

WinHong* New Hyper-converged Solution Upgradation Based on Intel® Xeon® Scalable Platform



Hyper-converged infrastructure is an important direction for the evolution of cloud computing infrastructure. Via close coordination with Intel, we have integrated a new generation of Intel® Xeon® Scalable platform into our hyper-converged appliance, which has improved the performance of the appliance and laid a solid hardware capability foundation for the applications in the key business of the industries. The performance of the upgraded appliance in performance, scalability and availability has been successfully verified by many financial market clients, demonstrating the important value of the hyper-converged infrastructure in IT transformation.



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WinHong Information Technology Co, Ltd. (hereinafter referred to as "WinHong"), a leading cloud-computing technology and service provider in China, is committed to independent R&D of high-security cloud-computing technology - server virtualization and hyper-converged cloud and has successfully developed cloud operating system with domestic intellectual property rights, facilitating its clients in many industries to build secure, efficient and stable cloud data centers and to transform and update their digital businesses. With a view to further enhance the performance and scalability of the WinHong Hyper-converged Appliance, WinHong has cooperated closely with Intel in full upgradation of the hyper-converged solution based on the Intel® Xeon® Scalable Platform, so as to meet the supporting demands for key business of the users in such industries with high information requirements as financial industry and empower the industry transformation and business innovation.

Background

With the current rapid development of the Internet economy, the client structure, profit model and service methods etc. of various industries like finance, medical care and energy are undergoing tremendous changes. The traditional centralized closed IT architecture finds it obviously difficult to adapt to the rapid development of the business, which will lead to numerous problems: complex operation and maintenance management, poor scalability, and difficulty to meet IT requirements for online time demand. Digital transformation has thus become the only way for these industries to change.

Under this context, the Hyper Converged Infrastructure (HCI), which integrates core storage and computing functions into a hyper-virtualization solution, has been growing rapidly, and the hyper-converged appliance has emerged. Compared with the traditional architecture, it not only simplifies IT management and meets the requirements for fast on-line delivery of the service, but also addresses tough issues like flexible expansion, high performance, high availability and provides powerful support for business ventures in Internet finance, etc. Furthermore, the hyper-converged appliance saves much space and energy compared with the traditional SAN (Storage Area Network) and NAS (Network Attached Storage) architectures. Adopting servers and storage components closely coupling management of structure management software tools, the hyper-converged appliance can be configured at a single-node level and scaled fast and easily with cost-effective increments, dramatically controlling total cost of ownership (TCO).

Challenge

To address challenges in the digital transformation, WinHong has launched a hyper-converged product based on HCI, which not only builds a scalability-on-demand cloud for the enterprise, but also integrates functional modules like virtual desktop, hybrid cloud, security, disaster recovery backup, and enterprise cloud applications with out-of-the-box user experience. During product innovation, WinHong has discovered that, the hyper-converged appliance must cope with the following challenges to meet the stringent demands of its clients:

How to Meet the Demanding Performance Requirements of Important Services

Although the hyper-converged appliance boasts numerous advantages (low cost, strong scalability), traditional SAN and NAS infrastructures have always been deployed in key businesses of the users in financial and other industries for a long time. A key reason lies in the insufficient performance of the current hyper-converged appliance: it still cannot meet the supporting needs for important services in financial and other industries. Therefore, with a view to enable the financial industry intends to extensively apply the appliance, its performance need be further improved via strategies like key hardware upgradation and architecture optimization.

How to Achieve Elastic Scaling and Agile Extension of IT

Innovative services like Internet finance pursue rapidity and flexibility, IT infrastructure shall focus on agility and flexibility and new services require gated launch, rapid iteration, and going online fast. In the traditional model, you need buy a server and a device for each new business; next, you will have to go through the complicated process of installation, configuration, implementation, debugging and going online, so the system cannot support the business needs in a short time. The evolving IT infrastructure must be able to move before all the business and be subject to elastic scaling and agile extension as the service changes.

How to Resolve Storage IO Bottlenecks

With the upgradation of service innovation and the explosive growth of data volume, the Internet finance and other industries need to process increasing data, but the end users hold increasingly higher requirements for business response time, which has exerted extreme pressure on the IO performance of the storage system. If the storage performance of the hyper-converged appliance has a significant bottleneck, it will not be able to support the service carriage and high-speed processing of industry users, let alone to replacement the traditional architecture.

Solution

Based on the above discussion, WinHong has comprehensively upgraded the hyper-converged appliance (its product infrastructure is shown in Figure 1), which boasts such advantages as 2U 4 nodes, high performance, low space occupancy, low cost, power saving, 10G network, security and reliability and is equipped with the hyper-converged core technologies independently developed by WinHong. Adopting heterogeneous design and being fully compatible with mainstream virtualization systems such as VMware, Hyper-V, Xen and PowerVM, it realizes deep integration of virtualization and distributed storage and the shortest IO path, effectively improving the random read performance of storage and moreover, employs a fully distributed and shared-nothing architecture, so the stateless processing architecture ensures the system achieves horizontal linear scaling without single-point failure and performance bottleneck.

