- Efficient Processing for Diverse Data
- Everlasting Operations for Workloads
- Economical Storage for Mass Data

Huawei OceanStor Pacific is an intelligent scale-out storage series designed to support the business needs of today and tomorrow. It features a wide range of storage systems that provide the high performance of traditional parallel storage and meet the needs of mission-critical and emerging workloads.

Product Overview

◄ Performance model

- OceanStor Pacific 9950 is a high-density, all-flash storage product that offers outstanding performance, capacity, and scalability. Each 5 U chassis houses a maximum of 8 storage nodes using all NVMe SSDs. Each chassis provides a raw capacity ranging from 128 TB to 614.4 TB, a bandwidth of up to 160 GB/s, and 6.4 million IOPS for data access performance. It is the perfect choice for mass unstructured data storage[1].

- OceanStor Pacific 9920 is an all-flash (SSD) scale-out storage product with each 2 U chassis housing 1 storage node. It delivers excellent performance and features flexible component configurations to meet the access requirements of various structured[2] and unstructured workloads. Each block storage node can provide a data access performance of up to 230,000 IOPS at a consistent latency of 1 ms.

◄ Balanced model

- OceanStor Pacific 9550 is a hybrid storage product that features ultra-high density and large capacity to deliver optimal cost-effectiveness. Each 5 U chassis houses 2 storage nodes and uses large-capacity HDDs as main storage. Each chassis provides a raw capacity ranging from 720 TB to 2,160 TB, reducing cabinet space consumption by 62.5% compared to general-purpose storage servers. It is suitable for mass unstructured data storage and can work with OceanStor Pacific 9950 to form a tiered data storage solution.

- OceanStor Pacific 9540 is a large-capacity hybrid scale-out storage product. Each 4 U chassis accommodates 1 storage node. It enables high capacity density and flexible component configurations to fulfill the access requirements of a wide range of structured and unstructured workloads.

- OceanStor Pacific 9520 is a hybrid scale-out storage product with each 2 U chassis housing 1 storage node. It provides flexible component configurations to meet the access requirements of various structured and unstructured workloads.

◄ Archive model

- OceanStor Pacific 9350 is a hybrid storage product that features ultra-high density and large capacity to deliver optimal cost-effectiveness. Each 5 U chassis houses 2 storage nodes and uses large-capacity HDDs as main storage. Each chassis provides a

Note: 1. Unstructured data storage includes scale-out file, object, and HDFS storage. 2. Structured data storage includes scale-out block storage.

raw capacity ranging from 720 TB to 2,160 TB, reducing cabinet space consumption by 62.5% compared to general-purpose storage servers. It is suitable for scenarios that only store massive amounts of video stream data.

- OceanStor Pacific 9340 is a hybrid scale-out storage product with each 4 U chassis housing 1 storage node. It provides high capacity density and flexible component configurations to store both video and image stream data.

The OceanStor Pacific series uses storage system software to integrate local storage resources from hardware nodes into a fully scale-out storage pool. It provides upper-layer applications with file, HDFS, and object storage services, or block storage services. Its diverse and adaptable features provide efficient processing for diverse data, everlasting operations for workloads, and economical storage for mass data.

- File storage is compatible with native NFS and SMB protocols, as well as parallel interfaces like POSIX and MPI-IO. It provides native seamless multi-protocol interworking, high-speed cache acceleration, and unique scenario-specific secondary data compression capabilities, making it perfect for high-performance computing (HPC) and other performance-intensive scenarios.

- HDFS storage provides a decoupled storage-compute big data solution using native HDFS semantics. It does not require plug-ins to be installed on compute nodes. Its intelligent storage tiering and takeover of multiple HDFS clusters reduce the total cost of ownership (TCO) while offering a consistent user experience.

- Object storage is compatible with Amazon S3. It provides HyperGeoEC- (cross-site erasure coding) and HyperGeoMetro-based (multiple active sites with flexible configuration of copies) disaster recovery solutions. Combined with its excellent small object processing performance, object storage is suitable for scenarios such as backup and archiving of mass data and content resource pools.

