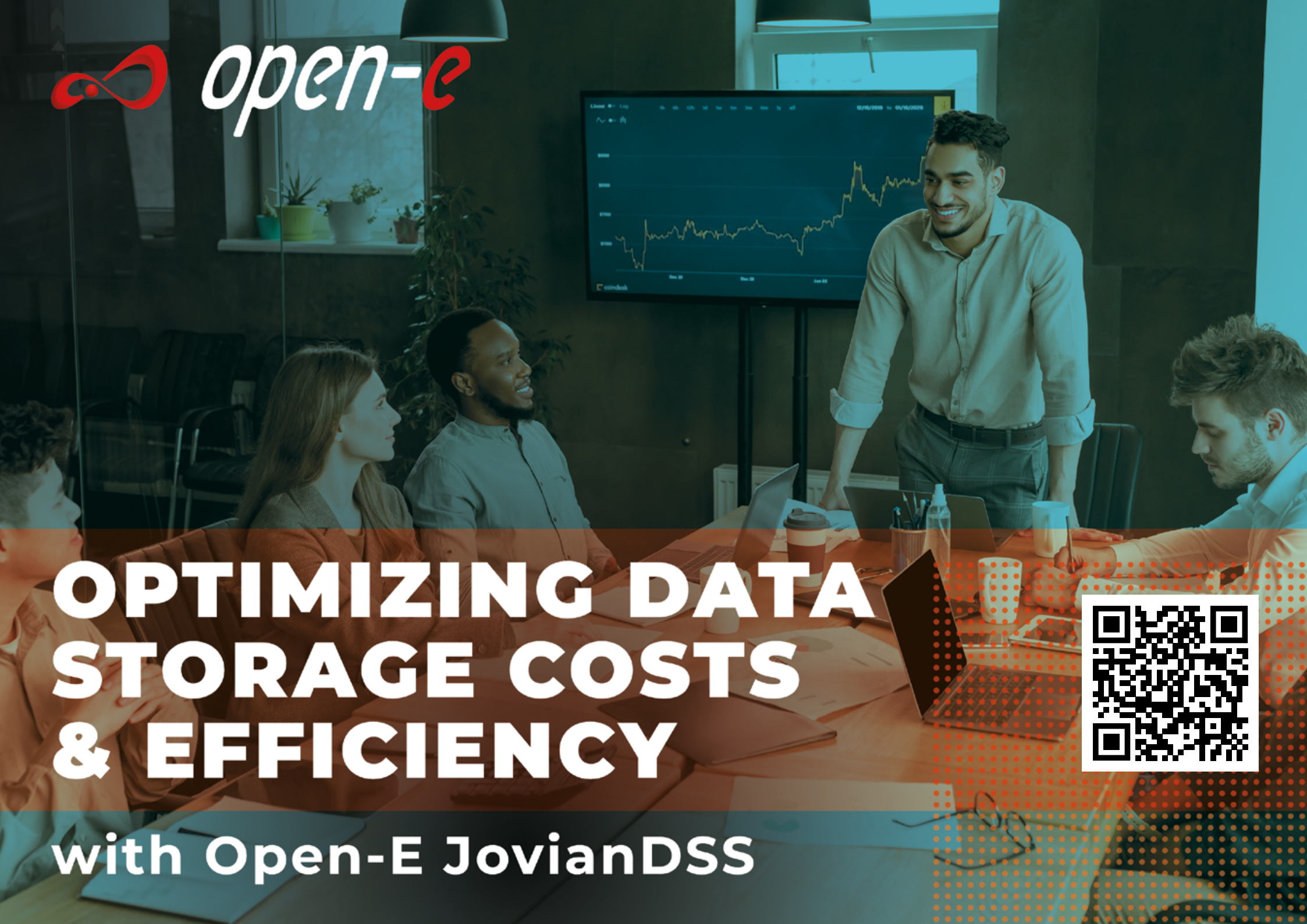
open-e
OPTIMIZING DATA STORAGE COSTS & EFFICIENCY
with Open-E JovianDSS

