Huawei OceanStor Dorado
Ever Fast, Ever Solid,
AI-Powered Storage

Ever Fast Performance with Chip and AI-Powered Architectures

20,000,000 IOPS, 0.1 ms latency

Five intelligent chips for end-to-end acceleration

End-to-end NVMe architecture for the full series, with 5x better latency than SAS all-flash storage

FlashLink® intelligent algorithm for stable performance

Ever Solid Applications with SmartMatrix-Based 5-Layer Reliability Layouts

Tolerates failures of 7 out of 8 controllers

Tolerates failures of 1 out of 2 controller enclosures

Fully-interconnected design at front and back-ends for zero fault impact on hosts

E2E active-active architecture for global resource balancing

Allows up to 3-SSD failures and supports 15 min/TB reconstruction

Gateway-free cloud backup

Efficient O&M with Edge-Cloud AI Synergy

FlashEver: no data migration over 10 years for 3-gen systems

3-layer intelligent management:

365-day capacity trends prediction

60-day performance bottleneck prediction

14-day disk fault prediction

Immediate solutions for 93% of problems

Huawei OceanStor Dorado V6 all-flash storage sets new benchmarks in storage performance and reliability for enterprises' critical services, providing a compelling data service experience. Leveraging Huawei-developed intelligent chips, FlashLink® intelligent algorithms, and full-series end-to-end NVMe architecture, the OceanStor Dorado delivers best-in-class performance of up to 20,000,000 IOPS*, twice that of the next-best player in the industry. Its next-generation hardware platform and fully-interconnected reliable SmartMatrix architecture ensure always-on services, while the AI chips are the first in the industry to deliver storage systems that get more intelligent during the application operations.

Excelling in scenarios such as databases, virtualization, and big data analytics, Huawei OceanStor Dorado all-flash storage is best suited to the carrier, finance, government, manufacturing, and other industries.

Product Features

Ever Fast Performance with Chip and AI-Powered Architectures

In today's rapidly changing world, all-flash storage has become the first choice for many enterprises, whose online business time has changed from 8-hour to 24-hour always-on, and application response time from quasi-real time to real-time. By leveraging intelligent chips, end-to-end NVMe architecture, FlashLink® algorithms, and powerful scalability to a maximum of 32 controllers, the OceanStor Dorado all-flash storage delivers the performance of up to 20,000,000 IOPS* (twice that of the next-best player) and a latency of just 0.1 ms. OceanStor Dorado is the perfect partner for enterprises who want to quickly step into the all-flash storage era.

• Intelligent chips:

Huawei all-flash storage uses five built-in intelligent chips for end-to-end application acceleration, providing performance 2x higher than the next-best player.

√ The intelligent multi-protocol interface chip hosts the protocol parsing previously performed by the general-purpose CPU, expediting the front-end access performance by 20%.

√ The intelligent Kunpeng 920 chip sets a new benchmark in processor performance, and its computing power is 25% better than the industry average.

√ The intelligent AI chip actively analyzes and understands the I/O rules of multiple application models based on machine learning frameworks to implement intelligent prefetching of memory resources. This improves the read cache hit ratio by 50%.

√ The intelligent SSD controller chip hosts the core Flash Translation Layer (FTL) algorithm, accelerating data access within SSDs and delivering a 50% lower write latency.

√ The intelligent BMC management chip has a built-in Huawei storage fault library, which speeds up component fault location and diagnosis, and shortens the fault recovery time from 2 hours to 10 minutes.

| SSD controller chip | CPU chip | AI chip | Network chip | BMC chip |

• Intelligent algorithms:

Most flash vendors lack end-to-end self-development capabilities to fully utilize SSD performance. Huawei OceanStor Dorado all-flash storage develops the industry-leading FlashLink® intelligent algorithms based on self-developed controllers, chips, and operating systems. First, the FlashLink® can empower intelligent chips and other key components.

FlashLink®

Controller with 5 chips

Smart SSD enclosure

SSD

√ Many-core balancing algorithm: Fully unleashes the power of the Kunpeng 920 chip in a controller to deliver compelling computing power.

√ Service splitting algorithm: Offloads reconstruction services from the controller enclosure to the smart SSD enclosure with the built-in Kunpeng 920 chip, easing load pressure for the controller enclosures.

√ Cache acceleration algorithm: Speeds up batch processing with the intelligent AI chip to make storage systems more intelligent over the course of application operations. Second, the FlashLink® also coordinates data layout between SSDs and controllers.

