Scalable, Large Storage Resource Pool
- Huawei FusionStorage Distributed Storage System

HUAWEI TECHNOLOGIES CO., LTD.

High Performance and Efficient Management of Storage Systems Required for Cloud Computing and Key Enterprise Applications

With the blossoming of the cloud computing era, more than half of x86 servers have implemented virtualization technologies. These technologies help reduce operating expenses (OPEX), improve resource utilization, and allow for more service agility. However, they also create the following challenges for storage systems:

- Compared with a traditional physical server, a single storage system holds more services. Therefore, it must provide robust performance and employ the scale-out architecture to support these services.
- Virtual machines (VMs) are deployed using shared storage, and a single volume may be attached to dozens, or even hundreds of VMs. Therefore, the storage system must be able to manage all applications running on each VM and coordinate resource contention of VMs, ensuring that services are processed based on different service level agreements (SLAs).
- Since VMs have been widely used, efficient storage technologies are necessary to speed up VM deployment, expand capacity, reduce maintenance and expansion costs, and shorten the time necessary for service rollout.
- Key enterprise applications, such as business intelligent (BI) and database applications, demand a storage system delivering high I/O performance and high throughput for improving service efficiency.

Huawei FusionStorage, a High-Performance, Efficient, and Innovative Storage System

After keeping a watchful eye on industry development trends and customers' requirements, Huawei has unveiled the FusionStorage distributed storage system that is installed on generic x86 servers. The FusionStorage system employs distributed hash-based data routing, distributed caching, global load balancing, and multi-data protection technologies to provide high-performance block storage. For that reason, FusionStorage can meet the requirements of key services in a variety of industries, including finance, telecommunications, securities, electricity, and oil. It not only ensures stability and efficiency in the operation of customer services, but also significantly improves service agility and competitiveness.
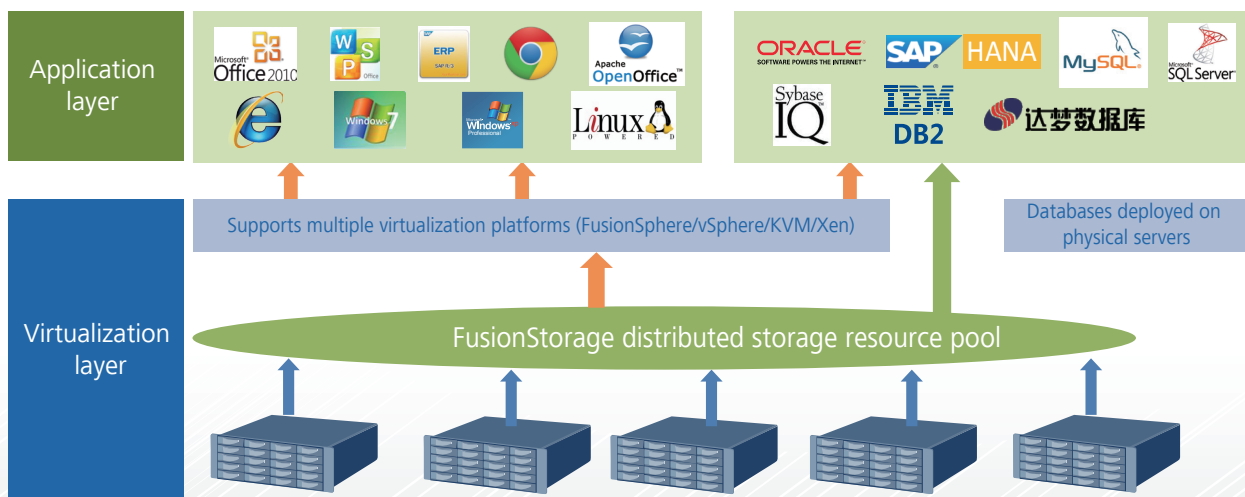
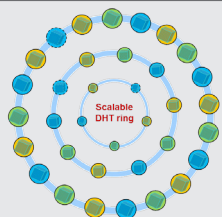Huawei FusionStorage system architecture

