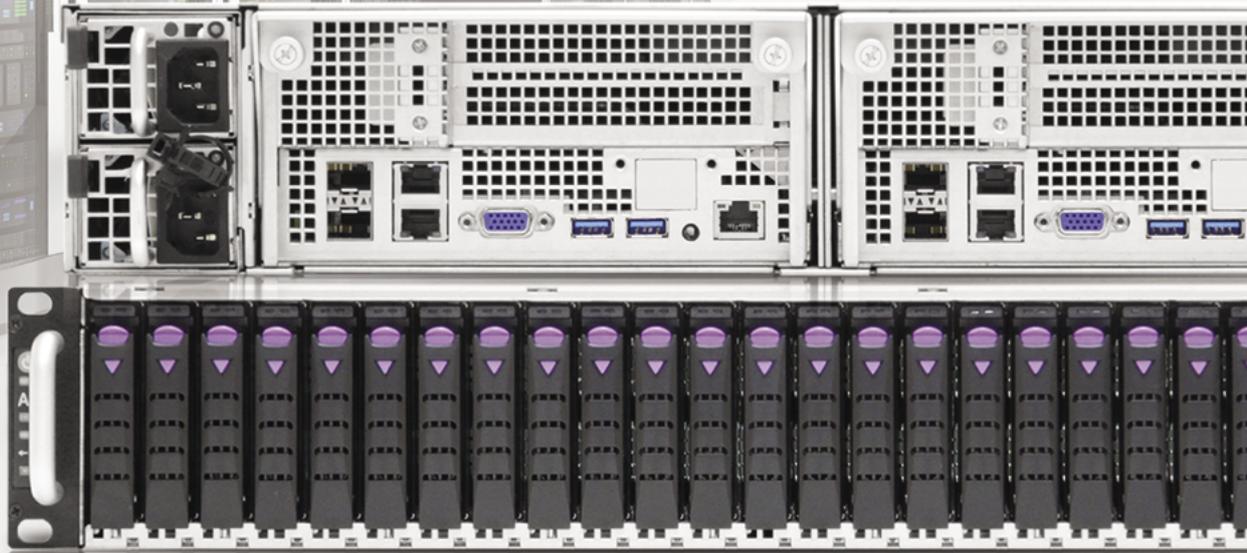


AIC

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AIC HA202-PV HA NVMe Shared Storage Cluster



AIC HA202-PV HA NVMe Shared Storage Cluster is a 2U 24-Bay NVMe storage server solution that provides high-availability with accelerated performance. AIC HA202-PV HA NVMe Shared Storage Cluster comes with two AIC Pavo Server Boards (one board per node), each supporting **dual Intel® Xeon® Scalable Processors**.

Both nodes process I/O, and provide simultaneous and balanced access to the logical devices, which significantly increases overall cluster performance. When failure occurs, the secondary node automatically takes over the devices, client connections, and all processes/services of the system.

By eliminating SPOFs (single points of failure) and designed for redundancy and end-to-end data protection, the AIC HA202-PV HA NVMe Shared Storage Cluster provides protection from storage system downtime and loss of revenue when access to data resources and critical business applications are interruptible.

Its support of NVMe SSDs allows for super-fast data access, and is optimized for mission-critical, enterprise-level storage applications.

- › Enhanced storage performance
- › Cluster-in-a-box
- › Guaranteed data protection
- › Flexible scalability
- › High Availability
- › Unlimited number of snapshots and clones
- › Data integrity check
- › Thin provisioning

Flexible and Ultra-Fast Storage Solution

Enhanced storage performance

Nowadays, enterprise storage has to provide big capacity while also being fast, affordable, and include reliable support. This is exactly what AIC HA202-PV HA NVMe Shared Storage Cluster has to offer. **Open-E JovianDSS-based AIC HA202-PV HA NVMe Shared Storage Cluster is an innovative data storage system fusing the capacity of large and fast NVMe SSDs with ultra-fast RAM read and write caching** to create flexible all flash based solutions that offer high performance while lowering the cost. On top of that, powerful tuning tools allow the system to optimize on I/O heavy databases or high throughput video editing equally well and predefined profiles save annoying testing time.