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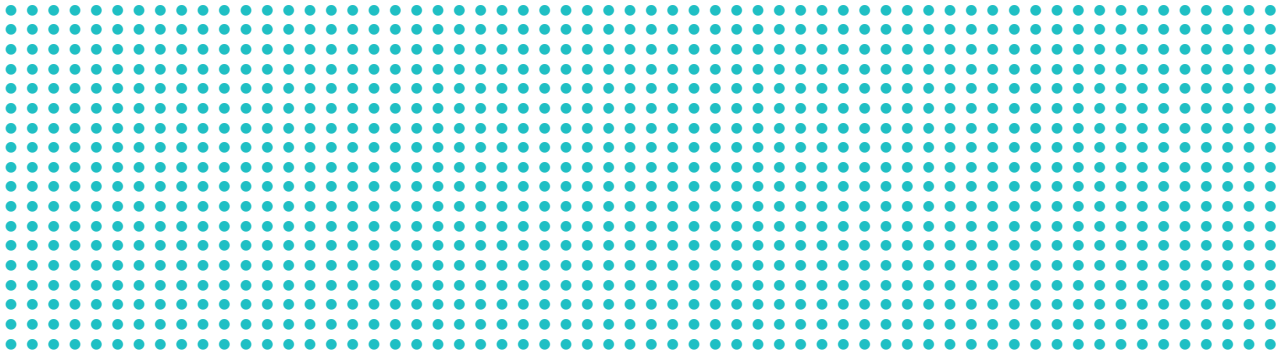


# Discover How to Achieve **Maximum Storage Efficiency and Cost Savings**

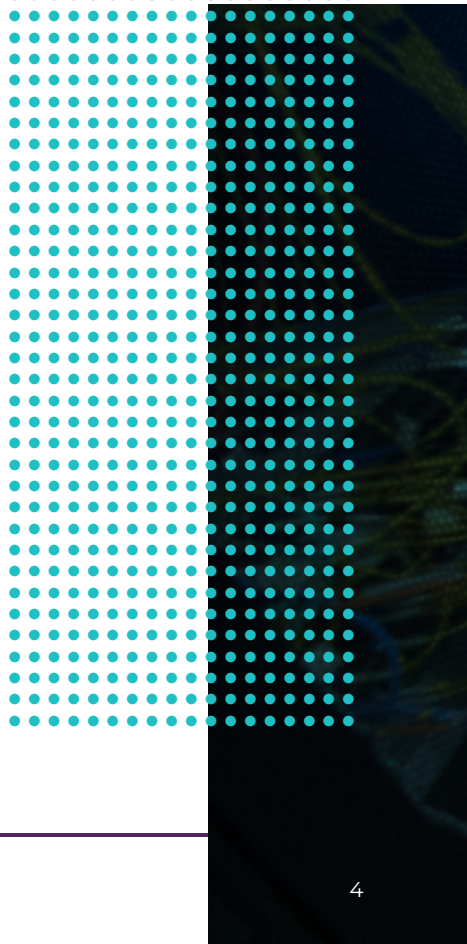
**In today's data-driven world, the importance of optimizing data storage cannot be overstated. As data continues to grow at an unprecedented rate, businesses face significant challenges in managing, storing, and protecting their data efficiently. Open-E JovianDSS emerges as a leading solution, offering robust features to tackle these challenges and optimize data storage.**

*Optimizing data storage costs and efficiency is crucial for businesses in today's fast-paced digital landscape. At Open-E, we understand that effective data storage management not only reduces expenses but also enhances overall performance and reliability. Our solution, Open-E JovianDSS, is designed to provide businesses with the tools they need to streamline their data storage infrastructure, improve data accessibility, and ensure robust data protection, all while keeping costs in check. By leveraging advanced features like deduplication, compression, and high availability clustering, we empower our customers to achieve optimal storage efficiency and scalability, driving their success in the competitive market"*

**— Krzysztof Franek, CEO of Open-E**

# Understanding Data Storage Optimization

**Data storage optimization involves employing strategies and technologies to store data more efficiently, ensuring maximum utilization of data storage resources while maintaining high performance and reliability. Effective optimization helps businesses reduce costs, improve performance, and ensure data availability.**



