Maipu MPS9000G3 Storage Datasheet

Overview

The MPS9000G3 series storage is a new generation of tightly coupled four-controller high-end all-flash storage from Maipu. Combining Maipu's high-end storage architecture technology and the third-generation V4 engine technology, it offers higher reliability than traditional dual-controller storage. It allows that data will not be lost and business will not be interrupted when any three controllers fail simultaneously, ensuring that critical businesses remain continuously online 24 hours a day, 7 days a week. It provides a secure, reliable, high-performance, intelligent and efficient storage platform for the core applications in data centers.



Key Features

Extremely Reliable

- **Highly Reliable Tightly Coupled Four-Controller Architecture:** The MPS9000G3 adopts the third-generation V4 engine technology. It integrates four controllers within one control enclosure. The controllers are interconnected at high speed based on 100GE RDMA, realizing the tightly coupled Active-Active mode among the four controllers. In terms of cache data access, the quadruple cache mirroring technology is employed to achieve real-time synchronization of write cache data within the four controllers, ensuring that the cache data will not be lost when any three controllers fail simultaneously at any time. Regarding hard disk access, an innovative hard disk network switching matrix architecture is adopted. Each controller is interconnected with all disk enclosures through SAS channels/RDMA. Consequently, when any three controllers fail simultaneously, the access to all hard disks will not be affected. It provides ultimate reliability support for users' critical businesses.
- **Fully Redundant Architecture:** The MPS9000G3 adopts a modular, fully redundant architecture design. In the event of a component failure, it enables rapid fault isolation and component replacement, enhancing business continuity.
- **Controller Self-Healing Technology**: When all controllers of the storage engine are abnormal at the same time (crash or software and hardware failure, etc.), the system can quickly and automatically repair, restore the normal operation state, and ensure that the cached data is not lost, and the upper service is not interrupted.
- **Cache Freezing Technology:** When the data cannot be written due to flash failure or failure of the data disk, the data in the cache can be frozen. After the data disk is repaired, the frozen cache data will be distributed to the data disk to ensure that the data is not lost.
- **CRAID Technology:** The unique IDDC+CRAID technology can realize minute-class rapid reconfiguration of partially damaged hard disks. A single RAID group can tolerate the failure of any three hard disks without data loss. Based on the global load technology, IO is distributed to all hard disks, greatly improving IO concurrency and realizing rapid reconfiguration. The reconfiguration time of 1TB data can be shortened to within 30 minutes, and it allows multiple disks of a RAID group to have media failures without data loss. At the same time, combined with the slow power-on technology of the hard disk of the storage system, avoid the risk of current overload and tripping caused by the simultaneous power on of a large number of hard disks, so as to further ensure the high reliability of the system.
- **Data Consistency Protection:** It supports data consistency protection based on T10 PI. In the process of data reading and writing, it ensures the data integrity of the whole path from the host port to the hard disk, prevents silent data errors, and ensures the safety of user data.

Rich Software Functions

MPS9000G3 provides rich advanced software functions, including data snapshot, data replication, data mirroring, symmetric active-active, and other features. Through these features, it realizes data management and protection from online to offline, from local to remote, and easily provides users with multi-level and cross-regional storage solutions.

- **Symmetrical Dual-Active:** Without introducing any third-party software and hardware, directly realize the dual-active operation of two storages through two MPS9000G3 series storage arrays, which are redundant to each other. When one storage fails, the other storage can take over the service in real time, realizing zero RPO and RTO. The dual-active link between devices supports 10/25/100GE Ethernet and 16/32Gb FC.
- **Data Snapshot:** It supports continuous data snapshot function and can create up to 2048 incremental historical time point copies for a single data volume. When data "soft" failures occur, such as data damage, virus damage, accidental deletion caused by software programs, data can be quickly recovered by "rolling back" the appropriate time point mark. This function is especially suitable for continuous data protection of critical services.