“Cluster-in-a-box” system powered by Dual-Port NVMe

AIC HA202-PV HA NVMe Shared Storage Cluster features a fully redundant, and fault-tolerant “Cluster-in-a-box” system based on the ultra-fast dual-port NVMe drives. This unique feature **ensures data connection between two redundant nodes, and thanks to it if one node fails, the standby node takes over and gains access to all to keep the system up and running.** “Cluster-in-a-box” powered by Dual-Port NVMe drives is enabled by Open-E JovianDSS storage management functionalities.

Guaranteed data protection

Data is your most important resource. This is why the Open-E JovianDSS-based AIC HA202-PV HA NVMe Shared Storage Cluster includes several mechanisms for data protection. Automatic and scheduled **multi-layer data integrity checks ensure data consistency**, while unlimited snapshots and clones make it easy to implement a disaster protection strategy and to instantly roll back to a previous point-in-time. At the same time, a scheduled self-healing mechanism fixes malfunctions and automatically restores full data redundancy in the system. Even when a drive fails, the software-based spare function offers one drive to several RAID arrays, saving you money on extra hardware without compromising data safety.

High Availability solution functionality test results

| Functionality test name | Functionality test results [passed/failed] |
|---|--|
| Manual Failover | Passed |
| Automatic Failover triggering after network failure | Passed |
| Automatic Failover triggering after shutdown test | Passed |
| Automatic Failover triggering after reboot test | Passed |
| Automatic Failover triggering after power-off | Passed |
| Automatic Failover triggering after I/O test | Passed |

Flexible scalability

The AIC HA202-PV HA NVMe Shared Storage Cluster will let you experience unlimited flexibility and minimize unappreciated downtime. Open-E JovianDSS uses a 128-bit file system that includes unlimited snapshots for easy backup, unlimited clones for easy duplication and **unlimited capacity with volume sizes up to one Zetabyte**. There are no limitations and you may easily control the total cost of ownership and expand your storage infrastructure as data grows.



Active-active failover resource switching time test results

| Total number of targets | Switching time [seconds] | Performance test results [passed/failed] |
|-------------------------|--------------------------|--|
| 2 | 22 | Passed |
| 10 | 23 | Passed |
| 20 | 24 | Passed |

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High Availability

The AIC HA202-PV HA NVMe Shared Storage Cluster is a perfect option if you are looking to deploy a High Availability cluster setup with NFS or iSCSI for storing business-critical data. With the Open-E JovianDSS High Availability Cluster Feature Pack the **AIC HA202-PV HA NVMe Shared Storage Cluster ensures reliability and redundancy through failover in case of a failure.** By using the cluster management software, all features related to the cluster setup can be quickly accessed and maintained - everything is in one place and guarantees ease of use for the storage administrator. Moreover, Open-E JovianDSS includes an independent Virtual IP (VIP) address feature. With this, VIPs can be used by multiple servers and flexibly switched at all times. When a hardware failure is detected, VIPs are automatically moved from the first to second node without the client servers noticing a timeout.

