



**OPEN-E JOVIANDSS**

**ACCELERATES YOUR**

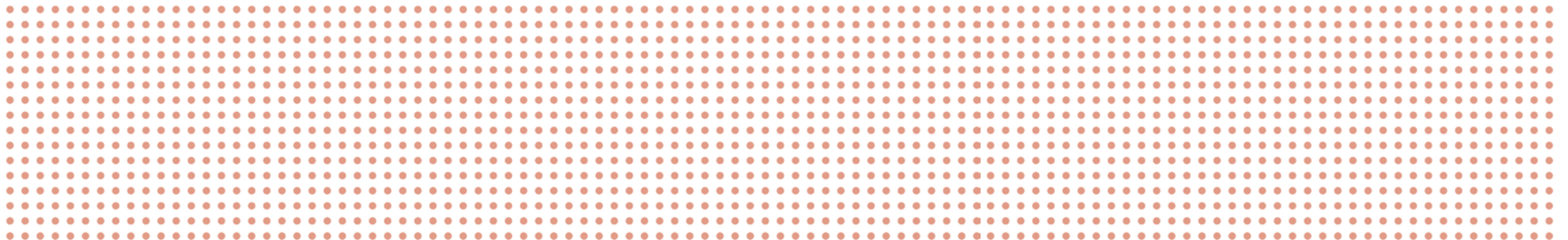
**HYPER-CONVERGED**

**INFRASTRUCTURE**



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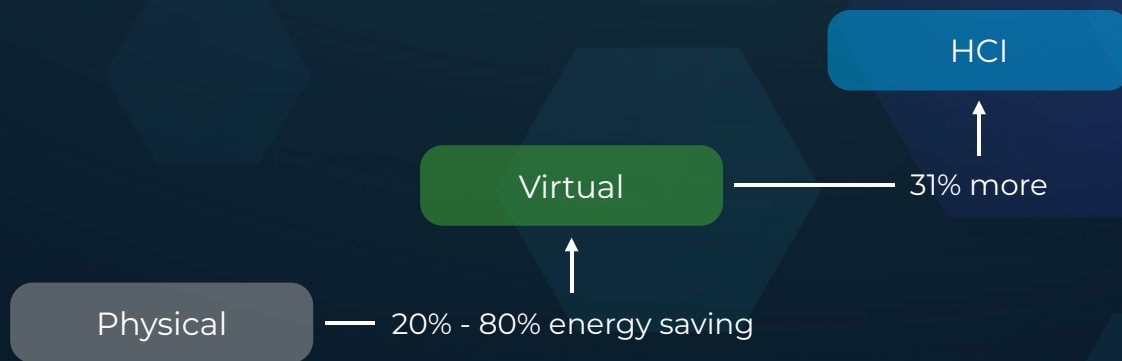
# Hyper-Converged Infrastructure Advantages *for 2023*

In 2023, the world of data storage is facing unprecedented challenges as businesses continue to generate and store vast amounts of data but need to count every penny at the same time. In this white paper, we will explore the key data storage challenges organizations are facing in 2023 and beyond, including virtualization and hyper-convergence. **Whether you're an IT professional looking to optimize your organization's data storage infrastructure or a business leader seeking to gain a competitive edge through better data management, this white paper will provide valuable insights into the future of data storage.**

The virtualization system and data storage for virtualization should guarantee high availability, data safety, and good performance, as well as resource-saving capabilities. As data storage is the foundation of virtualization solutions, hardware and software used for such implementations must meet the highest standards.

# Virtualization Saves Energy

Did you know that the transition from a traditional physical environment to a traditional virtual environment can save 20–80% of energy costs? And that's not all: the transition from a traditional virtual environment to Hyper-Converged Infrastructure can give you up to 31% of additional energy savings by integrating distributed data storage into your system.