Characteristics

High Scalability	The distributed stateless engines of FusionStorage support horizontal capacity expansion, smooth and parallel storage and computing capacity expansion, and non-chimney ultra-large capacity expansion. A maximum of 4096 nodes are supported in the FusionStorage system.
High Performance	FusionStorage is installed on generic x86 servers and relieves the need of dedicated storage hardware, such as fiber channel (FC) network interface cards (NICs) and host bus adapters (HBAs), thereby reducing energy consumption and use of space. In addition, equipped with solid state disks (SSDs), PCIe acceleration cards, and InfiniBand NICs, and backed by its distributed hash-based routing algorithm, I/O parallel processing, and distributed caching technologies, FusionStorage is able to provide tens of millions of IOPS, high throughput, and low latency.
Open	Being compatible with OpenStack and mainstream hypervisors, FusionStorage supports mainstream operating systems (OSs) and database applications, and can be installed on generic servers. These features provide flexibility for customers when using FusionStorage.

Typical Application Scenarios and Benefits

Cloud resource pool

FusionStorage software+rack servers, for constructing a large, scalable cloud storage resource pool.

Benefits

- Large resource pools improve storage resource utilization by 50%.
- Linear capacity expansion allows performance capacity scalability on demand and flexible customers' investment.

Desktop cloud

FusionCube for VDI, a one-stop desktop solution supporting 800 VMs and meeting enterprises' requirements for mobile working and information security.

Benefits

- Distributed engines and the parallel I/O processing mechanism resolve I/O performance-related issues, such as boot storms.
- FusionStorage supports advanced features such as linked cloning and thin provisioning, which significantly improve resource utilization and reduce TCO.

Development and test cloud

enables quick deployment and simplifies management for frequently changing development and test environments.

Benefits

- FusionStorage supports automatic resource discovery, resource addition, and load balancing, allowing customers to adjust resources on demand and simplifying customers' management of resources.
- FusionStorage manages storage resources by application running on VMs, significantly improving management efficiency.

Database applications

FusionCube for Database Infrastructure delivers millions of IOPS, up to 120 GB/s I/O, and only 150 μ s latency.

Benefits

- FusionStorage delivers high performance and eliminates the network and I/O performance bottlenecks that may be confronted by the traditional architecture.
- FusionStorage supports mainstream database applications, such as Oracle, SAP HANA, and IBM DB2, freeing customers from vendor lock-in.

Product Specifications

Item	Specifications
Maximum number of storage nodes in a cluster	4096
Storage type	Block storage
Storage medium	HDD and SSD
Cache	SSD, NVDIMM, and memory (read and write caches)
Data redundancy	Two or three identical data copies
Reliability	Server- or rack-level reliability
Heterogeneous servers	Supported
Storage services	Snapshot and thin provisioning

Global Applications

So far, FusionStorage has been deployed in various countries and regions around the world, covering industries and sectors including governments, public utilities, telecommunications, energy, finance, transportation, health care, education, media, and manufacturing.

Industry	Success Story
Governments and public utilities	Supreme People's Court, Shanxi e-government cloud, Yunnan Judicial Department, Zhuhai Local Taxation Bureau, National Development and Reform Commission of Inner Mongolia, and Shanghai Water Supply Company
Carrier	China Telecom, Zhejiang Branch, China Mobile, Jiangsu Branch, China Telecom, Guangxi Branch, China Mobile, Liaoning Branch, Telefonica, Asia Pacific Telecom
Finance	Hong Kong Infocast, CITIC Trust, Spain BME, China Merchants Bank, and China Life Insurance
Energy	PetroChina, SINOPEC, China Huaneng Group, SINOPEC Guizhou Company, and Shenhua Group
Transportation	Shanghai Pudong International Airport, Guangdong Maritime Safety Administration, Dalian Maritime Safety Administration, and Nanchang Railway Bureau
Others	Shenzhen Media Group, Shanghai Maritime University, The 305 Hospital, and MUJI