Unlimited number of snapshots and clones

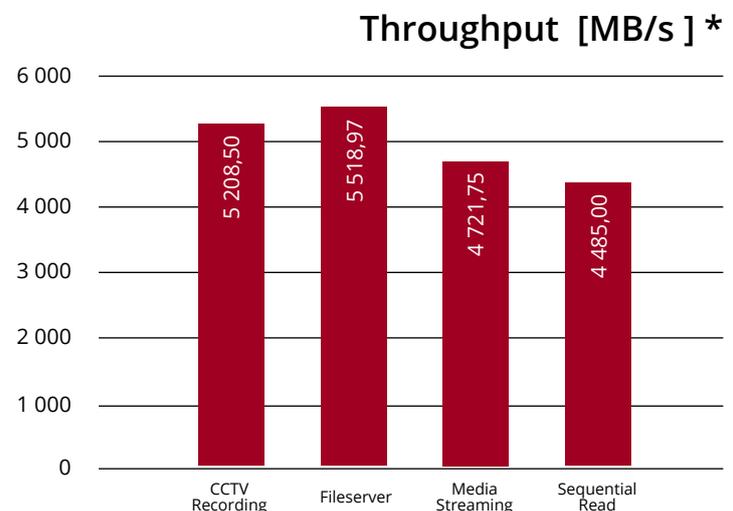
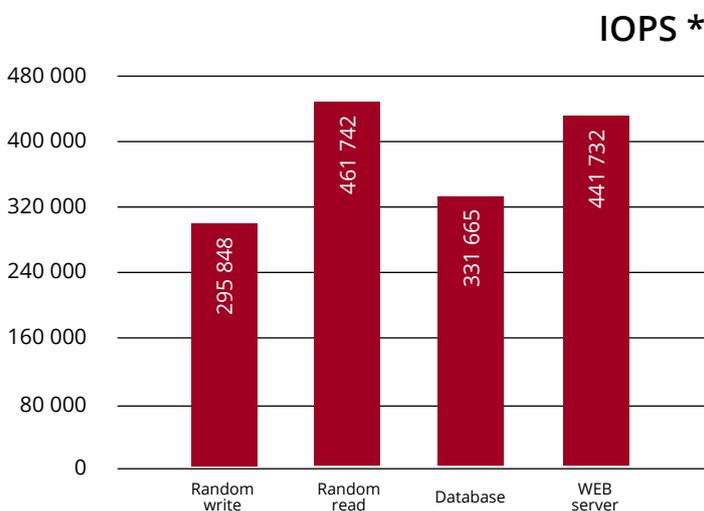
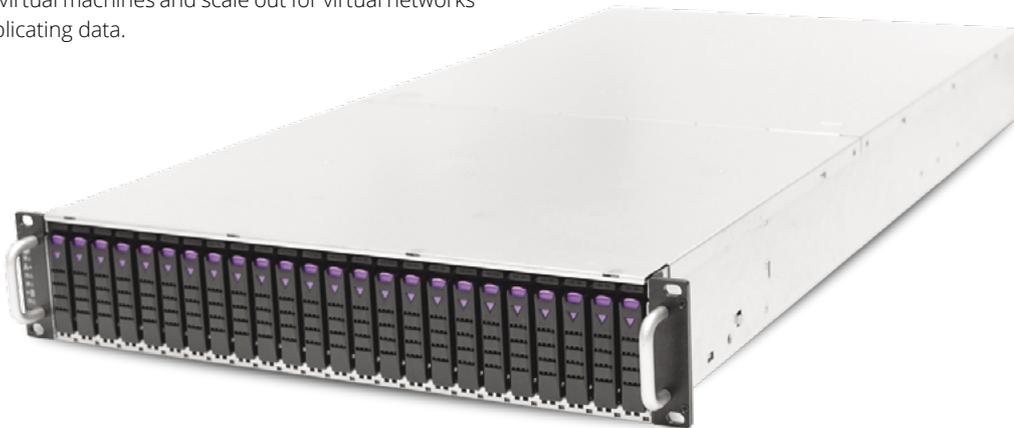
Every Open-E JovianDSS-based AIC HA202-PV HA NVMe Shared Storage Cluster allows **an unlimited number of snapshots and clones - greatly simplifying back-ups, replications and data recreation in case of accidental deletes or viruses.** Snapshots are read-only points-in-time and allow for easy roll-back. They are a must-have option for effective disaster recovery scenarios and in AIC HA202-PV HA NVMe Shared Storage Cluster you may schedule snapshots for months, weeks, hours, or even minutes. Whereas a clone is a writable copy of a snapshot and allows to easily duplicate virtual machines and scale out for virtual networks instantly and without duplicating data.