According to SmartX researchers and calculations

## Check out our case study!

IT-Beratung HALBE, which operates its own data center, wanted to realign its strategy by replacing the conventional storage and virtualization environment based on Open-E DSS V7 and VMware ESXi with a new infrastructure. Taking into account a general cost minimization, the goal was to create a future-proof starting position so that competitive services in the IT and hosting area can still be offered to the customers.

### IT-Beratung HALBE GmbH & Co. KG

The main reason we have chosen the redundant fail-proof storage solution based on Open-E JovianDSS presented by Boston Server & Storage Solutions was the perfect harmonization of stability, performance, scalability, and flexibility (which is more and more important these days). It allows us to react perfectly to the market needs. **Another noteworthy aspect is the amount of electricity saved, about 4 kWh per day**, which, thanks to the modern hardware, also benefits the environment and has a positive impact on our electricity costs. Especially the transparent advice in the area of hardware design possibilities on the part of Boston Germany, along with a fair price, convinced me - à la bonne heure. With this solution, we have created the optimal set of their applications in the home office for our customers.



Thomas Halbe,  
Managing Director / IT-Beratung HALBE



# Additional Virtualization Benefits for Tough Times

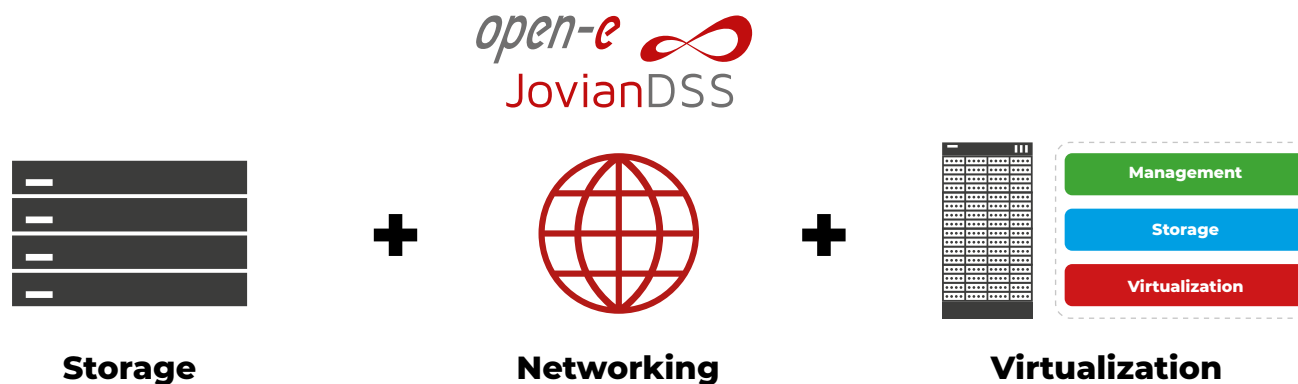
Apart from the energy savings, there are many more advantages of virtualization that can be important during the sluggish economy time:

✓ A desirable resource-saving features:

- **Thin Provisioning** enabled by virtualization reduces the allocated capacity
- **Less hardware** is needed
- **Full flexibility in resource management** for extra savings and scalability

- ✓ The fully-virtualized system simplifies the deployment of the new solution
- ✓ Virtualization makes many critical business processes faster. IT infrastructure becomes more secure and allows much faster disaster recovery.

## Hyper-converged infrastructure



# Open-E JovianDSS Implementation Examples

Virtualization technology has revolutionized the way IT infrastructure is designed, deployed, and managed. One of the most critical components of any virtualized environment is data storage, of course. In fact, **80% of Open-E implementations involve virtualization**, whether it's data storage for virtualization or virtualized storage, and it supports **VMware, Citrix, Microsoft Hyper-V, and ProxMox**.

The VMware logo, consisting of the word "vmware" in a lowercase, sans-serif font with a registered trademark symbol.The Citrix logo, featuring the word "citrix" in a lowercase, sans-serif font with a registered trademark symbol.The Microsoft Hyper-V logo, featuring the Windows logo icon (four blue squares) to the left of the text "Microsoft Hyper-V".The ProxMox logo, featuring a stylized orange "X" icon followed by the word "PROXMOX" in a bold, uppercase, sans-serif font.