√ Large-block sequential write algorithm: Aggregates multiple discrete data blocks into a unified big data block for disk flushing, reducing write amplification and ensuring stable performance.

√ Independent metadata separation algorithm: Effectively controls the performance compromise caused by garbage collection for stable performance.

√ I/O priority adjustment algorithm: Ensures that read and write I/Os are always prioritized, shortening the access latency.

FlashLink® intelligent algorithms give full play to all flash memory and help Huawei OceanStor Dorado achieve unparalleled performance or a smoother service experience.

• End-to-end NVMe architecture for the full series:

All-flash storage has been widely adopted to upgrade existing IT systems for enterprises, but always-on service models continue to push IT system performance boundaries to a new level. Existing SAS-based all-flash storage cannot break the bottleneck of 0.5 ms latency. NVMe all-flash storage, on the other hand, is a future-proof architecture. It implements direct communication between the CPU and SSDs, shortening the transmission path.

Huawei OceanStor Dorado
All-Flash Storage Systems

16G FC/10GE

CPU

SCSI

INTERPOSER

SAS

562μs

SAS AFA
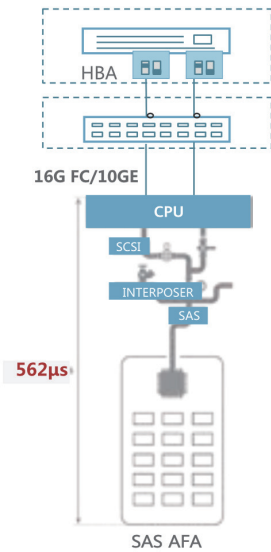
In addition, the quantity of concurrencies is increased by 65,536 times, and the protocol interaction is reduced from four times to two, which doubles the write request processing. Huawei is a pioneer in adopting end-to-end NVMe architecture across the entire series. OceanStor Dorado all-flash storage uses the industry-leading 32G FC/100GE NVMe protocols at the front end, PCIe 4.0 protocol inside, and 100GE RoCE protocol at the back end for end-to-end data acceleration. This enables latency as low as 0.1 ms and 5x faster transmission than SAS all-flash storage.

Ever Solid Applications with SmartMatrix-Based 5-Layer Reliability Layouts

For the sustainable development, finance, manufacturing, carrier, and other industries are vigorously promoting service system upgrades toward intelligent application platforms, the likely result of which will be the diversification of services and data types that will redefine IT architecture. Huawei OceanStor Dorado all-flash storage is the perfect choice for Chief Technology Officers (CTOs) who need robust IT systems that can consolidate multiple types of services and ensure ongoing service stability. It ensures end-to-end reliability at all levels, from component, architecture, product, solution, all the way to cloud, supporting data consolidation scenarios with 99.99999% service availability.

Benchmark-Setting Reliability

SSD

• **SSDs:** Reliability has always been a top concern in the development of SSDs, and Huawei SSDs are a prime example of this. Leveraging global wear-leveling technology, Huawei SSDs can balance their loads for a longer lifespan of each SSD. In addition, Huawei's patented anti-wear leveling technology prevents simultaneous multi-SSD failures and improves the reliability of the entire system.
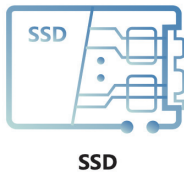
• **Architecture:** The most reliable SmartMatrix architecture is based on full front and back-end interconnection and intelligent multi-protocol interface chips of Huawei OceanStor Dorado. The industry's first fully-interconnected design at both front and back-ends allows the architecture to tolerate failures of up to seven out of eight controllers and of one out of two controller enclosures without services being disrupted, setting a new standard for storage reliability. The front-end interface modules are connected to four controllers simultaneously, which achieves switchover in seconds and uninterrupted host links in the event of a controller failure, and ensures upper-layer services remain unaffected. The storage architecture leverages a fully symmetric active-active controller design. LUNs can access application servers through any controller, instead of just a single controller. Multiple controllers share workload pressure using the load balancing algorithm. If a controller fails, other controllers take over services smoothly without any service interruption.