- Block storage allows for SCSI or iSCSI access modes, and delivers high availability (HA) solutions such as scale-out active-active and cabinet-level redundancy. Working with a variety of data encryption algorithms, block storage is most suitable for scenarios such as virtualization/cloud resource pools and databases.

Each product and storage service is available for individual or group purchase and on-demand deployment in a storage pool. You can access the same piece of data using multiple protocols, such as file, HDFS, and object storage, without migration, allowing for efficient data access and reducing storage space consumption.

The OceanStor Pacific series has been widely adopted in a variety of scenarios, including HPC, big data analytics,intelligent,applications, intelligent video & image, virtualization, clouds, content repository, backup, and archiving. We provide superior performance for oil & gas exploration, life sciences, financial institutions, carriers, smart city projects, and Internet companies.

Features

◀ Efficient Processing for Diverse Data

The OceanStor Pacific series uses innovative performance acceleration technologies, such as directory DHT partitioning, intelligent disk granularity management, large I/O pass-through, small I/O aggregation, and multi-tier intelligent cache, to meet the access requirements of bandwidth-and OPS-intensive workloads with just one storage system. The new-generation parallel file system can be accessed using either standard protocols such as NFS and SMB or parallel interfaces like POSIX and MPI-IO through Distributed Parallel Client (DPC). DPC can simultaneously connect to multiple storage nodes to implement I/O load balancing. Additionally, it supports Transmission Control Protocol (TCP) or Remote Direct Memory Access (RDMA), achieving higher single-thread and single-client performance. The storage system supports a large-scale compute cluster with a maximum of 5,000 nodes by using DPC.

The OceanStor Pacific series uses computing power provided by high-performance processors to offload some storage functions to the processor layer. It offers 20% more storage computing power compared to products with similar configurations. It adapts to any customer need for I/O, bandwidth, latency, or capacity. The OceanStor Pacific series supercharges the technology of today for the business of tomorrow.

◄◄ Everlasting Operations for Workloads

The OceanStor Pacific series uses E2E reliability assurance at the I/O, system, and data center levels to offer 99.9999% availability for different levels of data protection solutions. Specifically, it supports E2E data integrity checks and self-healing and uses inline verification and periodical background verification to handle silent data corruptions, such as bit changes and incorrect positions of read/write data. This helps ensure high data availability. The powerful elastic EC provides data redundancy protection so that a single storage system can tolerate the simultaneous failure of up to 4 nodes. The OceanStor Pacific series supports dynamic EC. Faulty nodes trigger automatic adjustments to EC ratios without compromising system reliability. Technologies such as multi-module concurrent service takeover enable services on a fault node to be switched over within 10 seconds. The OceanStor Pacific series monitors device status in real-time to provide comprehensive sub-health detection and self-healing for disks, nodes, and networks. It also builds a disaster recovery system using replication or scale-out active-active functions for data center availability. OceanStor Pacific leverages HyperGeoEC- and HyperGeoMetro-based disaster recovery solutions to build an economical, reliable, and efficient object storage foundation.

In addition, the OceanStor Pacific series provides comprehensive data protection solutions to ensure service data security and reliability and keep operations traceable at any time. For example, OceanStor Pacific encrypts data via internal or external key managers, offers multi-field audit logs for multi-level management of operation records, and implements multi-tenancy for resource isolation and mutual interference prevention. It also supports secure boot and digital signature to ensure data is always secure.

◄◄ Economical Storage for Mass Data

The OceanStor Pacific series organizes storage media, including HDDs and SSDs, into large-scale resource pools using scale-out technologies and provides industry-standard interfaces for upper-layer applications and clients. This eliminates typical data center bottlenecks and overcomes obstacles to system performance, such as the unbalanced utilization of hardware resources by silo storage systems. It can start small and scale-out to up to 4,096 nodes in a storage cluster. This allows for linear performance growth as capacity expands, maximizing the initial investment.