To address the unique storage needs of virtualized environments, we recommend several data storage topologies, you can use to build your final solution.

Let's dive deeper into the implementation's details to understand how Open-E JovianDSS can provide scalable and reliable data storage solutions for virtualized environments.



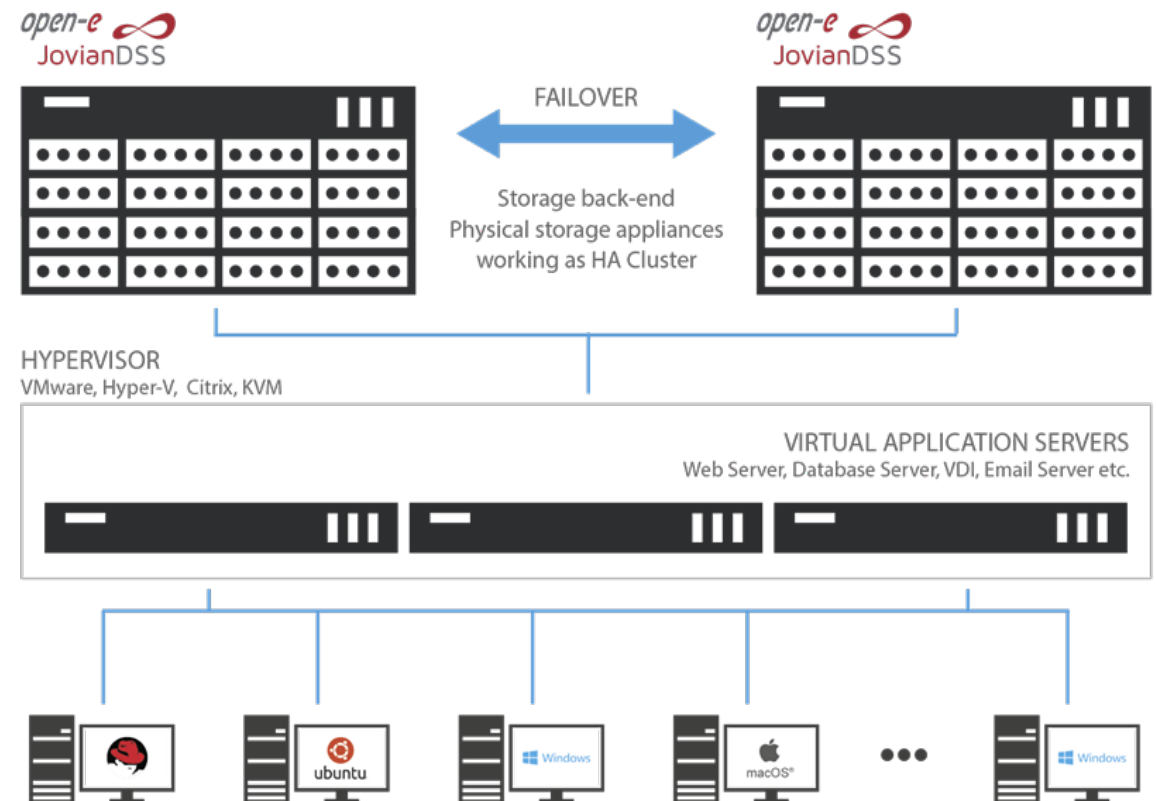
# Data Storage Back-end for Hypervisor

## Advantages:

- + Native (higher than virtualized) storage performance
- + A straightforward, easy-to-configure solution
- + More flexibility in terms of hardware and storage infrastructure

## Disadvantages

- More hardware required results in higher total costs
- More potential points of hardware failure



