Huawei OceanStor Dorado V6 All-Flash Storage

OceanStor Dorado V6

Huawei OceanStor Dorado V6 is an all-flash storage system designed for enterprises' mission-critical services. By leveraging the new-generation hardware platform, reliable SmartMatrix architecture, 6 intelligent chips, and FlashLink intelligent algorithm, the OceanStor Dorado is the first full series that supports end-to-end NVMe architecture, delivering the industry-leading performance (20 million IOPS*) and reliability (no service interruption, fault detection without affecting services, and no waits for upgrades) Customized intelligent device training and eService platform achieve intelligent lifecycle management from resource provisioning to fault locating. The Dorado V6 supports intelligent and elastic architecture to implement modular upgrades and free of data migration within three-generation systems to build an industry-leading intelligent O&M system.

Huawei OceanStor Dorado V6 all-flash storage system satisfies the data storage requirements of large databases like OLTP/OLAP, virtualization, and edge computing applications. While excelling in a variety of scenarios, the Dorado V6 is best suited for carrier, finance, government, energy, and manufacturing sectors to

Product Features

Redefining Performance Benchmark

Enterprises are finding precise decision-making more and more challenging in the face of today's rapidly changing world. They are in urgent need of high-performance IT infrastructures to support quick analytics of numerous data sets and extraction of valuable information. Huawei OceanStor Dorado V6 uses the intelligent chips, end-to-end NVMe architecture, FlashLink® intelligent algorithm, and 32 controllers with powerful scalability to expedite enterprises' transformation towards an all-flash era. This achieves 20,000,000 IOPS of best-in-class performance and 0.2 ms of latency, 2x better than the competition.

- **Intelligent chips:** Huawei uses 6 intelligent chips to implement end-to-end data acceleration. The intelligent multi-protocol interface chip supports the industry-leading 32G FC and 100GE front-end NVMe protocols. This industry-leading interface combines with protocol parsing that helps accelerate the front-end access speed by 20%. The intelligent processor chip uses the ARM-based CPU with industry's highest performance. Its computing power is 25% higher than the next-best. Based on machine learning frameworks, the intelligent AI chip actively analyzes and understands I/O rules of multiple application models, implements intelligent prefetch of memory space, improves the read cache hit ratio by 50%, and shortens the batch processing latency from 300μs to 150μs. The intelligent SSD controller chip hosts the core Flash Translation Layer (FTL) algorithm that accelerates data access within SSDs at an 80 μs read latency — the shortest in the industry. The intelligent disk enclosure chip implements service allocation, and the disk enclosure processes some tasks that are typically conducted by controller enclosures, which raises overall performance by 20%. The intelligent BMC management chip implements comprehensive manages CPU, memory, and PCIe modules, accelerating fault diagnosis to slash fault recovery time from 2 hours to 10 minutes.

- **End-to-end NVMe architecture for full series:** Compared with SAS, NVMe brings far faster performance to an all-flash storage architecture. In fact, NVMe is the fastest in the storage field. It implements direct communications between CPUs and SSDs and shortens transmission paths. The NVMe architecture also

increases the number of concurrencies by more than 65,536 times, while reducing the number of protocol interactions from four to two. That doubles the write request processing efficiency. Huawei is a pioneer in adopting the end-to-end NVMe architecture for full series to achieve NVMe commercial use in all-flash storage. The end-to-end latency of NVMe all-flash storage is 80% (100 μs) lower than that of SAS all-flash storage.

- **Intelligent algorithms:** Most all-flash storage products in the industry are optimized based on traditional storage systems and cannot take full advantage of SSD capabilities. Huawei OceanStor Dorado V6 incorporates FlashLink® intelligent algorithms to empower intelligent chips and other key components. FlashLink adjusts the data layout between SSDs and controllers for efficiency and consistently low latency. Dynamic I/O priority adjustment ensures fast responses to read and write I/Os. In addition, a load dispatching algorithm seamlessly works with an intelligent disk enclosure chip to take over loads such as data reconstruction from the controller enclosure, thereby relieving the controller enclosure for more urgent tasks. Capable of an extremely low latency of mere 0.2 ms, FlashLink fulfills the most demanding of requirements of latency-thirst scenarios.

- **Linear performance and capacity expansion:** Future business growth requires a predictable, scalable, and powerful storage infrastructure. The scale-out architecture of the OceanStor Dorado V6 supports linear expansion to 32 controllers and 20,000,000 IOPS*, ready to meet the needs of enterprise growth at any time.