The series protects storage through the data redundancy of powerful elastic EC. EC nearly triples the disk space utilization compared to the traditional multi-copy protection, offering a variety of EC ratios for flexible on-demand deployment. An EC ratio of 22+2 and a disk space utilization rate of 91.6% help reduce your hardware investment. It uses primary storage tiering policies to support automatic data migration between high-performance and large-capacity pools, enabling efficient storage and management of hot and cold data.

The OceanStor Pacific series also provides scenario-specific solutions to help you maximize your IT investments. For example, the decoupled storage-compute big data solution significantly improves data analysis efficiency and automatically takes over services from third-party HDFS. The scenario-specific data compression solution optimizes storage space and provides secondary data reduction in genome sequencing, satellite remote sensing, and digital pathology scenarios. This maximizes the return on investment (ROI) and reduces the TCO.

◄◄ Simplified Lifecycle Management

The OceanStor Pacific series provides unified, converged management and intelligent O&M for multiple products and storage services. Intelligent resource prediction identifies the service risks of storage resources in advance. This enables you to make well-informed decisions regarding capacity expansion, procurement, and service adjustments. In addition, intelligent fault location provides comprehensive sub-health detection and processing across the system for precise fault diagnosis and troubleshooting.

Application Scenarios

◄ HPC

The OceanStor Pacific series provides high-performance file storage services for HPC platforms. It supports DPC, which is compatible with POSIX and MPI-IO, to better adapt to HPC services. Automatic storage tiering optimizes storage architecture, and scenario-specific data compression improves storage space utilization to increase both efficiency and cost-effectiveness.

Typical industry scenarios: Oil & gas exploration, genome sequencing, electron cryomicroscopy, weather forecasting, and autonomous driving.

◄ Big data analytics

The OceanStor Pacific series provides a decoupled storage-compute big data solution. This enables on-demand configuration and flexible expansion of storage and compute resources and reduces TCO. It is fully compatible with native HDFS semantics for a consistent user experience and supports the coexistence of coupled and decoupled storage-compute architectures for seamless infrastructure evolution.

Typical industry scenarios: Big data for offline finance analytics, Internet log retention, operational carrier analytics, governments, and smart city projects.

◄ Backup and archiving of mass data

The OceanStor Pacific series object resource pools provide enterprises with high performance and reliability for large throughput, frequent access to hot data, long-term storage, and online access. The OceanStor Pacific series is ideal for real-time online services, such as Internet data, online audiovisual data, and enterprise web disks. Moreover, its HyperGeoMetro-and HyperReplication-based (remote replication) disaster recovery solutions ensure service continuity and data reliability.

Typical industry scenarios: Production, storage, backup, and archiving of document imaging in banks, audio and video recordings, medical imaging, e-documents of governments and enterprises, smart city projects, and the Internet of Vehicles (IoV).

◄ Intelligent Video and Image

The OceanStor Pacific intelligent video and image storage series (OceanStor Pacific 9340, OceanStor Pacific 9350, can interconnect with mainstream streaming media software platforms to provide cost-effective and reliable enterprise-grade file storage. With high-density hardware and performant software, the OceanStor Pacific series helps you accelerate intelligent transformation for your business while also meeting the requirements for storing mass diverse video and image stream data.

Typical industry scenarios: Smart transportation and smart campus projects.

◄ Virtualization/Cloud resource pool

The OceanStor Pacific series provides a storage resource pool to host mass data for on-demand resource provisioning and elastic capacity expansion in virtualization and cloud environments. It dramatically improves storage resource deployment, expansion, and O&M efficiency. The series supports software encryption algorithms such as XTS-AES-128 and XTS-AES-256 and uses the self-encrypting drive (SED) hardware configuration to provide comprehensive data encryption and protection solutions and ensure data security and reliability.

Typical industry scenarios: Channel access clouds for Internet finance, development and testing clouds, carrier cloud services for BOM domains and B2B cloud resource pools, smart governments, and smart city clouds.