# Virtualized Data Storage Back-end **within Hypervisor**

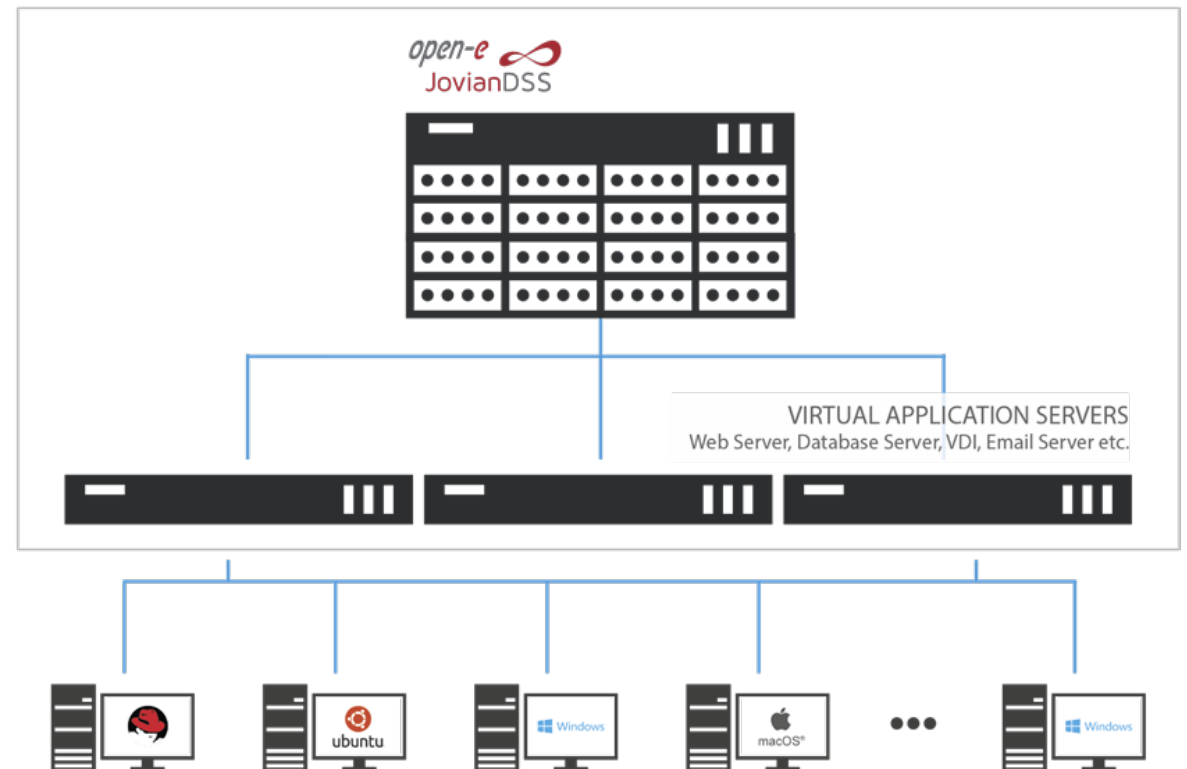
## Advantages:

- + Convenient maintenance with full remote management
- + Faster deployment compared to a solution with hardware-based storage backend
- + Less hardware is required

## Disadvantages

- Lower storage performance as the CPU is shared with the hypervisor, storage, and virtual machines
- Hypervisor is a single point of failure