To further enhance the data processing capabilities of the hyper-converged appliance, WinHong applies the brand new Intel® Xeon® Scalable platform and the Intel® SSD DC P4600 series product in it. The Intel® Xeon® Scalable Platform is optimized in line with demanding mainstream data centers, cloud computing, network and storage workloads, supporting maximum speed, capacity and enhanced scalability. In Intel® Mesh Architecture with up-to-28-core Intel® Xeon® Scalable processors, all cores share the last level cache (LLC), six memory channels, and 48 PCIe* channels, which allow access to vast resources of the entire chip and provide dynamic scalability without compromising the performance of various deployment scenarios like virtualization. Virtual machines can be easily extended with full access to all the shared onboard resources needed.

Intel® SSD DC P4600 Series is an Intel 3D NAND SSD based on NVMe (Non-Volatile Memory Express) protocol tailored for Software-Defined Cloud Infrastructure, delivering high performance, large capacity, strong durability and manageability to meet the workload requirements of clients in different cloud scenarios.

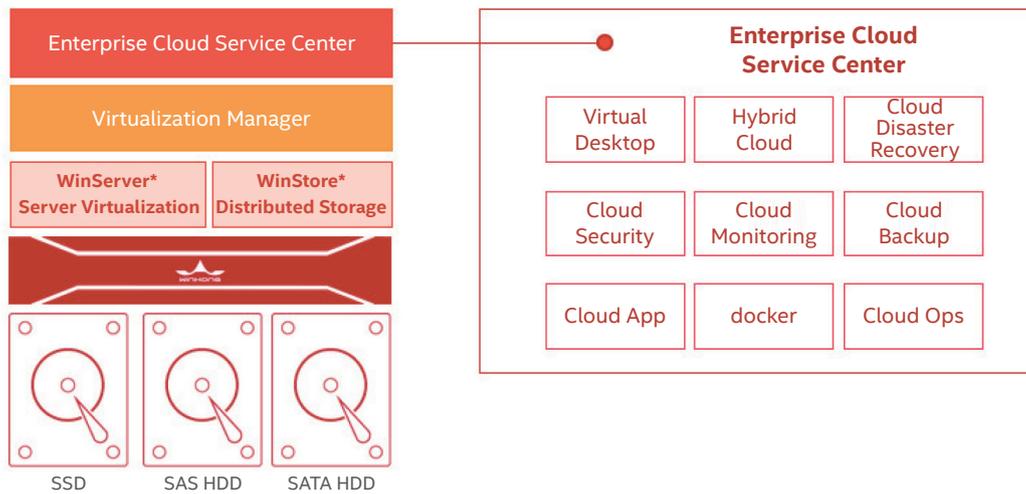


Figure 1. Architecture of WinHong Hyper-converged Appliance

Effect

Provide Superior Performance Support for Key Services

With a view to verify the performance of the upgraded hyper-converged appliance, WinHong builds two sets of new and old test platforms to test the performance in processor and storage with, 2U4N server (four nodes in each set). Refer to Table 1 for hardware configuration of the nodes:

(Old) Test Configuration 1 (a total of 4 nodes)	Hardware type	Parameter	Quantity
	CPU	Intel® Xeon® E5-2690 v3 Processor	2
	Memory	16G 2400MHz DDR4 RDIMM	8
	SSD	Intel® SSD DC S4500 Series (960G)	1
(New) Test Configuration 2 (a total of 4 nodes)	Hardware type	Parameter	Quantity
	CPU	Intel® Xeon® Gold 6140 Processor	2
	Memory	16G 2666MHz DDR4 RDIMM	12
	SSD	Intel® SSD DC P4600 Series (1.6 TB)	1

Table 1. Test Configuration Comparison

In the test on processor performance, WinHong adopts Sysbench to test the response time needed for execution of 10,000 requests with the execution primes of each request added to 20000 under 12 threads and 40 threads respectively, and the results are shown in Figure 2.

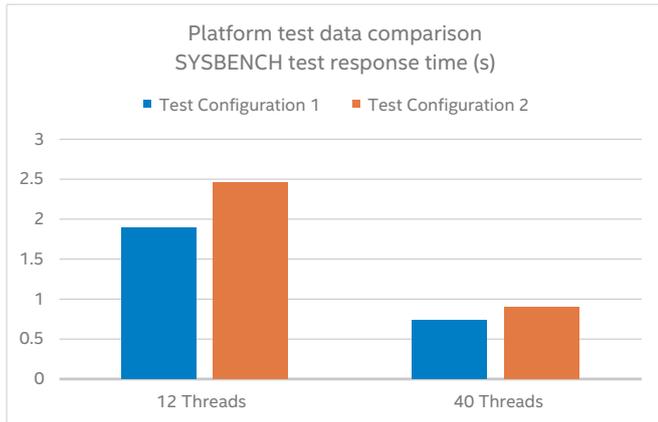


Figure 2. Sysbench Test Data

Note: As more tests are conducted, the performance benchmark results may be modified. The results depend on the particular platform configuration and workload used in the test, and may not be applicable to user's particular components, computer systems, or workloads. The results do not necessarily represent other performance benchmarks, and other performance benchmark results may be more or less inhibited