- **Data Replication:** It can provide the data replication function of 1:2, continuous hop, 64-to-1 points, support the graphical management interface to customize the remote data transmission time interval, provide users with flexible data replication policies, realize the remote backup of data, and can quickly recover data in case of unexpected disasters, to ensure the services continuity of users. The replication link supports 10/25/100GE Ethernet and 16/32G FC. For the IP link, it can be seamlessly docked with the replication link of the WAN through the replication interface, realizing long-distance data disaster recovery across the WAN without protocol conversion, and effectively reducing the cost of the disaster recovery link.
- **Local Cloning:** The local cloning function can online provide highly available and flexible data copies that are completely consistent with the production volume at a certain time and can continuously protect the data. In case of failure, it can ensure that the data is not lost, and independently provide the cloned volume to the front-end services for use. It is suitable for application scenarios that often analyze or test the generated data.
- **Data Mirroring:** The data mirroring function saves a fully synchronized real-time mirror of the main data by establishing mirrored data between two hard disk arrays. Each written IO will be saved to the primary storage and the mirrored storage at the same time. When the primary storage fails, the mirrored storage can provide storage services.

Excellent Performance

- **High-Performance Hardware Architecture:** The MPS9000G3 adopts a disk-control separation architecture design. The storage controllers are based on the fifth-generation Intel Xeon Scalable processors, with built-in hardware acceleration. High-speed 100GE RDMA channels are used for internal communication within the engine, providing outstanding I/O processing capabilities. It supports NVMe over Fabrics. The front end supports high-speed 16/32Gb NVMe over FC and 25/100Gb NVMe over RoCE protocols, while the back end supports the expansion of NVMe SSDs through 25/100GE RDMA interfaces, constructing a high-performance end-to-end NVMe architecture, breaking through performance bottlenecks and providing ultimate IOPS and ultra-low latency.
- **Powerful Performance Expansion:** The MPS9000G3 adopts revolutionary horizontal SAN expansion architecture, supporting online, non-disruptive horizontal expansion with 10/25/100GE RDMA networks and 16/32G FC network dual protocols. It can scale up to 48 storage controllers (12 engines), 192TB of DDR5 cache, and 1152 host interfaces, with a Max. expansion capacity of 38,400 hard drives. This large-scale parallel storage system is designed to handle numerous simultaneous data I/O requests, and it can tolerate the failure of at least half of the controllers without business interruption or data loss, enhancing system reliability.
- **Intelligent Cache Scheduling:** The MPS9000G3 adopts asymmetric cache scheduling technology in its caching strategy, dynamically adjusting the size of read and write caches based on actual conditions to meet the real-time performance needs of LUNs and fulfill QoS requirements.
- **Dynamic Load Balancing:** The MPS9000G3 supports dynamic load balancing among controllers. It can adjust the workload among controllers without interruption, eliminate performance bottlenecks, and achieve strict service level objectives.
- **Quality of Service (QoS) Control:** As the storage performance and expansion capabilities continue to increase, a single set of storage accommodates more and more business systems. Users need to specify different service priorities for different business types. The QoS function provided by the MPS9000G3 integrates and pools storage resources such as CPU, memory, and ports to ensure that service requests with higher priorities can obtain higher IOPS/throughput bandwidth and lower response latency.

Smart Resource Management

MPS9000G3 virtualizes the resource space to form a cell resource pool. Based on the dynamic distribution and free flow of Cell, Maipu has built an intelligent management method ICMT (Intelligent Cell Management Technology, cell-based intelligent resource management technology).

- **Thin Provisioning:** ICMT-based thin provisioning technology, the system automatically identifies front-end service IO and dynamically allocates storage resources, which can greatly reduce the

difficulty of capacity planning for system administrators.

- **Adaptive Deduplication:** Based on the MPSP storage software platform, it realizes global data block-level, online and post-line adaptive lossless deduplication, reduces the amount of data and improves the utilization rate of storage space. The system automatically switches between the online deduplication and post-line deduplication modes according to the business load conditions, reducing the impact of the deduplication process on business performance. A second comparison is conducted before deleting duplicate data to avoid data loss. It supports flexibly enabling and disabling the deduplication function online in units of data volumes, and also supports enabling it simultaneously with the online compression function to increase the data reduction ratio.
- **Online Compression:** Through the data compression function module built into the storage system, data is compressed online at the very moment when it is written. Lossless data compression is adopted to avoid data loss caused by data compression. Meanwhile, by leveraging powerful hardware resources and optimized compression algorithms, the impact of data compression on the front-end business systems is minimized to ensure the smooth access of businesses to the greatest extent. It supports configuring hardware acceleration cards to increase the compression ratio and reduce the occupation of storage controller resources. It also supports flexibly enabling and disabling the compression function online in units of data volumes, and supports enabling it simultaneously with the adaptive deduplication function to increase the data reduction ratio.