HYPERVISOR  
VMware, Hyper-V, Citrix, KVM





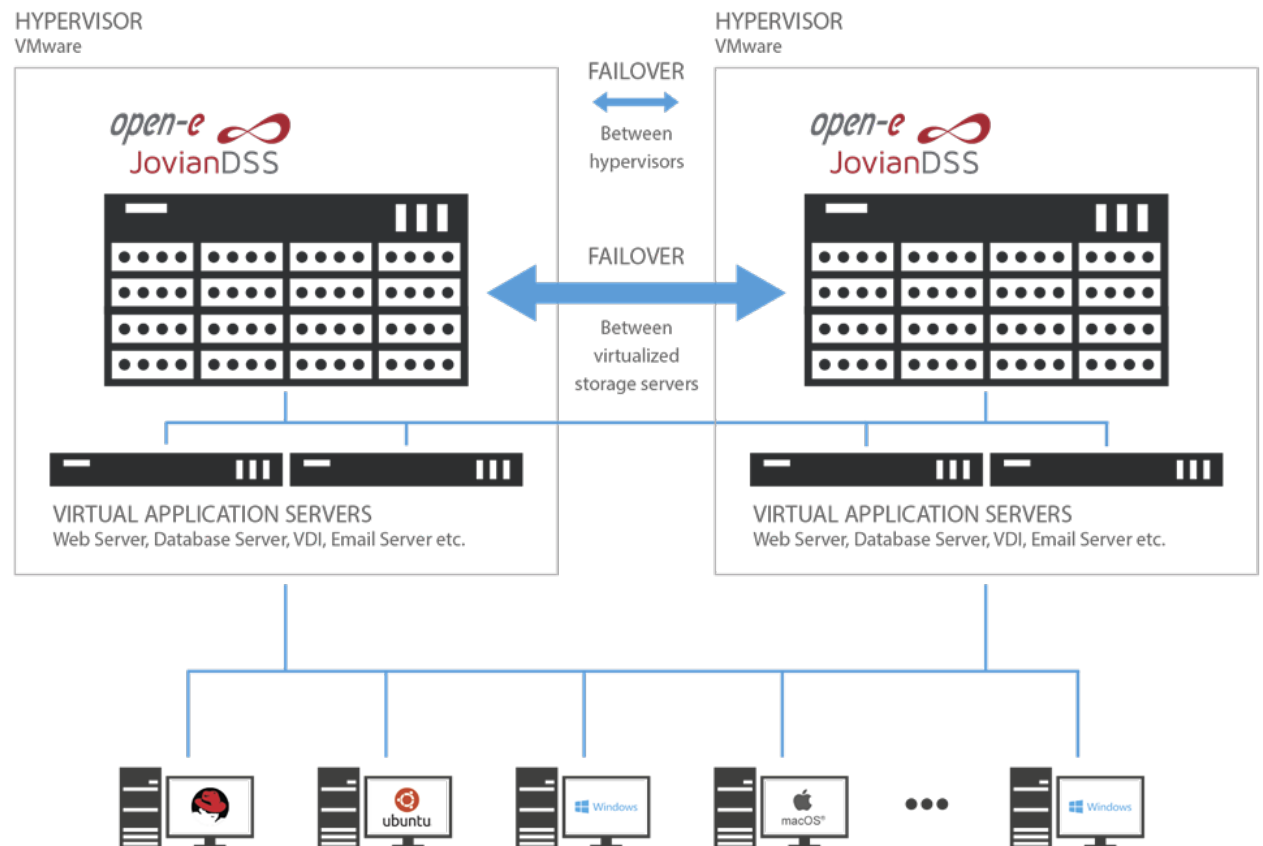
# Virtualized Data Storage Back-end within a HA Cluster Nodes Run on Hypervisors

## Advantages:

- + Eliminates a single point of failure due to failovers between both the storage servers and the hypervisors.
- + Ensures uninterrupted operations in typical failure scenarios