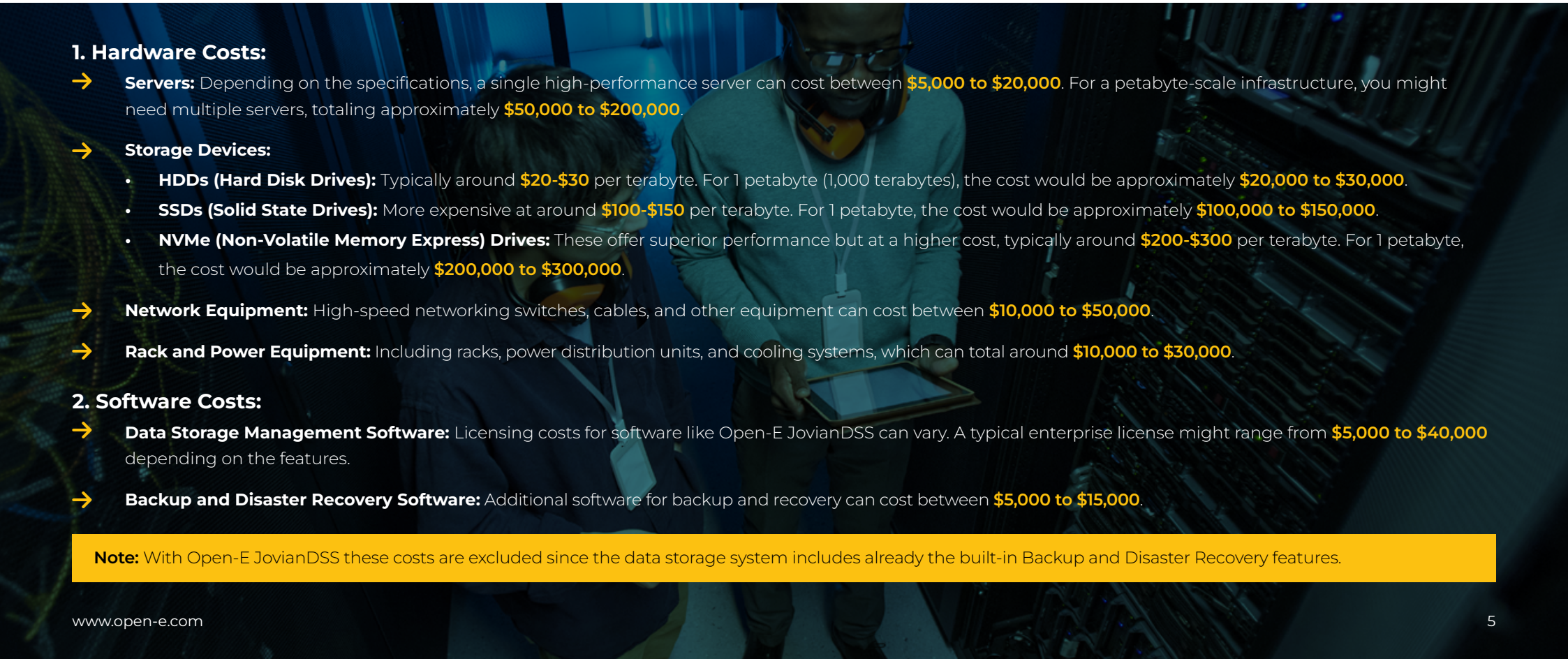
### Common Challenges in Data Storage Management:

- **Data Growth:** The exponential increase in data volumes can strain data storage infrastructure.
- **Performance Issues:** Ensuring quick data access and processing can be challenging with large datasets.
- **Redundancy and Inefficiency:** Duplicate data and inefficient data storage practices can waste valuable resources.
- **Rising Costs:** Inefficient data storage management, hardware setup, and capacity provisioning can increase costs and lead to financial loss.

**Open-E JovianDSS is a powerful data storage solution designed to address these challenges. It offers a comprehensive suite of features to optimize data storage efficiency, enhance performance, and ensure data protection.**

# Cost Evaluation for Setting Up Data Storage Infrastructure and Storing **1 Petabyte of Data**

**The cost of setting up data storage infrastructure can vary significantly depending on various factors such as location, the type of storage solution, the required performance, and redundancy needs. Here is a breakdown of the typical components and their approximate costs calculated in 2025:**