Test Results: The test results are shown in Figure 2. It shows that in the Sysbench test, the response time of the Intel® Xeon® Scalable processor is about 30% lower than that of the Intel® Xeon® E5-2600 v3 processor. With the Intel® SSD DC P4600 series, WinHong hyper-converged appliance delivers exceptional performance and easily hosts hundreds of virtual machines to meet the high-speed data processing need of key services. In the case for actual deployment of a financial client, the upgraded WinHong hyper-converged appliance proves its ability to greatly shorten the R&D compilation and deployment time and significantly improve the client's R&D efficiency.

Significantly Improved Storage Performance

With a view to verify the storage capacity promotion of the upgraded hyper-converged appliance, WinHong has also conducted tests on the IOPS performance of test software for different number of virtual machines and node operation FIO benchmark under the 8K random write and 8K random read scenarios in the two configurations. The test results are shown in Figure 3.

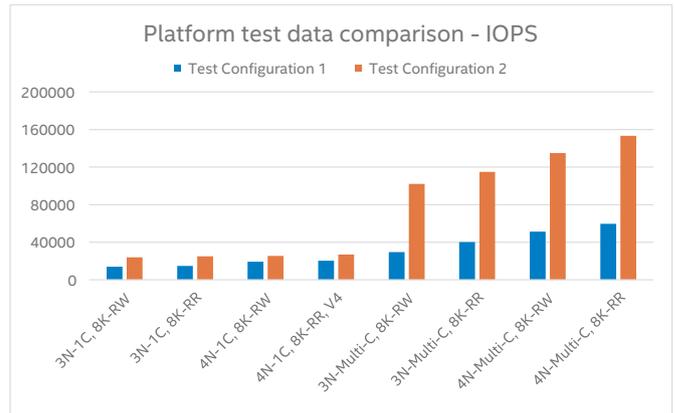


Figure 3. Random Write and Read Test

Note: As more tests are conducted, the performance benchmark results may be modified. The results depend on the particular platform configuration and workload used in the test, and may not be applicable to user's particular components, computer systems, or workloads. The results do not necessarily represent other performance benchmarks, and other performance benchmark results may be more or less inhibited

Test Conclusion: Intel® Xeon® Scalable Processor + Intel® SSD DC P4600 Series Product vs. Intel® Xeon® E5-2600 v3 Processor + Intel® SSD DC S4500: the 8K random read and write performance of hyper-converged cluster under overall performance with four nodes at the multiple concurrent accesses enjoys improvement of about 2.5 times, On one hand, it relies on the excellent features of the NVMe protocol-based SSDs, which show extremely high throughput with single access and ultra-low latency; on the other hand, via innovative technologies like deep integration of virtualization and distributed storage and minimization of IO paths, WinHong has greatly optimized its storage performance, enabling it to meet the high requirements of application environment.

After the upgradation, the users in the financial and other industries have also solved the storage performance concerns of the hyper-converged appliance. In a large number of scenarios, the WinHong hyper-converged appliance can exert the storage performance as high as the traditional solution, and meet the demand for data throughput of significant services.

Agile Extension Meets Elastic Scaling Requirements of IT

WinHong hyper-converged appliance fully exerts the advantages of the hyper-converged infrastructure in terms of scalability. The whole system adopts a fully distributed shared-nothing architecture, so the stateless processing architecture ensures that its fulfillment of horizontal linear extension. Furthermore, WinHong hyper-converged appliance supports multi-resource pool management, which enables the number

of hyper-converged nodes to extend indefinitely, and to support the procurement of server devices with different hardware configurations in different periods. This incremental scalability is more refined than other converged alternatives, facilitating the cost reduction via avoiding users' procurement of more infrastructure than that needed.

In a data center resource pool scaling project of a financial market client, WinHong Hyper-converged Solution provides 8 hyper-converged nodes, stores 2 copies, 48TB available capacity and implements data migration functions, realizing the integration of guarantee of business continuity and data reliability with the unified management of the heterogeneous infrastructure and achieving the ultimate goal of cost-effectiveness, stability and reliability that the clients pursue.



Software and workloads involved in the performance tests may have been optimized only on Intel microprocessors. Performance tests like SYSmark* and MobileMark*, are based on specific computer systems, hardware, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance (including the performance of that product when used in combination with other products) tests to assist you in full evaluation of your contemplated procurement. For more information, please visit <http://www.intel.cn/content/www/cn/zh/benchmarks/intel-product-performance.html>

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