## Disadvantages

- Higher costs as it requires 2 physical servers



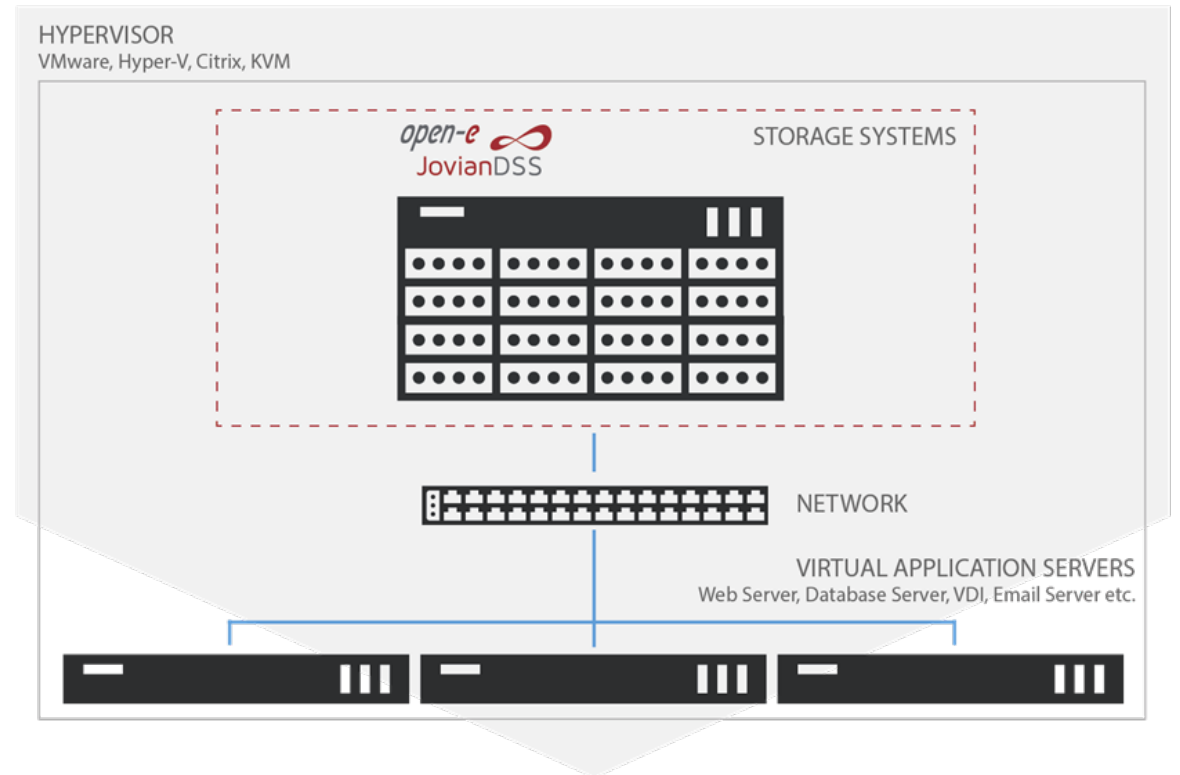
# Data Storage Back-end in Fully Virtualized **Hyper-Converged Infrastructure (HCI)**

## Advantages:

- + All infrastructure – including networking – is fully virtualized and, therefore, fully configurable
- + Less IT infrastructure complexity
- + Deploys on commodity hardware
- + Most efficient maintenance and management
- + Lowest TCO (Total Cost of Ownership) in many scenarios

## Disadvantages

- Not suitable for all types of use, e.g., big data processing and others requiring the highest possible performance





# How to Optimize Your Open-E JovianDSS for Virtualization Purposes

In this part, we'd like to highlight the technical tips and recommendations for **Open-E JovianDSS as storage for virtualization**. We'll answer the following questions:

- What challenges might you encounter during installation?
- What are the hardware recommendations?
- What are the technical tips and tricks?

## Common Virtualization Challenges

When optimizing your data storage for virtualization you might encounter a couple of challenges.

We have listed the most common issues reported by our customers:

- Too low IOPS
- Disks with too high latency are used
- Poor overall performance of storage servers caused by wrong hardware used
- Insufficient total network layer throughput with a large number of machines operating on large data
- No redundancy of network connections between storage and the virtualization system
- Storage is not scalable enough for the constantly increasing number of virtual machines

As you can see in the list above, the issues that might show up involve hardware mostly. Therefore, it is critical to use proper and high-quality hardware. Fortunately, Open-E specialists have provided **a comprehensive list of hardware tips to avoid those issues and how to make your storage for virtualization solution with Open-E JovianDSS as optimal as possible, in an uncomplicated and affordable way.**

# Hardware Recommendations



So, let's talk about the hardware that is recommended to be used to make such a solution optimal. As for the data groups, it is recommended to use **HDD SAS disks, preferably 10k RPM**. For more demanding environments, we'd suggest using All-Flash storage based on **dual-port SSD for shared storage clusters** or All-Flash storage based on high-capacity, **multi-layer 3D NAND SSDs for non-shared storage clusters**.