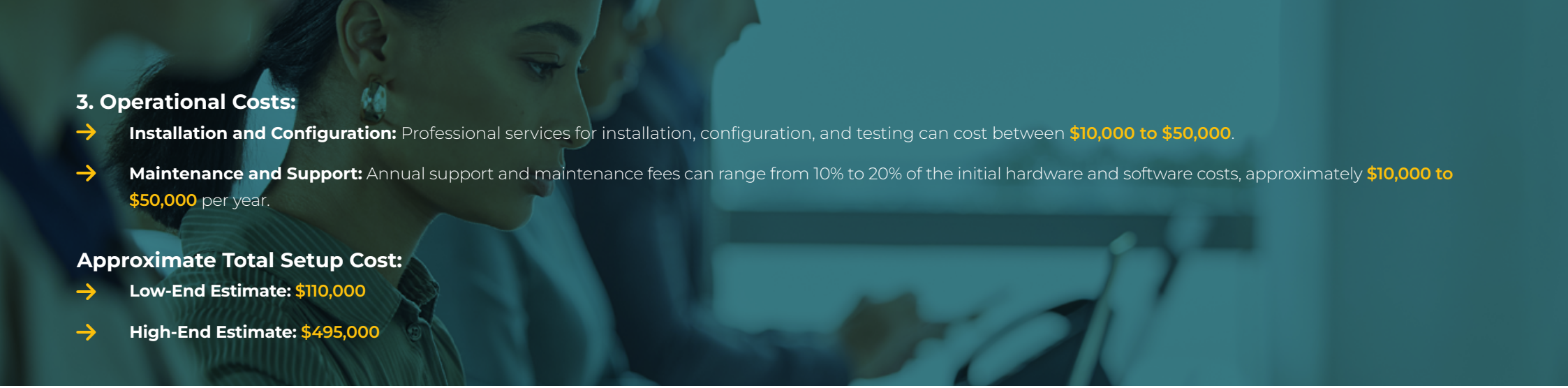
### 1. Hardware Costs:

- **Servers:** Depending on the specifications, a single high-performance server can cost between **$5,000 to $20,000**. For a petabyte-scale infrastructure, you might need multiple servers, totaling approximately **$50,000 to $200,000**.
- **Storage Devices:**
  - **HDDs (Hard Disk Drives):** Typically around **$20-$30** per terabyte. For 1 petabyte (1,000 terabytes), the cost would be approximately **$20,000 to $30,000**.
  - **SSDs (Solid State Drives):** More expensive at around **$100-$150** per terabyte. For 1 petabyte, the cost would be approximately **$100,000 to $150,000**.
  - **NVMe (Non-Volatile Memory Express) Drives:** These offer superior performance but at a higher cost, typically around **$200-$300** per terabyte. For 1 petabyte, the cost would be approximately **$200,000 to $300,000**.
- **Network Equipment:** High-speed networking switches, cables, and other equipment can cost between **$10,000 to $50,000**.
- **Rack and Power Equipment:** Including racks, power distribution units, and cooling systems, which can total around **$10,000 to $30,000**.

### 2. Software Costs:

- **Data Storage Management Software:** Licensing costs for software like Open-E JovianDSS can vary. A typical enterprise license might range from **$5,000 to $40,000** depending on the features.
- **Backup and Disaster Recovery Software:** Additional software for backup and recovery can cost between **$5,000 to $15,000**.

**Note:** With Open-E JovianDSS these costs are excluded since the data storage system includes already the built-in Backup and Disaster Recovery features.



### 3. Operational Costs:

- **Installation and Configuration:** Professional services for installation, configuration, and testing can cost between **$10,000 to $50,000**.
- **Maintenance and Support:** Annual support and maintenance fees can range from 10% to 20% of the initial hardware and software costs, approximately **$10,000 to $50,000** per year.

### Approximate Total Setup Cost:

- **Low-End Estimate:** **$110,000**
- **High-End Estimate:** **$495,000**

## Cost Evaluation of 1 Petabyte Data Storage Maintenance

The ongoing costs for storing 1 petabyte of data include hardware, software, maintenance, and operational expenses:

- **Hardware Replacement and Upgrades:** Hardware typically needs replacement or upgrading every 3-5 years. Assuming a mid-range estimate, this could be approximately **$40,000 to $100,000** per year.
- **Energy Costs:** Power and cooling costs for a petabyte-scale infrastructure can be significant. This can range from **$10,000 to $50,000** per year depending on the data center location and efficiency.
- **Data Center Space:** Renting data center space can cost around **$10 to $50** per square foot per month. For a petabyte of storage, this could total around **$12,000 to $60,000** per year.
- **Software Licensing and Support:** Annual licensing and support for software like Open-E JovianDSS and backup solutions can range from **$10,000 to $35,000** per year.