Flash-oriented smart storage platform

Flash Hormone Optimization Technology (FlashHormone): The Flash Hormone Optimization Technology reallocates a space for each write operation of data, whether it is an append write or an overwrite of existing data. Regardless of the business model type, all write data can be evenly distributed across different hard disks and combined into a full stripe before being written at one time. The Flash Hormone Technology can effectively solve the write penalty and stripe conflict issues in traditional RAID, significantly improve the read and write performance of the flash array, and remarkably extend the lifespan of the flash media.

- **Enhancing SSD Durability:** Adopting a management mode with two layers of virtualization, namely the underlying hard disk management and the upper resource management, the SSD space is divided into small-grained data blocks. Based on these data blocks, RAID groups are constructed, enabling data to be evenly distributed across all hard disks in the storage pool. Meanwhile, resource management is carried out in units of data blocks, which greatly improves the efficiency of resource management, thereby achieving global wear leveling and significantly increasing the service life of the flash memory.
- **Visual Health Analysis:** Through visualization software, real-time reports on the health status of SSD hard disks are provided for users, displaying the health conditions of SSDs, recording changes in health information, and estimating the unit lifespan. This enables early detection and early judgment to ensure business continuity.
- **Large-Capacity Flash Media:** The MPS9000G3 supports multiple large-capacity SSD hard disks, including 1.92TB, 3.84TB, 7.68TB, 15.36TB, 30.72TB, etc., which can meet users' demands for massive storage capacity within a certain physical space. The four-controller configuration can support a maximum of 3200 SSDs.

Efficient Business Deployment

- **Integration of SAN and NAS:** The same set of hardware devices can simultaneously provide two types of data storage services, namely SAN and NAS, without the need to configure additional NAS gateway devices. This reduces equipment investment, shortens the data access path, and effectively lowers the complexity of deployment and operation & maintenance. NAS supports functions such as file system snapshots, replication, and active-active, enabling the construction of a highly reliable solution integrating SAN and NAS with active-active functionality. □
- **Support for Cloud and Container Loads**: The MPS9000G3 has the ability to interface with the OpenStack cloud platform and the K8S container orchestration platform, providing high-performance and highly reliable storage resources for cloud and container environments, simplifying management and improving the efficiency of business deployment.

Open Platform and Interconnection

- **Heterogeneous Virtualization:** Equipped with a virtualization data management engine, it can incorporate storage array devices of different brands and architectures, such as IP SAN and FC SAN, into Maipu's unified storage resource pool for unified management. This effectively reduces management difficulties and maintenance costs and improves the utilization rate of resources. In addition, the heterogeneous virtualization function can be combined with software such as replication, snapshot, and active-active to achieve local or cross-site data protection. It supports the storage products of mainstream storage manufacturers in virtualization, effectively protecting users' existing investments. □
- **Non-disruptive Data Migration (NDM):** Maipu's NDM technology can achieve data migration within a single device and across different devices. During the migration process, the front end remains unaware and business operations are not interrupted. All products in Maipu's series support the NDM technology. Hybrid arrays can achieve non-disruptive data migration with all-flash arrays through the NDM technology. Moreover, for third-party storage arrays, Maipu can also achieve data migration for third-party storage arrays through the NDM technology combined with the heterogeneous virtualization function, realizing resource integration. □
- **Comprehensive Support for IPv6:** It supports both IPv4 and IPv6 dual protocol stacks. An IP SAN storage network can be constructed between hosts and storage through the IPv4/v6 protocol. An out-of-band management network can be constructed between management terminals and storage through the IPv4/v6 protocol. A data replication network can be constructed between storages through the IPv4/v6 protocol, so as to meet the IP deployment, application, and management requirements in different application scenarios. □
- **Interconnection of the Entire Series:** Based on the unified MPSP software platform, the MPS9000G3 is compatible with all products in the MPS series without the need for third-party software or hardware.