- In the case of data groups on HDD, fast, low latency, write-intensive SSD is recommended
- Due to extremely low latency and high endurance, a device based on, for example, KIOXIA FL6 Enterprise SCM NVMe is preferred
- For All-flash, it is usually not necessary to use writelog. Using the writelog may be beneficial when the SSD storage is relatively slow (e.g., a small number of QLC NAND disks) and a writelog device is very fast, e.g., Intel Optane (Note: such solutions always have to be tested before implementation)
- Random performance may improve when using writelog (SLOG) with All-Flash disks, but sequential performance may be poor. In such a situation, if it's possible to select zvols for which the priority is a sequential performance, set ZFS logbias to throughput for them. Thanks to this, write operations on these zvols will bypass the SLOG

For read cache, a fast, read-intensive SSD is recommended, as the capacity depends on the hot data footprint (strictly speaking – the number of virtual machines). When it comes to All-Flash storage, a **read cache** is not required.

Talking about recommendations for **writelog**, the following recommendations have been collected by our specialists:



# CPU, RAM and Network Requirements

For optimization from the **CPU's** side and extremely intensive load installations, we recommend a fast processor around 3.0 GHz (the preferred line is Intel Xeon Gold or an equivalent from AMD). For standard load installations, the Intel Xeon Silver CPU with a 2.4 GHz clock is enough. Keep in mind that the number of cores depends on the number of storage controllers, network adapters, and other devices, such as NVMe disks that will be included in the storage server.

For RAM, you should use a large (at least 64GB) and fast (adapted to the controller in the CPU) RAM for even better IOPS. When it comes to the **storage controller**, there are no special requirements.

For **network controllers**, we recommend high-speed network adapters with RDMA support for the mirror path with the number of ports that allow using the MPIO in the connection to the client.

In the case of network **switches**, they should definitely be of high quality and high speed with Rapid Spanning Tree Protocol (RSTP) support to prevent any bottlenecks in network connectivity.

## Check out our case study!

**Cloudlayer8 (CL8)** is a state-of-the-art Tier-III data center, and cloud services provider from Cyprus. The company needed a new software solution for its configurations of two off-site backup server setups, one of which was already using a Veeam Cloud Connect solution and the other, using a VMware VDC solution.



*Offering money-back guarantee SLAs for a data center is not easy, and reliable enterprise software is essential to have peace of mind! We've been using the Open-E JovianDSS system for more than a year. The product experience is very positive, as it is stable, easy to use, robust, and offers excellent performance. The High Availability Cluster has an outstanding price-performance ratio.*



Theodosios Theodosiou,  
Business Development Manager at Cloudlayer8  
Cyprus

# Open-E JovianDSS Configuration Tips

Take a look at the 8 points below and keep them in mind for the future configuration of the Open-E software used for virtualization purposes:

1

A 2-way mirror or a 4-way mirror (especially in the case of a non-shared storage cluster) is a must for optimal redundancy and performance.

2

Set up Thin Provisioning in zvol configurations for optimal use of storage capacity.

3

For better performance and connection redundancy set the MPIO on iSCSI connection to the client system.

4

Zvol volblocksize should be matched to the application/client system requirements.

5

For higher IOPS, use a smaller volblocksize and, for higher throughput, a bigger volblocksize.

6

When configuring the architecture and storage parameters, don't forget to use the best practices document dedicated to storage, prepared by the manufacturer of the virtualization platform you are going to use.

7

Use tunings for SAN protocols available in the Open-E JovianDSS Release Notes.

8

Use several volumes instead of one and attach up to 4 volumes per target because of a separate command queue for each iSCSI target – this recommendation applies only to iSCSI TCP connections and does not apply to RDMA connections.



# High Availability Precautions

When building High Availability cluster solutions, it can be a good practice to use one of our “**no single point of failure**” topology schemes.