## Approximate Annual Ongoing Costs:

- **Low-End Estimate:** **$72,000**
- **High-End Estimate:** **$245,000**

## Total Cost Summary

Setting up and maintaining a data storage infrastructure for 1 petabyte of data involves a significant investment. Initial setup costs can range from approximately **$110,000 to $495,000**, while annual ongoing costs can vary from **$72,000 to $245,000**. These estimates provide a general idea and can vary based on specific requirements, regional costs, and chosen technologies. Before we investigate how we can optimize these costs, let's check what tools are available.

# Key Features of Open-E JovianDSS for Data Storage Optimization

## Advanced ZFS Data Storage Caching Mechanisms

**Open-E JovianDSS employs advanced caching mechanisms that not only enhance performance but also significantly reduce costs associated with data storage infrastructure. These caching mechanisms - such as read cache, write log, and the use of ZFS Special Devices - are integral to optimizing the TCO:**

- **Read Cache:** A read cache caching mechanism improves read data storage performance by keeping frequently and recently accessed data in faster memory media. This helps reduce latency and enhance the user experience.

- **Writelog:** A similar approach can improve write operations by adding a separate write log SSD or NVMe device (SLOG). This makes write operations faster and more reliable. An additional write log device increases system reliability and protects data against sudden power loss that could otherwise affect data cached in RAM and lead to data loss.

- **ZFS Special Devices:** Open-E JovianDSS implements ZFS Special Devices to enhance the speed and efficiency of data storage operations. By using them to manage metadata and small files, Open-E JovianDSS can reduce the load on the main storage devices, improving overall performance and reducing latency.

SSDs and NVMe devices offer significantly faster data access speeds, providing a middle ground between the speed of RAM and the capacity of traditional hard drives. While SSDs and NVMe devices are more expensive than traditional HDD drives, they are more affordable than large quantities of RAM, offering an excellent balance of performance and cost. By reducing the load on primary storage drives, SSD/NVMe caching can also extend the lifespan of existing hardware, delaying the need for costly upgrades.

**By using the NVMe partitioning feature available in Open-E JovianDSS, all these caching options can residue on a single NVMe drive (but we need a minimum of 2 such devices to ensure redundancy and avoid the single point of failure).**

# Data Deduplication & Compression

Data deduplication eliminates redundant copies of data, reducing storage space usage. **Open-E JovianDSS implements advanced deduplication techniques, ensuring that only unique data is stored**. By removing duplicate data, businesses can achieve significant cost savings and improve the performance of their data storage systems. Data compression reduces the size of stored data, allowing more data to be retained in the same amount of space. **Open-E JovianDSS leverages powerful compression algorithms to optimize storage utilization without compromising performance.**

## Flexible Data Storage Resources Provisioning

Using Open-E JovianDSS you have the flexibility of data storage resources allocation and can choose among thin, thick, and overprovisioning approaches. For maximum allocation efficiency, we recommend using the thin provisioning option, which allows for the dynamic allocation of data storage space, providing only the amount of storage capacity needed at any given time. This approach helps manage data storage more efficiently, reducing wasted space and costs. **Open-E JovianDSS's thin provisioning feature ensures that data storage space is allocated as needed, allowing for more efficient use of available resources.** This can be particularly beneficial in environments where data storage needs fluctuate, as it allows for flexible and efficient resource management.

## Data Storage Pool Management

Efficient storage pool management is crucial for optimizing performance and capacity. Open-E JovianDSS offers advanced features for creating and managing storage pools, ensuring optimal utilization and performance of data storage resources. **By allowing for the creation of multiple storage pools with different performance and redundancy characteristics, Open-E JovianDSS enables businesses to tailor their data storage infrastructure to their specific needs.** This flexibility helps maximize the efficiency and performance of the storage system, ensuring that resources are used effectively.

# Data Protection and Reliability

Performance efficiency and cost optimization are crucial yet not the only critical challenges to be faced by data storage administrators. Data protection and infrastructure reliability are high on their list as well. To meet these challenges without compromising the performance or TCO, Open-E JovianDSS offers the whole package of built-in data safety tools, that can be used to achieve a high level of data protection.

