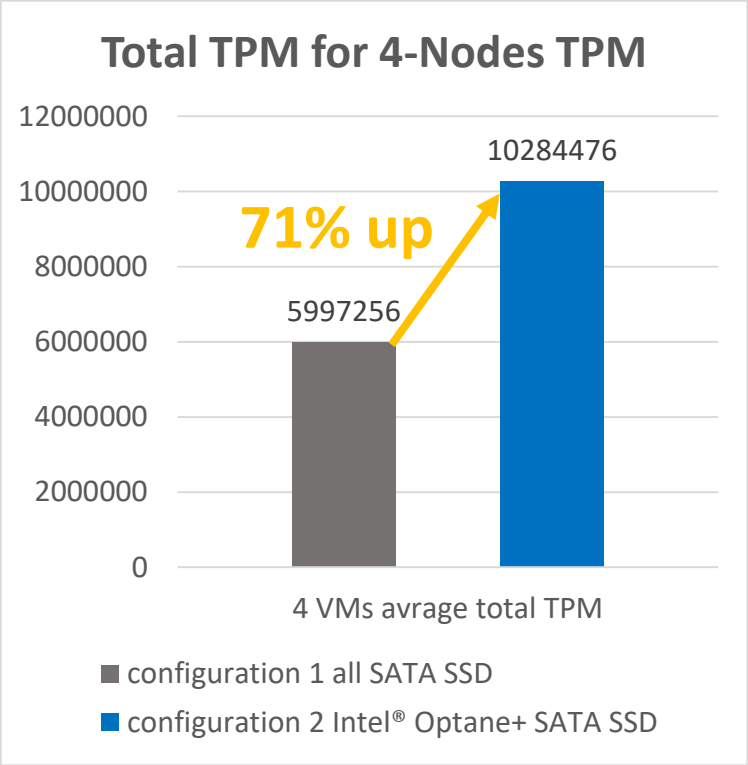


Figure 4. Total Average TPM for 4-nodes Comparison between Configuration"1" and Configuration"2".

" When adopting Intel® Optane™ plus SATA SSD configuration, ***the total average TPM achieve to 10 million which dramatically increase by 71%*** compared to all SATA SSD configuration "

Latency

Fig. 5 and Fig. 6 show the metrics about cluster in the perspective of vSAN™ backend performance. In configuration "1", around 14 milliseconds erratic write latency is observed during the test period in vSAN™ backend as shown in Fig. 5. In configuration "2", it shortens the write latency from 14 milliseconds to 1 millisecond in vSAN™ backend during the test with 14 times improvement compare to the configuration "1", as shown in Fig. 6 and Fig. 7.

The sub-millisecond write latency provides consistent performance to ensure the business SLA's uptime and QoS when deploying the database on vSAN™.

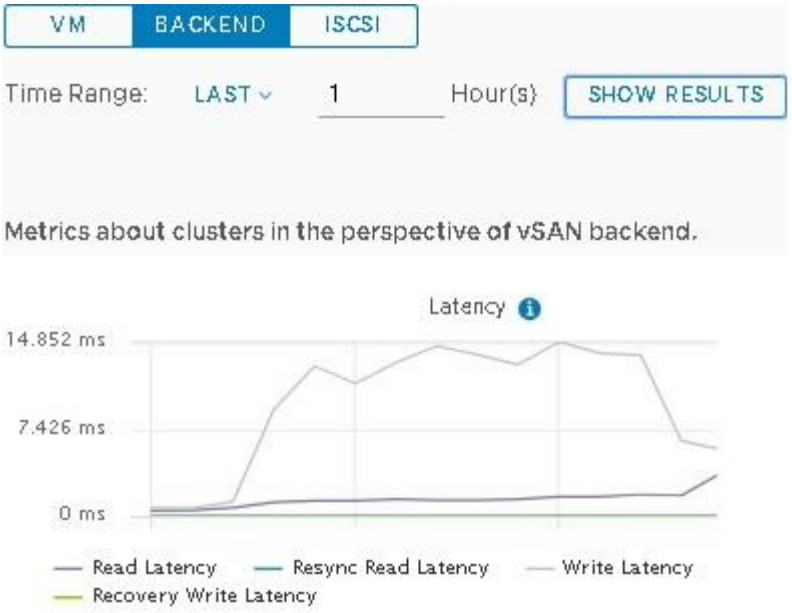


Figure 5. Metrics about Clusters in The Perspective of vSAN™ Backend Performance – Configuration"1".