Technical Specifications

Product Model	MPS9040G3
Max. Controller	48
Max. Cache	192TB DDR5
Max. Host Ports	1152
Max. Disks	38400
Expand Hard Disk Cabinet Type	4U hard disk cabinet: 24 Bays, supporting 2.5/3.5-inch hard disk drive 2U hard disk cabinet: 25 Bays, supporting 2.5-inch hard disk drive 2U hard disk cabinet: 25 Bays, supporting 2.5-inch NVMe SSD
Hard Disk Type	NVMe, SSD (support mixed insertion of different types of hard disks)
Max. LUNs	65536
Front-End Interface Type	16/32Gb/s FC、10/25/100Gb/s iSCSI、16/32Gb NVMe over FC、25/100Gb NVMe over RoCE
Hard Disk Detection and Diagnosis	Support periodic hard disk detection and intelligent dynamic adjustment of hard disk detection speed
RAID Class and Hot Backup Feature	RAID/CRAID(CRAID3.0) 0, 1, 3, 4, 5, 6, 10, 50, 60, x0 and so on, support dedicated hot backup, global hot backup, and hot backup of idle hard disk
CRAID Feature	CRAID group allows media errors in multiple hard disks, tolerates physical failures in any three disks, and supports normal reconstruction, local reconstruction, and fast reconstruction
LUN Synchronization Feature	Support Asynchronization, Check Synchronization, and Fast Synchronization
OS Supporting	AIX, HP-UX, Solaris, Windows, Linux and so on
Virtualization Platform Supporting	VMware, Citrix, Hyper-V, OpenStack, KVM, XEN and so on
Host Multi-Path Supporting	Multi-Path Software That Supports the ALUA/SLUA Features, Which Can Realize Dynamic Load Balancing and Link Failover
Basic Management Software	Management Suite, Including Basic Storage Management, CRAID, System Monitoring, Log and Alarm Functions
Management Mode	Support Graphical, CLI Interface, Provide WebService Access Interface, Provide SMI-S, Cinder Management Interface
Advanced Features	Thin Provisioning, Intelligent Tiered Storage, Non-Interrupt Data Migration (NDM), Performance Monitoring, Data Snapshots, Data Replication, Data Mirroring, Local Cloning, Local Mirroring, Symmetric Dual-Active, Storage Heterogeneous Virtualization, Quality Of Service Control (QoS), Multi-Tenant, Online Global Re-Deletion, Online Compression, etc.
Protocol	Support FC、iSCSI、NVMe over FC、NVMe over RoCE、CIFS、NFS、HTTP、FTP、S3 and other protocols
Power Input	100V ~ 127V AC/200V ~ 240V AC; 60Hz/50Hz 240V HVDC
Temperature	Work temperature: 0°C -40°C Recommended 10°C -35°C
Humidity	Working humidity: 10%-85%, no condensation Recommended 20%-80%, no condensation Non-working humidity: 10%-90%, no condensation
Hardware Specification	

Number of SPs	4
Number of Fan Modules	28
Number of Power Supply Modules	4
Number of Front-End IO Card Slots/SP	7 (Optional)
Dimension (H×W×L)	219.5mm(5U)×482.6mm×739mm
Bare Weight	⩽80kg
Full Weight	⩽87kg
Average Power Consumption with Full Configuration	3451W
Peak Power Consumption with Full Configuration	3458W
Power Input	100V-240V±20％ AC; 60Hz±2％/50Hz±2％; 240V HVDC
Power Module	Equipped with redundant platinum AC power supply
Temperature	Work temperature: 5°C -35°C; recommended 10°C -35°C
	Non-work temperature: -15°C -40°C
Humidity	Working humidity: 10%-90%, no-condensing; 20% - 80% recommended, no condensing

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Maipu Communication Technology Co., Ltd
No.16, Jiuxing Avenue
Hi-Tech Zone
Chengdu, Sichuan Province
P. R. China
610041
Tel: (86) 28-65544850,
Fax: (86) 28-65544948,
URL: http:// www.maipu.com
Email: overseas@maipu.com

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