Data integrity check

The AIC HA202-PV HA NVMe Shared Storage Cluster storage system effectively detects data corruption, as even minor integrity violations could cause loss of data. AIC HA202-PV HA NVMe Shared Storage Cluster ensures reliability by check-summing individual blocks of data and once faulty blocks have been detected, they are automatically rewritten. If the same error is found several times, the data blocks are moved to different parts of the drives. **Each read/write is checked automatically plus you can schedule to perform checks on not accessed blocks.** All actions are done in atomic writes to ensure consistency of your data and to reduce data loss, even during power cuts.

Thin provisioning

AIC HA202-PV HA NVMe Shared Storage Cluster uses thin provisioning to improve your storage utilization by allocating just the exact amount of server space at the time it is required. **You'll eliminate the cost of unused storage space and never again have to pre-allocate storage up front and buy too much hardware.** In AIC HA202-PV HA NVMe Shared Storage Cluster there is no need for evaluating storage requirements and take the risk of rebuilding the entire system when it runs out of space. With this system, it is easy to manage storage capacity and set notifications when physical space shrinks. This is a highly scalable solution - just add physical drives as your data grows.



* To achieve best performance, tests were performed with ZFS volume sync set to disabled.

Hardware details

For each of the 2 servers

| | Default configuration | Options |
|----------------------|---|---------|
| Motherboard | AIC PAVO | - |
| CPU | 2x Intel® Xeon® Gold 6240C CPU 2.60GHz | - |
| RAM | 9x 16GB Micron 18ASF2G72PDZ-2G6B1 | - |
| Storage raw capacity | 19.2TB | - |
| Storage controller | Samsung Electronics Co Ltd NVMe SSD Controller 172Xa/172Xb | - |
| Storage device | 24x 800GB Samsung PM1725a | - |
| Network controller | 1x Intel® Ethernet Server Adapter I350-T2 1x Intel® Ethernet Connection X722-DA2 | - |
| Form factor | 2U | - |
| Boot medium | 600GB WDC WD6000HLHX | - |

Cluster in a box (specification per node - both systems had the same hardware installed). Single box solution has been applied here - a dual channel NVMe cluster has been used and there is no network latency since there is no Metro Cluster solution utilized here.



About AIC

AIC is a leading provider of both standard OTS (off-the-shelf) and OEM/ODM server and storage solutions. With expert in-house design, manufacturing and validation capabilities, AIC's products are highly flexible and configurable to any form factor, standard or custom. AIC leads the industry with over 25 years of experience in mechanical, electronic, system-level engineering as well as a dedication to innovation and customer satisfaction. Headquartered in Taiwan, AIC has offices and operations throughout the United States, Asia and Europe.

About Open-E

Open-E, founded in 1998, is a well-established developer of IP-based storage management software. Its flagship product Open-E JovianDSS is a robust, award-winning storage application which offers excellent compatibility with industry standards, and is the easiest to use and manage. Additionally, it is of the most stable solutions on the market and undisputed price performance leader.

Thanks to its reputation, experience and business reliability, Open-E has become the technology partner of choice for industry-leading IT companies. Open-E accounts for over 37,000 installations world-wide and has received numerous industry awards and recognition, also with its product Open-E DSS V7.

For further information about Open-E, its products and partners, visit <http://www.open-e.com/>

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About the Open-E JovianDSS Server Certification

Open-E JovianDSS delivers software-defined storage which results in a wide variety of different hardware requirements such as performance, range, capacity, capability, and connectivity. To ensure compatibility and robust storage environments, all selected partners offer storage systems which are tested, benchmarked, and certified by Open-E. This way, customers are able to use solutions that require exceptional security and redundancy, without compromising performance.