## Data Redundancy & High Availability Clustering

To provide a high level of data protection, **Open-E JovianDSS offers a wide range of data redundancy levels**, starting from mirroring options to RAIDZ-3 arrays to keep the system up and running even if data drives fail. But also **High Availability clustering** is essential for ensuring continuous data access. Open-E JovianDSS provides robust clustering features, ensuring data availability and minimizing downtime. By clustering data storage nodes together, Open-E JovianDSS can provide **seamless failover and load balancing**, ensuring that data is always available even in the event of hardware failures that lead to the situation when one of the nodes is unavailable. This High Availability feature is crucial for mission-critical applications where downtime can have significant consequences.

# Snapshots & Clones

Snapshots technology allows for efficient data protection by capturing the state of the data at specific points in time. Open-E JovianDSS's snapshot implementation enables quick and efficient data rollback and recovery. **By taking regular snapshots of the data, Open-E JovianDSS allows businesses to quickly revert to a previous state in the event of data corruption, loss, or ransomware attack**. This feature is particularly useful for environments where data integrity is critical, such as financial institutions and healthcare organizations.

## Data Replication and Open-E JovianDSS On- & Off-site Data Protection

Snaphot-based data replication is also vital for disaster recovery. Open-E JovianDSS supports efficient data replication across different locations, ensuring data protection and availability in case of any disasters. By replicating data to remote sites, Open-E JovianDSS ensures that a copy of the data is always available, even in the event of a catastrophic failure at the primary location. **This replication option, combined with the On- and Off-site Data Protection feature, provides comprehensive disaster recovery capabilities, ensuring that businesses can quickly recover from data loss and continue operations with minimal disruption.**

**Note:** The Open-E team continuously works on improving the performance of the system and adding new features to optimize performance, TCO, and reliability. Recent enhancements include support for the RDMA protocol, NVMe partitioning, self-encrypting drives, TRIM support, and many more. For more information, see the Open-E JovianDSS release notes.

# Data Storage Optimization for Specific Business Usages

## Virtualization

Virtualized environments require optimized storage to handle high IOPS and ensure efficient VM operations. Open-E JovianDSS supports virtualization with features like VM-aware storage and high IOPS, ensuring smooth performance. **By providing high-speed data access and efficient data storage management, Open-E JovianDSS can support the demanding requirements of virtualized environments, ensuring that virtual machines run smoothly and efficiently**. This is important for businesses that rely on virtualization for their IT infrastructure, as it helps in maintaining high levels of performance and reliability. What is more, Open-E JovianDSS is a hypervisor-agnostic solution, which means it can be used with most of the hypervisors available on the market, such as VMware, Microsoft Hyper-V, Proxmox, Xen, XenServer, Citrix, XCP-ng, and more.

**Read more on how Open-E JovianDSS Accelerates Your Hyper-Converged Infrastructure.**

## Video Recording, Streaming, and Processing

Video applications require storage solutions that can handle large files and real-time streaming. Open-E JovianDSS offers capabilities to efficiently manage large video files, real-time streaming, and processing, ensuring smooth and reliable performance. **Open-E JovianDSS can support the demanding requirements of video applications, ensuring that video files are stored and accessed quickly and efficiently.**

**Read Open-E's tips on data storage for video recording.**

# High-Performance Computing (HPC)

**HPC environments require data storage solutions that can handle high throughput and low latency. Open-E JovianDSS supports HPC workloads with features designed to meet these demanding requirements, such as:**

- **High Throughput and Low Latency:** Open-E JovianDSS's support for high-speed storage devices, such as SSDs and NVMe drives, ensures that data can be accessed and written at high speeds, minimizing latency and maximizing throughput.
- **Parallel I/O Operations:** Open-E JovianDSS's advanced data storage architecture is designed to manage high levels of parallelism, ensuring efficient data processing and minimizing bottlenecks.
- **Data Integrity and Reliability:** Open-E JovianDSS incorporates robust data protection features, such as end-to-end data integrity checks and support for various redundancy configurations, with the High Availability Clustering and backup tools included, to safeguard against data loss and ensure reliable data storage operations.
- **Support for Diverse Workloads:** HPC environments often involve a variety of workloads, from simulations and modeling to data analytics and machine learning. Open-E JovianDSS's flexible and adaptable data storage architecture supports a wide range of HPC workloads, ensuring optimal performance across diverse applications.