- **Redefine Reliability Benchmark:** In a cloud environment, flash technologies must support explosive growth in data volume and increased demand for data reliability. The OceanStor Dorado V6 ensures reliability at levels ranging from components and products to cloud layers. Satisfying the most-strict enterprise-class reliability requirements, the OceanStor Dorado V6 achieves 99.9999% availability for mission-critical applications.

- **World's most-reliable SSD:** As the storage medium, SSD focuses on the reliability that is key for users. Huawei SSDs leverage global wear-leveling technology to balance SSD loads and extend the life of flash components. In addition, Huawei's patented anti-wear leveling technology prevents multi-SSD failures and improves the reliability of the entire system. With the Mean Time Between Failures (MTBF) of 3 million hours, Huawei SSDs outperform those of other vendors by 20%.

- **World's most-reliable storage system:** Empowered by an intelligent balancing algorithm and a self-developed convergent network chip, the SmartMatrix architecture tolerates the collective failure of seven controllers (out of eight) across engines without causing service interruption, a capability that no other vendors can provide. In the event that a controller becomes faulty, services are switched to functioning ones within one second in an application-unaware manner. Component-based upgrades can be completed online in one second without service awareness. The OceanStor Dorado V6 adopts a fully redundant architecture. It supports dual-port NVMe and hot swaps to prevent Single Points of Failure (SPOFs). In terms of hardware, the OceanStor Dorado V6 is the first storage system in China to pass the intensity-9 earthquake resistance test by the China Telecommunication Technology Labs (CTTL). High-end models are shipped wholly in cabinets — a measure that ensures transportation stability and ease of onsite deployment. The OceanStor

Dorado V6 also boasts many software features that help maintain reliability. For example, the RAID-TP technology allows the simultaneous failure of any three disks without interrupting services, which is another industry-leading figure. The OceanStor Dorado V6 can recover data at a rate of 1 TB per 30 minutes. As the capacity of disks getting larger, customers are worried about data loss and long data reconstruction. The OceanStor Dorado V6 removes customers' worries and allow them to enjoy the benefits of footprint reduction.

- **Industry-leading gateway-free active-active solution**: Flash storage is designed for mission-critical applications that cannot tolerate loss or interruption. Therefore, an active-active solution is the ideal choice. The OceanStor Dorado V6 uses a gateway-free active-active solution to simplify deployment and improve system reliability. This solution also supports performance by balancing the load between active-active mirrors and permits non-disruptive cross-site takeover. The system supports two physical quorum servers to prevent single points of failure. The active-active option allows smooth upgrades to a 3DC solution without gateways, ensuring 99.9999% availability and protecting core applications. More important, thanks to the high-performance flash storage products, the Dorado-based gateway-free active-active solution achieves superior performance at 1 ms latency and ensures fast and stable core applications.
- **Converged Data Management (CDM) solution**: Traditional backup solutions are slow and expensive. Because the backup data cannot be directly used, working with massively big data sets is difficult. The OceanStor Dorado V6 provides a CDM solution that enables efficient storage protection in multi-cloud environments such as HUAWEI CLOUD and Huawei jointly-operated clouds. The solution utilizes fast snapshot technology to achieve industry-leading 10-second backup intervals and improve the backup frequency by 30 times. Disaster Recovery (DR) and backup integration is implemented in the storage array, which means that backup copies can be directly used for development and testing. This feature alone can reduce the Total Cost of Ownership (TCO) by 50%. The OceanStor Dorado V6 implements gateway-free DR and cloud recovery in minutes*.

Redefine Intelligent O&M Benchmark

IT systems are designed to keep improving enterprises' efficiency and this mission is more critical than ever in this intelligent era. With the transition to a flash-oriented architecture, enterprises can boost IT efficiencies to increase profits while achieving intelligent O&M and delivering optimal user experience.

- **On- and off-premises synergy**: Cloud general-purpose AI, edge customized AI, and built-in Ascent 310 chips are used for incremental training and deep learning of service characteristics, enhancing personalized customer experience.
- **AI throughout service lifecycle**: Intelligent management from resource provisioning to fault location predicts performance and capacity trends 60 days in advance, discovers disk faults 14 days before they occur, and offers immediate solutions for 93% of problems located.
- **Flash Ever program**: The intelligent elastic architecture implements modular upgrades without the need for data migration. Users can enjoy latest-generation software and hardware capabilities, while protecting their investments.