Specifications

◀◀ General scenarios: Key specifications of scale-out file, object, and HDFS storage products

Model	OceanStor Pacific 9520	OceanStor Pacific 9540	OceanStor Pacific 9550	OceanStor Pacific 9920	OceanStor Pacific 9950
System Architecture	Fully symmetric scale-out architecture				
Max. Raw Capacity per Chassis	216 TB	648 TB	2,160 TB	92 TB	614.4 TB
Height per Chassis	2 U	4 U	5 U	2 U	5 U
Number of Nodes per Chassis	1	1	2	1	8
Max. Number of Main Storage Disks per Node	12	36	60	12	10
Number of Processors per Node	2 x Huawei Kunpeng 920 processors or 2 x x86 architecture processors	2 x Huawei Kunpeng 920 processors or 2 x x86 architecture processors	1 x Huawei Kunpeng 920 processor	2 x Huawei Kunpeng 920 processors	1 x Huawei Kunpeng 920 processor
Max. Memory per Node	512 GB	512 GB	256 GB	512 GB	256 GB
Max. Cache per Node	4 x NVMe SSDs	4 x NVMe SSDs	4 x Half-palm NVMe SSDs	N/A	N/A
Number of System Disks per Node	2 x 600 GB SAS HDDs or 2 x 480 GB SATA SSDs	2 x 600 GB SAS HDDs or 2 x 480 GB SATA SSDs	2 x 480 GB SATA SSDs	2 x 600 GB SAS HDDs or 2 x 480 GB SATA SSDs	2 x 480 GB SATA SSDs
Data Disk Types	3.5-inch HDDs	3.5-inch HDDs	3.5-inch HDDs	3.5-inch SAS SSDs	Half-palm NVMe SSDs
Front-End Service Networks[1]	• 10GE, 25GE, or 100GE TCP/IP • 25GE or 100GE RoCE • 100 Gb/s EDR InfiniBand	• 10GE, 25GE, or 100GE TCP/IP • 25GE or 100GE RoCE • 100 Gb/s EDR InfiniBand	• 10GE, 25GE, or 100GE TCP/IP • 25GE or 100GE RoCE • 100 Gb/s EDR/HDR InfiniBand	• 10GE, 25GE, or 100GE TCP/IP • 25GE or 100GE RoCE • 100 Gb/s EDR InfiniBand	• 25GE, or 100GE TCP/IP • 25GE or 100GE RoCE • 100 Gb/s EDR/HDR InfiniBand
Storage Interconnection Networks	• 10GE or 25GE TCP/IP • 10GE, 25GE, or 100GE RoCE • 100 Gb/s EDR InfiniBand	• 10GE, 25GE, or 100GE TCP/IP • 10GE, 25GE, or 100GE RoCE • 100 Gb/s EDR InfiniBand	• 25GE or 100GE TCP/IP • 25GE or 100GE RoCE • 100 Gb/s EDR/HDR InfiniBand	• 25GE or 100GE RoCE • 100 Gb/s EDR InfiniBand	100GE RoCE
Data Redundancy Protection Mechanism	EC: N + M (M is 2, 3, or 4), applicable to SSDs or HDDs used as main storage				
Storage Access Protocols	NFS, SMB, POSIX, MPI-IO, HDFS, and Amazon S3				
Key Features	SmartQuota (quotas), SmartTier (storage tiering), SmartQoS (service quality), SmartEqualizer (load balancing), SmartMulti-Tenant (multi-tenancy), SmartEncryption (data encryption), SmartAuditlog (audit logs), HyperLock (WORM), HyperSnap (snapshots), HyperReplication(A) (asynchronous replication), SmartIndexing (metadata indexing), Recycle Bin (recycle bin), SmartInterworking (multi-protocol interworking), DIF (end-to-end data integrity verification), Object Versioning (versioning)[2], SmartTakeover (intelligent takeover)[3], SmartCompression (scenario-specific compression), HyperGeoMetro (multiple active sites)[4], and HyperGeoEC (cross-site EC)[4]				
Data Self-Healing	Automatic concurrent data reconstruction at 2 TB per hour				
Chassis Dimensions (H x W x D)	• Kunpeng model: 86.1 mm x 447 mm x 790 mm • x86 model: 86.1 mm x 447 mm x 748 mm	• Kunpeng model: 175 mm x 447 mm x 790 mm • x86 model: 175 mm x 447 mm x 748 mm	219.5 mm x 447 mm x 1030 mm	86.1 mm x 447 mm x 790 mm	219.5 mm x 447 mm x 926 mm
Max. Weight per Chassis (with Disks)	• Kunpeng model: ≤ 32 kg • x86 model: ≤ 34.1 kg	• Kunpeng model: ≤ 65 kg • x86 model: ≤ 65 kg	≤ 164 kg	≤ 32 kg	≤ 115 kg
Operating Temperature	5°C to 35°C	5°C to 35°C	5°C to 35°C	5°C to 35°C	5°C to 35°C
Operating Humidity	8% to 90% RH (non-condensing)	8% to 90% RH (non-condensing)	5% to 90% RH (non-condensing)	8% to 90% RH (non-condensing)	5% to 90% RH (non-condensing)