SmartMatrix
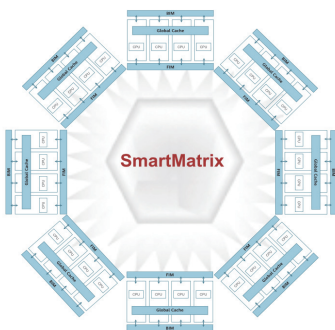
• **Products:** Product design is a systematic process. A stable storage system that hosts key enterprise applications should be systematically thought out from both a hardware and software perspective before its market launch. The hardware uses a fully redundant architecture and supports dual-port NVMe and hot swap, preventing single points of failure. The breakthrough 9.5 mm palm-sized SSDs and biplanar orthogonal backplane design improve the capacity density by 44% and heat dissipation capability by 25%, ensuring stable operations of 2U 36-slot SSD enclosures. The smart SSD enclosure is the first ever with built-in Kunpeng 920 chips that help offload reconstruction services from the controller to the smart SSD enclosure.

Backed up by RAID-TP technology, the smart SSD enclosure can tolerate simultaneous failures of three SSDs and reconstruct 1 TB of data within 15 minutes. In addition, the storage system offers comprehensive enterprise-grade features and compelling highlights, such as 3-second periodic snapshots, setting a new standard for storage product reliability.

HyperMetro
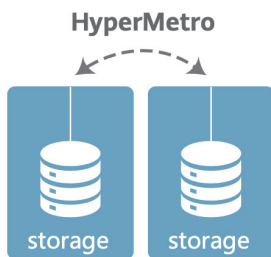
• **Gateway-free active-active solution:** Flash storage is designed for enterprise applications that require zero data loss or zero application interruption. An active-active solution is the ideal choice in such scenarios. The OceanStor Dorado applies a gateway-free active-active solution to reduce node failure, simplify deployment, and improve system reliability. In addition, the active-active solution implements active-active mirroring for load balancing and cross-site takeover without service interruption, ensuring that core applications are not affected by system breakdown. The active-active solution can also be smoothly upgraded to the Disaster Recovery (DR) solution in geo-redundant mode, providing high-level data protection.

• **Gateway-free cloud backup:** Traditional backup solutions are slow, expensive, and the backup data cannot be directly used. OceanStor Dorado all-flash storage provides a Converged Data Management (CDM) solution. It improves the backup frequency 30-fold based on the industry-leading 10-second backup interval technology, and allows backup copies to be directly used for development and testing. The DR and backup are integrated in the storage array, slashing TCO of DR construction by 50%. Working with HUAWEI CLOUD and Huawei jointly-operated clouds, the solution achieves gateway-free DR and DR in minutes on the cloud.

Efficient O&M with Edge-Cloud AI Synergy

IT systems are designed to keep improving enterprises' efficiency, and this mission is more critical than ever in this intelligent era. Based on AI chips and AI algorithms, OceanStor Dorado all-flash storage implements intelligent O&M throughout the entire lifecycle. The innovative business model avoids service interruption caused by data migration, providing a smoother user experience.


• **Edge-cloud synergy:**
General-purpose cloud AI, customized edge AI, and the built-in Ascend 310 intelligent chip are used for incremental training and deep learning of service characteristics, delivering a more personalized customer experience. The eService intelligent O&M management platform collects and analyzes 190,000+ device patterns on the live network in real time, extracts general rules, and enhances basic O&M.

• **AI throughout service lifecycle:**
Intelligent management from resource planning to provisioning, system tuning, risk prediction, and fault location enables 365-day prediction of capacity trends, 14-day prediction of disk faults, and offers immediate solutions for 93% of problems detected.

• **Flash Ever program:**
The intelligent flexible architecture implements component-based upgrades without the need for data migration within a period of 10 years. Users can enjoy latest-generation software and hardware capabilities while also making the most of their existing investments.
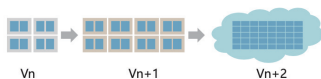
Technical Specifications