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Technical Specifications

Model	OceanStor Dorado3000 V6	OceanStor Dorado5000 V6	OceanStor Dorado6000 V6	OceanStor Dorado8000 V6	OceanStor Dorado18000 V6
Hardware Specifications					
Maximum Number of Controllers	16*				32*
CPU (Each Controller)	1* Kunpeng920 24 cores 2.6GHz	1* Kunpeng920 64 cores 2.6GHz	2* Kunpeng920 48 cores 2.6GHz	4* Kunpeng920 48 cores 2.6GHz	4* Kunpeng920 48 cores 2.6GHz
Maximum Cache (Dual Controllers, Expanding with the Number of Controllers)	192 GB to 1536 GB (DDR4, ECC)	256 GB to 4 TB (DDR4, ECC)	1 TB to 16 TB (DDR4, ECC)	512 GB to 16 TB (DDR4, ECC)	512 GB to 32 TB (DDR4, ECC)
Supported Interface Protocols	FC, iSCSI				
Management Interface	GE				
Front-End Port Types	8/16/32 Gbit/s FC, 1/10/25/40/100GE	8/16/32 Gbit/s FC, 1/10/25/40/100GE			
Back-End Port Types	SAS 3.0 (12c)	SAS 3.0 (12 Gbit/s)/RDMA (100 Gbit/s)			
Maximum Number of SSDs	1200	1,600	2,400	3,200	6,400
Maximum Effective Capacity	4000TB	8192TB	16384TB	16384TB	32768TB
System bus bandwidth	80 Gbit/s	200 Gbit/s	200 Gbit/s	400 Gbit/s	400 Gbit/s
Supported SSDs	960 GB / 1.92 TB / 3.84 TB / 7.68 TB / 15.36 TB / 30.72TB SAS SSDs (TLC)	1.92 TB / 3.84 TB / 7.68 TB / 15.36 TB PALM NVMe SSDs (TLC) 960 GB / 1.92 TB / 3.84 TB / 7.68 TB / 15.36 TB / 30.72TB SAS SSDs (TLC)			
Software Specifications					
Supported RAID Levels	RAID 5, RAID 6, RAID 10*, and RAID-TP (tolerating the simultaneous failure of 3 SSDs)				
Maximum Number of Hosts	4,096	8,192			
Maximum Number of LUNs	8,192	16,384	32,768	65,536	
Value-Added Features	SmartDedupe (Intelligent inline&global deduplication) SmartThin (intelligent thin provisioning) SmartMigration (intelligent LUN migration) HyperSnap (snapshot) HyperCopy (LUN copy) HyperMetro (gateway-free active-active solution) CloudReplication (remote replication)	SmartCompression (intelligent inline&global compression) SmartVirtualization (intelligent heterogeneous virtualization) SmartQoS (intelligent QoS control) HyperClone (LUN clone) HyperReplication (remote replication) HyperCDP (continuous data protection) CloudBackup (backup and recovery between cloud and local data centers)			
Storage Management Software	DeviceManager (device management) UltraPath (multi-path management) eService (remote maintenance and management)				
Operating System Compatibility	AIX, HP-UX, Solaris, Linux, Windows				
Supported Virtualization Environment Software	Virtualization platforms: Huawei FusionSphere, VMware, XenServer, and Hyper-V Value-added features: VMware VAAI, VASA, SRM, VVOL, and Hyper-V Integration: VMware vSphere and vCenter				
Physical Specifications					

Power Supply	AC: 100 V to 240 V DC: 192 V to 288 V	AC: 100 V to 240 V DC: 192 V to 288 V	AC: 200 V to 240 V DC: 192 V to 288 V	AC: 200 V to 240 V DC: 192 V to 288 V	AC: 200 V to 240 V DC: 192 V to 288 V
Dimensions (H x W x D)	Controller enclosure: 86.1 mm x 447 mm x 748 mm Disk enclosure: 86.1 mm x 447 mm x 440 mm	Controller enclosure: 86.1 mm x 447 mm x 920 mm Disk enclosure: 86.1 mm x 447 mm x 620 mm	Controller enclosure: 86.1 mm x 447 mm x 920 mm1 Disk enclosure: 86.1 mm x 447 mm x 620 mm	Controller enclosure: 175 mm x 447 mm x 865 mm Disk enclosure: 86.1 mm x 447 mm x 620 mm	Controller enclosure: 175 mm x 447 mm x 865 mm Disk enclosure: 86.1 mm x 447 mm x 620 mm
Weight	Controller enclosure: ≤ 40 kg Disk enclosure: ≤ 21.3 kg	Controller enclosure: ≤ 50 kg Disk enclosure: ≤ 21.3 kg	Controller enclosure: ≤ 50 kg Disk enclosure: ≤ 21.3 kg	Controller enclosure: ≤ 99.5 kg Disk enclosure: ≤ 21.3 kg	Controller enclosure: ≤ 99.5 kg Disk enclosure: ≤ 21.3 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 (non-condensing)				

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