◄ Intelligent video and image scenarios: Key specifications of scale-out file and object products

Model	OceanStor Pacific 9340	OceanStor Pacific 9350
System Architecture	Fully symmetric scale-out architecture	
Max. Raw Capacity per Chassis	648 TB	2,160 TB
Height per Chassis	4 U	5 U
Number of Nodes per Chassis	1	2
Max. Number of Main Storage Disks per Node	36	60
Number of Processors per Node	2 x Huawei Kunpeng 920 processors	1 x Huawei Kunpeng 920 processor
Max. Memory per Node	512 GB	256 GB
Max. Cache per Node	4 x NVMe SSDs	4 x Half-palm NVMe SSDs
Number of System Disks per Node	2 x 600 GB SAS HDDs or 2 x 480 GB SATA SSDs	2 x 480 GB SSDs
Data Disk Types	3.5-inch HDDs	3.5-inch HDDs
Front-End Service Networks	• 10/25GE TCP	• 10/25GE TCP
Storage Interconnection Networks	• 10/25GE TCP • 10/25GE RoCE	• 10/25GE TCP • 10/25GE RoCE
Data Redundancy Protection Mechanism	EC: N + M (M is 2, 3, or 4)	
Storage Access Protocols	NFS, SMB, and Amazon S3	
Key Features	SmartQuota (quotas), SmartQoS (service quality), SmartEqualizer (load balancing), SmartMulti-Tenant (multi-tenancy), SmartAuditlog (audit logs), SmartIndexing (metadata indexing), SmartInterworking (multi-protocol interworking), and DIF (end-to-end data integrity verification)	
Data Self-Healing	Automatic concurrent data reconstruction at 2 TB per hour	
Chassis Dimensions (H x W x D)	175 mm x 447 mm x 790 mm	219.5 mm x 447 mm x 1030 mm
Max. Weight per Chassis (with Disks)	≤ 65 kg	≤ 164 kg
Operating Temperature	5°C to 35°C	5°C to 35°C
Operating Humidity	8% to 90% RH (non-condensing)	5% to 90% RH (non-condensing)