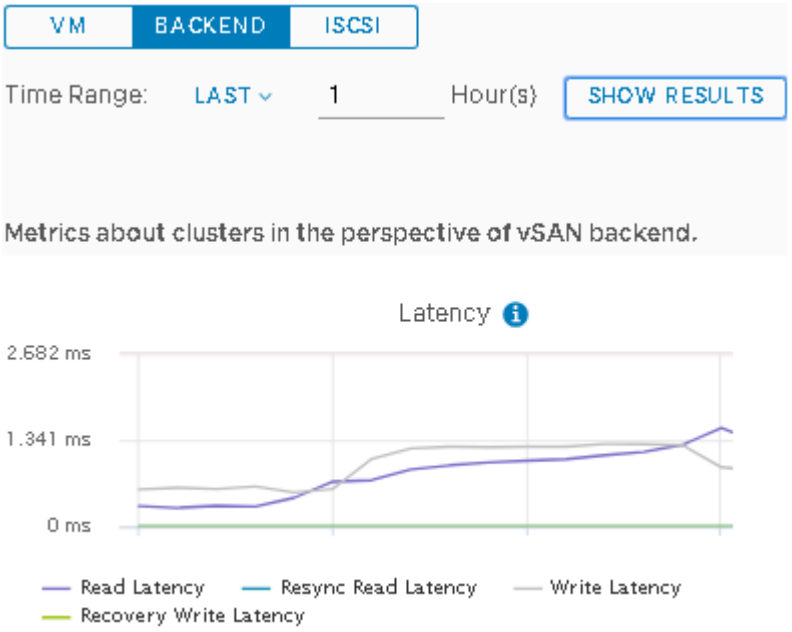


Figure 6. Metrics about Clusters in The Perspective of vSAN™ Backend Performance – Configuration"2".

"When adopting Intel® Optane™ plus SATA SSD configuration, it shortens the write latency form ***14 millisecond to 1 millisecond*** in vSAN™ backend during the test period with ***14 times improvement*** compared to all SATA SSD configuration **"**

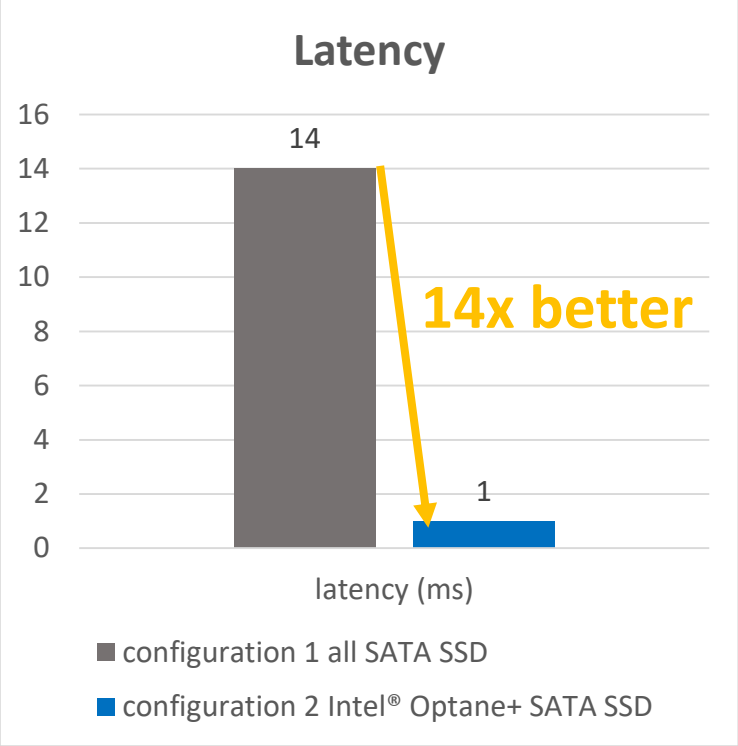
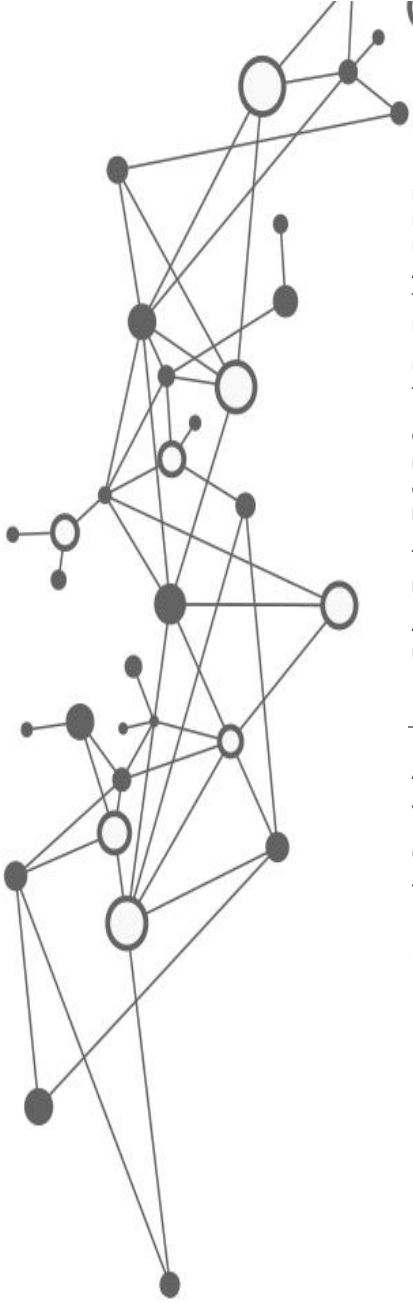


Figure 7. vSAN™ Backend Performance Comparison between Configuration"1" and Configuration"2".



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ABOUT VMware

VMware software powers the world’s most complex digital infrastructure. The company’s compute, cloud, mobility, networking and security offerings provide a dynamic and efficient digital foundation to over 500,000 customers globally, aided by an ecosystem of 75,000 partners. Headquartered in Palo Alto, California, this year VMware celebrates twenty years of breakthrough innovation benefiting business and society.

ABOUT QCT

QCT (Quanta Cloud Technology) is a global datacenter solution provider extending the power of hyper scale 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 hyper scale 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.

The parent of QCT is Quanta Computer Inc., a Fortune Global 500 technology engineering and manufacturing company.

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