Model	OceanStor Dorado 3000 V6	OceanStor Dorado 5000 V6	OceanStor Dorado 6000 V6	OceanStor Dorado 8000 V6	OceanStor Dorado 18000 V6
Hardware Specifications					
Maximum Number of Controllers	16*				32*
Maximum Cache (Dual Controllers, Expanding with the Number of Controllers)	192 GB – 1,536 GB	256 GB – 4 TB	1 TB – 8 TB	512 GB – 16 TB	512 GB – 32 TB
Supported Storage Protocols	FC, iSCSI, NFS, CIFS				
Front-End Port Types	8/16/32 Gbit/s FC/FC-NVMe*, 10/25/40/100 Gbit/s Ethernet,25/100 G NVMe over RoCE*				
Back-End Port Types	SAS 3.0	100G RDMA/SAS 3.0			
Maximum Number of Hot-Swappable I/O Modules per Controller Enclosure	6	12	12	28	28
Maximum Number of Front-End Ports per Controller Enclosure	40	48	56	104	104
Maximum Number of SSDs	1,200	1,600	2,400	3,200	6,400
Supported SSDs	960 GB/1.92 TB/3.84 TB/7.68 TB/15.36 TB/30.72 TB* SAS SSD	1.92 TB/3.84 TB/7.68 TB/15.36 TB palm-sized NVMe SSD 960 GB/1.92 TB/3.84 TB/7.68 TB/15.36 TB/30.72 TB* SAS SSD			
Supported SCM*	800 GB* SCM				
Software Specifications					
Supported RAID Levels	RAID 5, RAID 6, RAID 10*, and RAID-TP (tolerates simultaneous failures of 3 SSDs)				
Number of LUNs	8,192	16,384	32,768	65,536	65,536
Value-Added Features	SmartDedupe (intelligent inline deduplication) SmartVirtualization (intelligent heterogeneous virtualization) SmartMatrix (intelligent fully-interconnected architecture) HyperMetro (active-active between storage arrays) HyperReplication (remote replication)	SmartCompression (intelligent inline compression) SmartMigration (intelligent LUN migration) HyperSnap (snapshot) HyperMetro-Inner (active-active within storage arrays) CloudBackup (cloud backup)*	SmartThin (intelligent thin provisioning) SmartQoS (intelligent service quality control) HyperCDP (continuous data protection) HyperClone (clone) SmartCache (Intelligent SCM Caching) * SmartTier (Intelligent Data Tiering) * SmartMulti-Tenant(Intelligent multi-tenant)* SmartQuota(Quota Management)*		
Storage Management Software	DeviceManager (device management)	UltraPath (multi-path management)	eService (remote maintenance and management)		
Physical Specifications					
Power Supply	Controller enclosure/Smart SAS SSD enclosure/Smart NVMe SSD enclosure: 200V–240V AC±10%, 192V–288V DC SAS SSD enclosure: 100V–240V AC±10%, 192V–288V DC				Bay: 200V–240V AC±10%, 346V–415V AC±10% 192V–288V DC

Model	OceanStor Dorado 3000 V6	OceanStor Dorado 5000 V6	OceanStor Dorado 6000 V6	OceanStor Dorado 8000 V6	OceanStor Dorado 18000 V6
Dimensions (H x W x D)	Controller enclosure: 86.1 mm x 447 mm x 520 mm	SAS controller enclosure: 86.1 mm x 447 mm x 820 mm NVMe controller enclosure: 86.1 mm x 447 mm x 920 mm		Controller enclosure: 175 mm x 447 mm x 865 mm	Bay: 2,000 mm x 600 mm x 1,200 mm
	SAS SSD enclosure: 86.1 mm x 447 mm x 440 mm	SAS SSD enclosure: 86.1 mm x 447 mm x 440 mm Smart SAS SSD enclosure: 86.1 mm x 447 mm x 520 mm Smart NVMe SSD enclosure: 86.1 mm x 447 mm x 620 mm			
Weight	Controller enclosure: ≤ 35 kg SAS SSD enclosure: ≤ 20 kg	Controller enclosure: ≤ 50 kg SAS SSD enclosure: ≤ 20 kg Smart SAS SSD enclosure: ≤ 30 kg Smart NVMe SSD enclosure: ≤ 35 kg		Controller enclosure: ≤ 97 kg SAS SSD enclosure: ≤ 20 kg Smart SAS SSD enclosure: ≤ 30 kg Smart NVMe SSD enclosure: ≤ 35 kg	System bay: ≤ 700 kg Disk bay: ≤ 600 kg
Operating Temperature	5ºC to 40ºC (altitude: < 1,800 m), 5ºC to 35ºC (altitude: 1,800 m to 3,000 m)				
Operating Humidity (Relative Humidity)	5% RH to 95% RH				

*For projects requiring any specification marked with an asterisk (*), please contact Huawei sales.

For more information about Huawei storage, please contact your local representative office or visit Huawei's official website http://e.huawei.com.

HUAWEI Enterprise Business Official APP

Huawei IT Products and Solutions