## High-Capacity Data Storage Systems

Managing high-capacity storage systems can be challenging due to both cost and maintenance issues. Open-E JovianDSS offers solutions for scaling data storage capacity while maintaining performance and reliability, ensuring efficient management of large datasets. By providing scalable data storage solutions, Open-E JovianDSS allows you to easily manage and store large volumes of data. **It also gives you freedom of choice when it comes to hardware options that fit your budget requirements, such as HDD large-capacity drives supported with powerful SSD or NVMe caching devices.**

# Comprehensive Cost Savings Analysis with Open-E JovianDSS

Our analysis aims to provide a detailed comparison between traditional 1 petabyte data storage solution and an optimized storage solution using Open-E JovianDSS. The objectives are to highlight the potential cost savings and improved resource utilization achievable with advanced storage technologies and management practices.

**The comparison considers the initial setup costs, annual ongoing costs, and total costs over five years for both data storage approaches. For the detailed specification of the hardware and software included go back to the chapter: Cost Evaluation for Setting Up Data Storage Infrastructure and Storing 1 Petabyte of Data (page no. 5 and 6).** Traditional storage setups used for the comparison rely on high-capacity SSDs for primary storage and third-party tools for backup and disaster recovery. In contrast, the optimized solution utilizes a combination of HDDs for bulk storage and NVMe drives for caching, along with built-in deduplication, compression, and disaster recovery features provided by Open-E JovianDSS to achieve comparable performance while significantly reducing the TCO.

By analyzing these scenarios under realistic conditions, this study demonstrates how leveraging Open-E JovianDSS can lead to significant financial benefits and operational efficiencies for enterprises managing large volumes of data.

## Important Considerations

These estimates provide a general idea of potential cost savings with Open-E JovianDSS. Actual costs can vary based on:

- **Specific Requirements:** Unique data storage needs and performance requirements.
- **Regional Costs:** Variations in hardware, energy, data center space, and labor costs by location.
- **Chosen Technologies:** Differences in hardware and software components and configurations.

While this analysis offers a framework for understanding potential savings, organizations should conduct tailored assessments to obtain precise cost estimates based on their specific circumstances.

| | Traditional Data Storage Solution (Without Optimization)* | Optimized Data Storage Solution with Open-E JovianDSS* |
|---|---|---|
| **Servers:** | $100,000 (mid-range estimate) | $100,000 (mid-range estimate) |
| **Storage Devices:** | **SSDs:** $125,000 (assuming $125 per terabyte for 1 PB) | **HDDs:** $25,000 (assuming $25 per terabyte for 1 PB)<br>**NVMe Drives for Caching (2 redundant drives):** 2 x $25,000 (100 TB at $250 per TB) = $50,000 |
| **Network Equipment:** | $30,000 | $30,000 |
| **Rack and Power Equipment:** | $20,000 | $20,000 |
| **Software Costs:** | $30,000 | **(Open-E JovianDSS Single Node):** $30,000 |
| **Installation and Configuration:** | $30,000 | $30,000 |
| **3rd Party Backup and Disaster Recovery Tool:** | $15,000 | - |
| **Total Initial Setup Cost:** | **$350,000** | **$285,000** |
| **Hardware Replacement and Upgrades:** | $70,000 | $50,000 |
| **Energy Costs:** | $30,000 | $20,000 |
| **Data Center Space:** | $36,000 (assuming $30 per square foot per year) | $24,000 (assuming $20 per square foot per year due to optimized space utilization) |
| **Software Licensing and Support:** | $25,000 | $20,000 |
| **3rd Party Backup and Disaster Recovery Tool Maintenance:** | **Maintenance:** $10,000 | $0 (included with Open-E JovianDSS) |
| **Total Annual Ongoing Costs:** | **$171,000** | **$114,000** |
| **Initial Setup Cost:** | $350,000 | $285,000 |
| **Annual Ongoing Costs for 5 Years:** | $171,000 * 5 = $855,000 | $114,000 * 5 = $570,000 |
| **Total Costs Over 5 Years:** | **$1,205,000** | **$855,000** |