In the case of **the Open-E Non-shared Storage High Availability Clusters**, fast NICs on the mirror path (25+ GbE recommended) can be helpful to achieve a good throughput on the HA cluster replication. NICs with RDMA support are recommended for even better performance in large data operations. The general rule is that network bandwidth should be balanced with storage performance.

Talking about **High Availability** even further, use static discovery in all SAN initiators and extend timeouts in all SAN. Also, make

sure that the resource switch time is within an acceptable range, especially in the case of non-shared storage HA clusters and a large number of disks. If the switchover time is too long due to a large number of disks, it can be fixed by employing the RAID controller.

After you finish the configuration process, pre-production tests should be conducted - performance and basic failover operations/triggers should be checked (system restart, power off, a manual move of resources). Don't forget that the second ring is recommended in the HA cluster, and up to six ping nodes are recommended.



# VMware Ready™ Data Storage Solution

Open-E JovianDSS is a VMware-ready storage solution that utilizes iSCSI, FC, and NFS (for NAS) protocols for hosting hundreds of virtual machines in optimal data storage space.

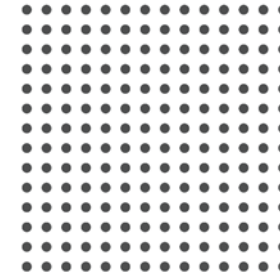
It gives you a cost-effective, flexible, and scalable data storage solution for virtual environments that offers high availability, high performance, and high data efficiency.

You can install Open-E JovianDSS as data storage for ESXi within minutes and connect it in a few steps only, since its intuitive WebGUI simplifies storage administration. You will also get professional technical support for the complete storage setup, including VMware implementation, in case of any doubts.

System Certification for VMware vSphere® 5.5, 6.0, 6.5, 6.7, and 7.0

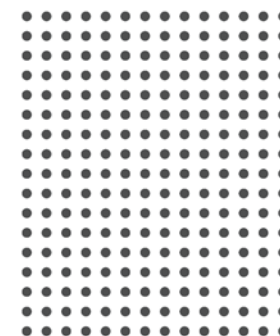
## VMware features supported by Open-E JovianDSS

- Consistently backs up data from Virtual Machines, including databases and user data, with the feature of advanced schedules and retention plans – lowering RPO (Recovery Point Objective)
- Quiesced snapshots feature, which allows virtual machine data to be in a more consistent state for snapshot purposes, and protects the environment against the ransomware effects
- Support for Single-Root Input/Output Virtualization (SR-IOV) that enables sharing of the network card to many virtual machines at the level of direct access to the hardware
- Offload operations support for iSCSI and Fiber Channel with VMware vStorage APIs for Array Integration (VAAI)



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JovianDSS' Features



# Cost-Effective Data Storage for Virtualized Infrastructure

Open-E JovianDSS comes with inexpensive product licenses and technical support options, compared to other storage software providers:

- The licensing system is based on the capacity of each storage environment and is designed to be as fair as possible for users.
- Lowers Total Cost of Ownership (TCO) through built-in storage virtualization with thin / over provisioning and compression.
- Free, built-in backup feature, no third-party software necessary.

## Conclusions

All in all, virtualization is a technology that provides not only high performance, great efficiency, and flexibility, but also a range of other benefits. Investing in proven data storage for virtualization and, at the same time, following a few implementation rules results in building a future-proof, reliable, and high-performing storage solution that will last for years.



Founded in 1998, Open-E is a well-established developer of IP-based storage management software. Its flagship product, Open-E JovianDSS, is a robust, award-winning storage application that offers excellent compatibility with industry standards. It's also the easiest to use and manage. Additionally, it is one of the most stable solutions on the market and an 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 38,000 installations worldwide. Open-E has also received numerous industry awards and recognition for its product, Open-E DSS V7.

**+38000** software implementations

**+100** countries worldwide

**+25** years of experience

**+800** certified engineers and sales professionals