◀ # Key specifications of scale-out block storage products

| Model	OceanStor Pacific 9520	OceanStor Pacific 9540	OceanStor Pacific 9920
System Architecture	Fully symmetric scale-out architecture		
Max. Raw Capacity per Chassis	216 TB	648 TB	92 TB
Height per Chassis	2 U	4 U	2 U
Number of Nodes per Chassis	1	1	1
Max. Number of Main Storage Disks per Node	12 or 25	36	12, 22, or 25
Number of Processors per Node	2 x Huawei Kunpeng 920 processors or 2 x x86 architecture processors	2 x Huawei Kunpeng 920 processors or 2 x x86 architecture processors	2 x Huawei Kunpeng 920 processors or 2 x x86 architecture processors
Max. Memory per Node	512 GB, 768 GB, or 1 TB	512 GB, 768 GB, or 1 TB	768 GB or 1 TB
Max. Cache per Node	4 x NVMe SSDs or SAS SSDs	4 x NVMe SSDs or SAS SSDs	N/A
Number of System Disks per Node	2 x 600 GB SAS HDDs or 2 x 480 GB SATA SSDs	2 x 600 GB SAS HDDs or 2 x 480 GB SATA SSDs	2 x 600 GB SAS HDDs or 2 x 480 GB SATA SSDs
Data Disk Types	2.5-inch or 3.5-inch HDDs	3.5-inch HDDs	2.5-inch or 3.5-inch SAS SSDs or NVMe SSDs
Front-End Service Networks	• 10GE or 25GE TCP/IP • 25GE RoCE	• 10GE or 25GE TCP/IP • 25GE RoCE	• 10GE or 25GE TCP/IP • 25GE or 100GE RoCE • 100 Gb/s InfiniBand
Storage Interconnection Networks	• 10GE or 25GE TCP/IP • 25GE RoCE	• 10GE or 25GE TCP/IP • 25GE RoCE	• 10GE or 25GE TCP/IP • 25GE or 100GE RoCE • 100 Gb/s InfiniBand
Data Redundancy Protection Mechanism	• EC: N + M (M is 2, 3, or 4), applicable to SSDs or HDDs used as main storage • Multi-copy: 3-copy mode		
Storage Access Protocols	iSCSI, SCSI, and OpenStack Cinder		
System Security Policies	Disk, node, and cabinet levels		
Key Features	SmartThin (thin provisioning), SmartDedupe & SmartCompression (data reduction), SmartQoS (service quality), SmartAuditlog (audit logs), SmartEncryption (data encryption), HyperSnap (snapshots), HyperClone (linked clone), HyperMetro (scale-out active-active), HyperReplication(A) (asynchronous replication), HyperReplication(S) (synchronous replication), MultiPool (multiple resource pools), and DIF (end-to-end data integrity verification)		
Data Self-Healing	Automatic concurrent data reconstruction at 4 TB per hour		
Deployment Scheme	Decoupled and coupled deployment of compute and storage resources		
Compatible Platforms	Huawei FusionSphere, VMware vSphere, Microsoft Windows Hyper-V, OpenStack, and containers[5]		
Chassis Dimensions (H x W x D)	• Kunpeng model: 86.1 mm x 447 mm x 790 mm • x86 model: Chassis with 3.5-inch disks: 86.1 mm x 447 mm x 748 mm Chassis with 2.5-inch disks: 86.1 mm x 447 mm x 708 mm	• Kunpeng model: 175 mm x 447 mm x 790 mm • x86 model: 175 mm x 447 mm x 748 mm	• Kunpeng model: 86.1 mm x 447 mm x 790 mm • x86 model: Chassis with 3.5-inch disks: 86.1 mm x 447 mm x 748 mm Chassis with 2.5-inch disks: 86.1 mm x 447 mm x 708 mm
Max. Weight per Chassis (with Disks)	• Kunpeng model: ≤ 32 kg • x86 model: ≤ 34.1 kg	• Kunpeng model: ≤ 65 kg • x86 model: ≤ 65 kg	• Kunpeng model: ≤ 32 kg • x86 model: ≤ 24 kg
Operating Temperature	5°C to 35°C	5°C to 35°C	5°C to 35°C
Operating Humidity	8% to 90% RH (non-condensing)	8% to 90% RH (non-condensing)	8% to 90% RH (non-condensing)

Note: 1. NFS, SMB, HDFS, S3, and DPC support TCP, RoCE, and InfiniBand networks.
Block storage allows the front-end service network and storage interconnection network to be of the same network type.
3. SmartTakeover is applicable to HDFS storage. 4. HyperGeoMetro and HyperGeoEC are applicable to Object storage. 5. iSCSI can be used to connect containers.

For More Information

To learn more about Huawei storage, please contact your local Huawei office or visit the Huawei Enterprise website: http://e.huawei.com/en/.

Huawei Enterprise Business App
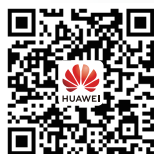
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