**Cost Savings: $65,000**

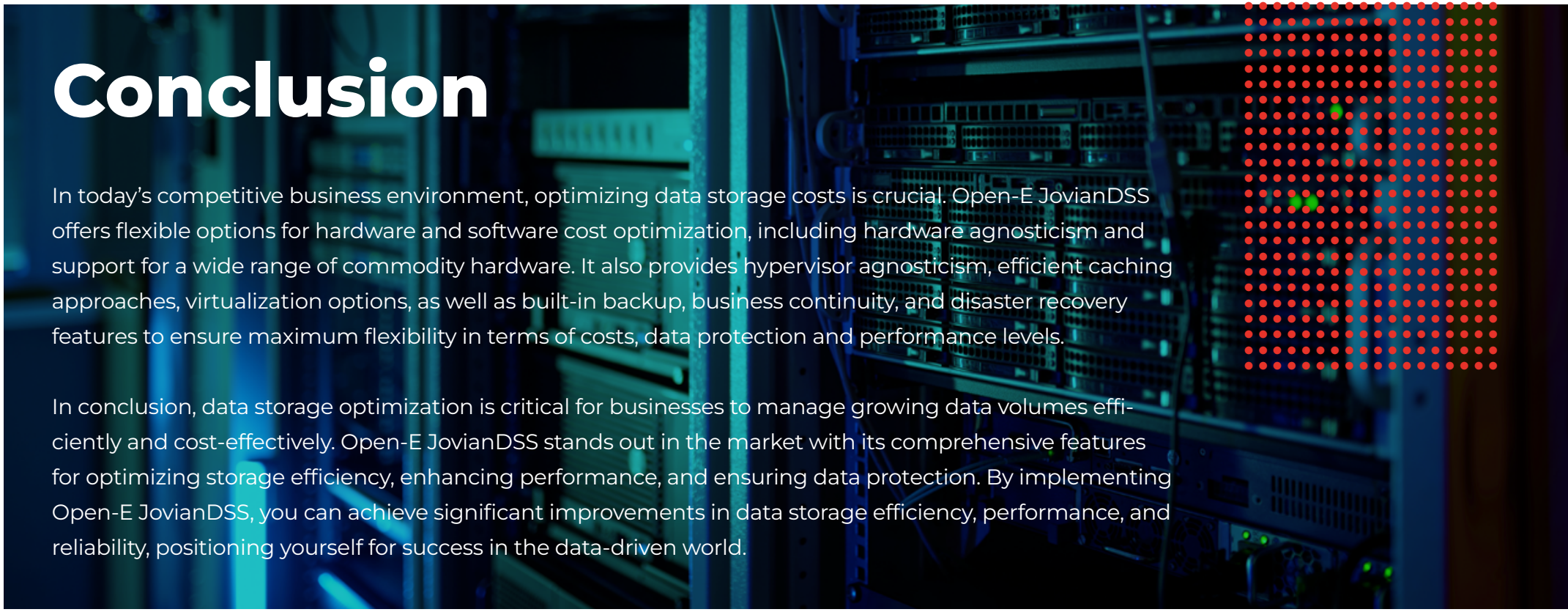
**Cost Savings: $57,000**

**Cost Savings: $350,000**

*** 1 Petabyte Data Storage System** in 2025

## These savings are realized through:

- Improved data efficiency via deduplication and compression
- Optimized storage management with tiered storage and thin provisioning
- Reduced energy costs through efficient power management
- Better hardware utilization and reduced need for high-capacity primary storage due to effective NVMe caching
- Built-in backup and disaster recovery features, eliminating the need for additional third-party tools and their associated costs
- Comprehensive data protection and high availability features, ensure maximum return on investment.



# Conclusion

In today's competitive business environment, optimizing data storage costs is crucial. Open-E JovianDSS offers flexible options for hardware and software cost optimization, including hardware agnosticism and support for a wide range of commodity hardware. It also provides hypervisor agnosticism, efficient caching approaches, virtualization options, as well as built-in backup, business continuity, and disaster recovery features to ensure maximum flexibility in terms of costs, data protection and performance levels.

In conclusion, data storage optimization is critical for businesses to manage growing data volumes efficiently and cost-effectively. Open-E JovianDSS stands out in the market with its comprehensive features for optimizing storage efficiency, enhancing performance, and ensuring data protection. By implementing Open-E JovianDSS, you can achieve significant improvements in data storage efficiency, performance, and reliability, positioning yourself for success in the data-driven world.

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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 is 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 40,000 installations worldwide.

**+40,000** software implementations

**+120** countries worldwide

**+25** years of experience

**+800** certified engineers and sales professionals

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